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Software

CAD/CAM/CAE and GIS Europe Overview Forecast Update

Market Statistics

1994

Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9420
Publication Date: September 27, 1994

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Note: All tables show estimated data.

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CAD/CAM/CAE and GIS Europe Overview Forecast Update

Fluctuating exchange rates masked true market performance in the 1993 CAD/CAM/CAE and GIS market. Japanese CAD/CAM/CAE and GIS total revenue grew a surprising 2.8 percent from 1992 to 1993 when measured in U.S. dollars, contrary to what would be expected in the worst recession Japan has experienced in 50 years. However, the dollar depreciated against the yen at a rate of 12.3 percent, so when measured in yen, Japanese CAD/CAM/CAE and GIS total revenue declined 9.8 percent from 1992 to 1993.

In the meantime, European CAD/CAM/CAE and GIS total revenue declined 7.8 percent from 1992 to 1993 when measured in U.S. dollars. With the dollar appreciating 10.0 percent against the ECU, European CAD/CAM/CAE and GIS total revenue grew 2.8 percent from 1992 to 1993 when measured in ECU. Table 1 shows the dramatic impact that currency fluctuation has on the CAD/CAM/CAE and GIS.

The yen has been strengthening against the dollar for the past three years, changing in 1993 at a rate twice that of previous years. And the end is not in sight. In contrast, Hong Kong and Singapore had relatively stable currency during 1993, while the currencies in China, Korea, and Taiwan weakened against the dollar. In Europe, 1993 was a year for weakening of local currencies against the dollar after having currencies strengthened against the dollar in 1992.

The midyear indications are that currencies are beginning to stabilize (see Table 2). Although Dataquest does not forecast currency exchange rates, we do forecast with the best information available. The exchange rate is calculated as the simple arithmetic mean of the 12 average monthly rates for each country. For the purpose of this forecast, Dataquest assumes the June exchange rate will apply for the future.

Dataquest's forecast is based on the updated market share data, gathered in March and April of this year. It includes country-level forecast for Asia and Europe.

This document contains Dataquest's detailed forecast information for the CAD/CAM/CAE and GIS industry. Included are the following:

- Five-year historical data
- Five-year forecast data

More detailed data is available through Dataquest's Client Inquiry service, which can provide custom analysis of the multidimensional database.

The CAD/CAM/CAE and GIS *Dataquest Perspective* (CCAM-WW-DP-9404), available in September, contains additional tables and analysis and is a companion piece to this book.

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Table 1
CAD/CAM/CAE and GIS Revenue Growth Comparison
(U.S. Dollars versus Local Currency for Both Europe and Japan)

	1992	1993	Forecast 1998	Growth (%) 1992-1993	Growth (%) 1993-1998
Europe (U.S.$ Million)					
Software Revenue	1,693.8	1,608.7	2,231.4	-5.0	6.8
Hardware Revenue	3,037.8	2,701.7	3,388.8	-11.1	4.6
Service Revenue	1,106.6	1,072.2	1,381.4	-3.1	5.2
Total Factory Revenue	5,838.2	5,382.6	7,001.6	-7.8	5.4
ECU/U.S.$ Exchange Rate	*0.7686*	*0.8566*	*0.8419**	*11.4*	*-0.3*
Europe (ECU Million)					
Software Revenue	1,301.8	1,378.0	1,878.6	5.9	6.4
Hardware Revenue	2,334.9	2,314.3	2,853.0	-0.9	4.3
Service Revenue	850.5	918.5	1,163.0	8.0	4.8
Total Factory Revenue	4,487.3	4,610.8	5,894.6	2.8	5.0
Japan (U.S.$ Million)					
Software Revenue	1,270.4	1,371.2	2,010.2	7.9	8.0
Hardware Revenue	2,420.1	2,397.0	2,759.8	-1.0	2.9
Service Revenue	617.4	665.5	887.7	7.8	5.9
Total Factory Revenue	4,317.8	4,438.8	5,657.8	2.8	5.0
Yen/U.S.$ Exchange Rate	*126.34*	*110.85*	*101.56**	*-12.3*	*-1.7*
Japan (Yen Million)					
Software Revenue	160,506	152,001	204,155	-5.3	6.1
Hardware Revenue	305,752	265,706	280,289	-13.1	1.1
Service Revenue	78,000	73,768	90,158	-5.4	4.1
Total Factory Revenue	545,508	492,037	574,603	-9.8	3.2
North America (U.S.$ Million)					
Software Revenue	1,562.5	1,754.6	3,085.6	12.3	12.0
Hardware Revenue	2,672.1	2,824.5	4,477.9	5.7	9.7
Service Revenue	931.5	1,092.3	1,904.2	17.3	11.8
Total Factory Revenue	5,166.6	5,671.3	9,467.7	9.8	10.8
Worldwide (U.S.$ Million)					
Software Revenue	4,717.1	5,021.5	7,956.1	6.5	9.6
Hardware Revenue	8,424.4	8,308.7	11,367.1	-1.4	6.5
Service Revenue	2,776.3	2,989.5	4,496.3	7.7	8.5
Total Factory Revenue	15,928.3	16,325.7	23,819.0	2.5	7.8

*Assuming a stable currency, the 1998 exchange rate is the June 1994 exchange rate.

Source: Dataquest (September 1994)

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Table 2
Foreign Currency/U.S. Dollar

		Actual				Current	Current	Year-to-Year Change (%)				
		1990	1991	1992	1993	1994	1995-1998	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995
European Community	ECU	NA	0.8079	0.7686	0.8566	0.8561	0.8419		-5	11	0	-2
France	Franc	5.4277	5.6183	5.2571	5.6641	5.6343	5.5346	4	-6	8	-1	-2
Germany	Mark	1.6111	1.6523	1.5513	1.6543	1.6485	1.6163	3	-6	7	0	-2
Italy	Lira	1195.03	1235.03	1220.85	1575.05	1610.71	1584.79	3	-1	29	2	-2
Netherlands	Guilder	1.81	1.86	1.75	1.86	1.85	1.8126	3	-6	6	0	-2
Spain	Peseta	101.70	103.48	101.50	127.10	135.40	133.39	2	-2	25	7	-1
Sweden	Krona	5.9137	6.0314	5.7770	7.8003	7.7955	7.7340	2	-4	35	0	-1
United Kingdom	Pound	0.5599	0.5658	0.5652	0.6665	0.6604	0.6549	1	0	18	-1	-1
China	Renminbi	4.7912	5.3340	5.5076	5.7580	8.5534	8.6895	11	3	5	49	2
Hong Kong	Dollar	7.7900	7.7712	7.7399	7.7351	7.7271	7.7280	0	0	0	0	0
Japan	Yen	144.05	134.59	126.34	110.85	103.08	101.56	-7	-6	-12	-7	-1
Korea	Won	242.70	730.67	782.41	799.42	806.49	805.80	201	7	2	1	0
Singapore	Dollar	1.8129	1.7277	1.6284	1.6155	1.5481	1.5300	-5	-6	-1	-4	-1
Taiwan	Dollar	26.64	26.49	24.93	26.15	26.77	26.98	-1	-6	5	2	1

NA = Not applicable

Source: Dataquest (September 1994)

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A new forecasting process for each application is being used to improve revenue and unit shipment control by region and by platform. This new process may cause some mismatch in market share tables and forecast tables. Please use the forecast tables to understand the year-to-year changes. Use the market share tables to compare company-to-company performance.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is the underlying philosophy that the best data and analyses come from a well-balanced program. This program includes the following: balance between primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from the more than 25 separate high-technology industries Dataquest covers; and balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macro environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at gross national product (GNP) growth, interest rate fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1994.

Figure 1 shows the CAD/CAM/CAE and GIS forecasting model. The overall forecasting process uses a combination of techniques such as time series and technological modeling. Market estimates and forecasts are derived using the following research techniques:

- "Bottom-up" aggregation—This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting—For each application segment tracked by the CAD/CAM/CAE and GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis—Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market model and a satisfied available market figure to assess the levels of penetration accurately. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Dataquest analysts also factor in the acceptance or ability for users to consume new technology.

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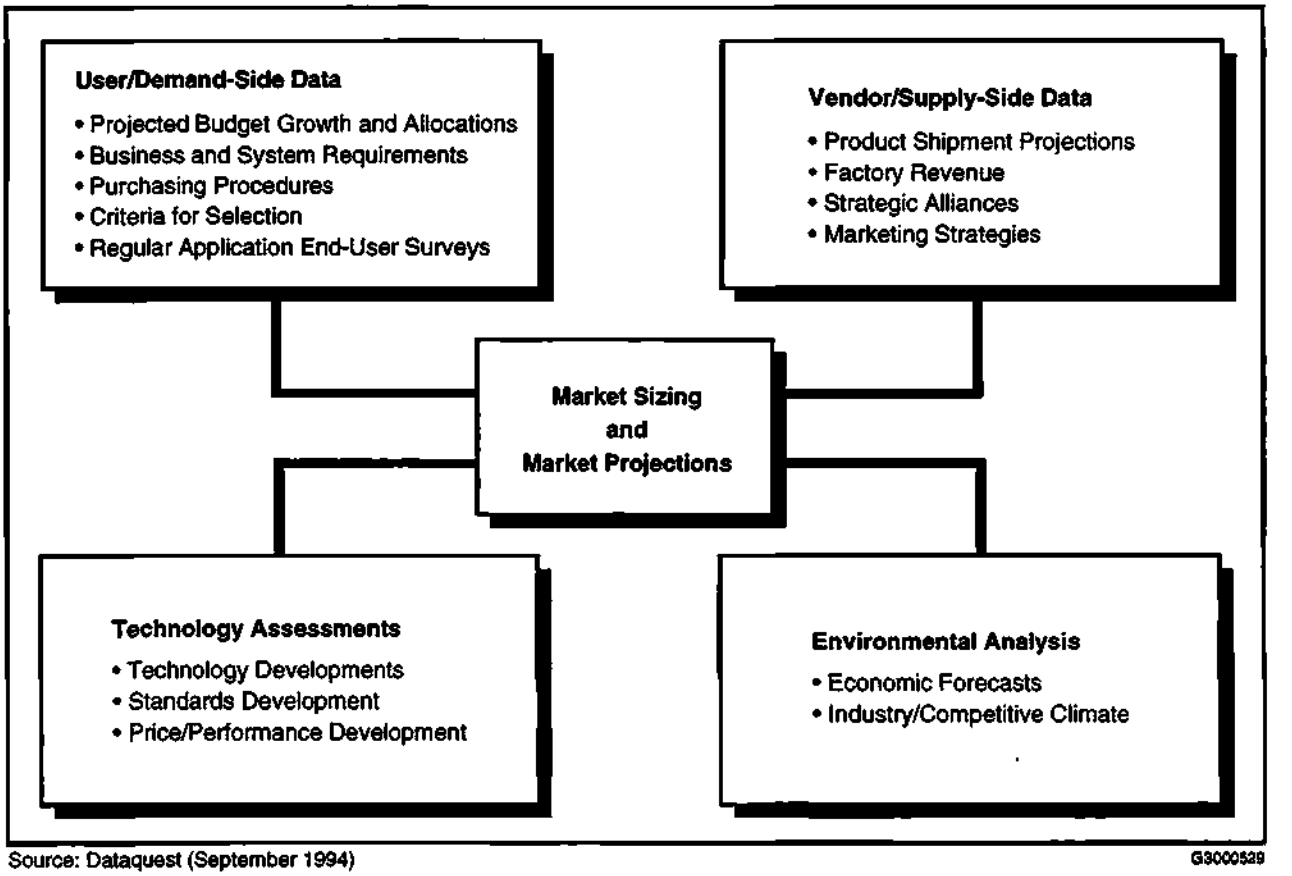
Figure 1
CAD/CAM/CAE and GIS Forecasting Model



Source: Dataquest (September 1994) G3000529

- Capacity-based analysis—This method involves identifying future shipment volume constraints. These constraints, or "ceilings," can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below the demand level.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and

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electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic computer-aided engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of ECAE applications are schematic capture and simulation.
- IC layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe (which includes Austria, Switzerland, and eastern Europe)

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong.

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Rest of World

Rest of World includes all other countries and regions, including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

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Line Items

Line item definitions are as follows:

- Average selling price (ASP) is defined as the average price of a product, inclusive of any discounts.
- CPU revenue is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
- CPU shipment is defined as the number of CPUs delivered.
- CPU installed base is defined as the total number of CPUs in active, day-to-day use.
- Unit shipment is defined as the number of products delivered (that is, seats).
- Seats are defined as the number of possible simultaneous users.
- Installed seats are defined as the total number of seats in active, day-to-day use.
- Hardware revenue is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
- Peripherals revenue is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
- Terminal revenue is defined as revenue derived from the sale of terminals used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform, as terminal revenue is contained within CPU revenue for technical workstations and PCs.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
- Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue that a company may receive from products sold to another company for resale (OEM revenue).

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Table 3
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	168,180	173,258	196,783	224,049	231,887	252,900	277,400	302,400	327,000	349,300	8	9
Unit Shipments or Seats	181,214	181,800	208,410	234,281	239,175	259,100	283,000	307,600	331,800	353,900	7	8
CPU Installed Base	422,145	562,685	699,900	834,621	946,765	1,035,800	1,132,900	1,253,200	1,377,400	1,487,500	22	9
Installed Seats	474,868	622,854	769,253	909,202	1,020,679	1,105,800	1,197,500	1,311,400	1,428,200	1,531,600	21	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	69.9	62.3	58.6	49.9	37.4	33.3	31.1	29.1	27.6	26.5	-14	-7
Hardware-Only ASP	8.7	8.7	8.1	9.1	8.7	8.6	8.5	8.5	8.6	8.8	0	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2,711	2,773	2,907	3,038	2,702	2,749	2,857	3,014	3,198	3,389	-0	5
CPU Revenue	2,146	2,261	2,428	2,600	2,382	2,456	2,583	2,754	2,946	3,143	3	6
Terminal Revenue	254	187	171	164	123	109	98	91	88	86	-16	-7
Peripheral Revenue (Turnkey)	311	325	308	274	196	184	176	169	164	160	-11	-4
Software Revenue	1,215	1,474	1,606	1,694	1,609	1,688	1,812	1,946	2,086	2,231	7	7
Bundled	671	793	799	796	658	642	647	647	650	654	-1	-0
Unbundled	544	682	807	898	951	1,046	1,165	1,300	1,437	1,578	15	11
Service Revenue	773	984	990	1,107	1,072	1,087	1,141	1,208	1,290	1,381	9	5
Total Factory Revenue	4,699	5,231	5,502	5,838	5,383	5,523	5,810	6,169	6,574	7,002	3	5
Increase over Prior Year (%)	23	11	5	6	-8	3	5	6	7	7		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms
Source: Dataquest (August 1994)

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Table 4
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Europe
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	41,265	47,359	55,794	61,544	62,165	65,500	70,400	75,900	82,000	89,000	11	7
Unit Shipments or Seats	41,265	47,359	55,794	61,544	62,166	65,500	70,400	75,900	82,000	89,000	11	7
CPU Installed Base	94,728	137,189	183,293	229,293	268,120	302,700	334,000	363,900	393,700	418,600	30	9
Installed Seats	94,728	137,189	183,293	229,293	268,120	302,700	334,000	363,900	393,700	418,600	30	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	54.8	48.6	48.5	48.0	41.2	38.7	36.6	34.6	33.2	31.9	-7	-5
Hardware-Only ASP	17.4	21.1	20.8	24.5	24.5	23.9	23.4	22.9	22.3	21.7	9	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,205	1,335	1,508	1,658	1,539	1,533	1,567	1,618	1,689	1,777	6	3
CPU Revenue	1,011	1,138	1,307	1,460	1,393	1,399	1,442	1,501	1,577	1,669	8	4
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	194	197	201	198	147	134	126	117	112	108	-7	-6
Software Revenue	739	924	1,049	1,151	1,069	1,109	1,176	1,251	1,330	1,421	10	6
Bundled	467	557	585	642	517	504	504	500	499	500	3	-1
Unbundled	272	367	464	508	552	605	672	750	831	920	19	11
Service Revenue	479	637	644	817	831	838	870	908	957	1,013	15	4
Total Factory Revenue	2,424	2,895	3,201	3,626	3,439	3,480	3,613	3,777	3,976	4,211	9	4
Increase over Prior Year (%)	36	19	11	13	-5	1	4	5	5	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 5
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Europe
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	5,051	4,800	2,927	2,039	1,599	1,400	1,300	1,300	1,300	1,300	-25	-4
Unit Shipments or Seats	18,085	13,341	14,554	12,270	8,886	7,600	6,900	6,400	6,100	5,900	-16	-8
CPU Installed Base	15,731	19,981	21,727	21,900	21,015	19,600	17,800	16,100	14,900	13,800	8	-8
Installed Seats	68,455	80,149	91,079	96,481	94,929	89,600	82,400	74,300	65,700	57,900	9	-9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	386.3	393.3	369.7	421.3	344.7	313.9	289.7	266.5	244.7	225.8	-3	-8
Hardware-Only ASP	128.5	116.1	218.0	263.3	230.2	228.6	221.2	213.1	205.1	197.4	16	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	928	848	751	595	381	322	290	269	256	248	-20	-8
CPU Revenue	604	592	524	406	246	204	183	169	161	155	-20	-9
Terminal Revenue	254	187	171	164	123	109	98	91	88	86	-16	-7
Peripheral Revenue (Turnkey)	69	69	56	25	12	9	9	8	7	7	-36	-10
Software Revenue	224	262	199	110	76	61	55	50	46	43	-24	-11
Bundled	172	207	154	81	52	40	37	33	29	28	-26	-12
Unbundled	52	54	46	29	24	21	18	17	16	16	-18	-8
Service Revenue	252	293	246	171	100	83	76	70	66	64	-21	-9
Total Factory Revenue	1,404	1,402	1,196	875	557	465	420	389	368	356	-21	-9
Increase over Prior Year (%)	2	-0	-15	-27	-36	-16	-10	-8	-5	-3		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 6
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Europe
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	2,534	3,892	4,115	5,200	6,100	7,500	8,900	10,400	NA	20
Unit Shipments or Seats	NA	NA	2,534	3,892	4,115	5,200	6,100	7,500	8,900	10,400	NA	20
CPU Installed Base	NA	NA	2,534	6,426	10,308	14,900	19,500	24,900	29,700	35,100	NA	28
Installed Seats	NA	NA	2,534	6,426	10,308	14,900	19,500	24,900	29,700	35,100	NA	28
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	79.1	72.6	67.0	63.5	60.3	57.4	55.2	53.5	NA	-4
Hardware-Only ASP	NA	NA	49.3	63.6	65.1	64.1	63.0	62.0	61.0	60.0	NA	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	125	227	241	297	344	414	488	562	NA	18
CPU Revenue	NA	NA	112	214	233	289	337	407	481	555	NA	19
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	14	13	8	8	7	7	7	7	NA	-3
Software Revenue	NA	NA	31	46	54	64	75	87	99	112	NA	16
Bundled	NA	NA	25	32	29	34	38	42	45	49	NA	10
Unbundled	NA	NA	6	14	24	30	36	45	54	63	NA	21
Service Revenue	NA	NA	59	75	86	104	122	147	172	199	NA	18
Total Factory Revenue	NA	NA	215	348	380	465	542	648	759	872	NA	18
Increase over Prior Year (%)	NA	NA	NA	62	9	22	16	20	17	15		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 7
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Europe
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	121,864	121,099	135,528	156,575	164,007	180,900	199,600	217,800	234,900	248,600	8	9
Unit Shipments or Seats	121,864	121,099	135,528	156,575	164,007	180,900	199,600	217,800	234,900	248,600	8	9
CPU Installed Base	311,685	405,515	492,348	577,002	647,322	698,600	761,500	848,400	939,000	1,020,000	20	10
Installed Seats	311,685	405,515	492,348	577,002	647,322	698,600	761,500	848,400	939,000	1,020,000	20	10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	28.9	26.8	18.7	14.8	12.2	11.0	10.6	10.4	10.1	9.9	-19	-4
Hardware-Only ASP	4.2	4.3	3.5	3.2	2.9	3.0	3.0	3.0	3.0	3.0	-9	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	578	591	523	558	541	597	656	713	765	801	-2	8
CPU Revenue	530	532	485	520	511	564	622	677	727	763	-1	8
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	48	59	38	38	30	33	35	36	38	38	-11	5
Software Revenue	252	289	327	388	411	454	506	560	611	656	13	10
Bundled	32	29	36	42	59	64	68	72	76	77	16	5
Unbundled	220	260	291	346	351	390	438	487	536	579	12	11
Service Revenue	42	54	41	43	55	62	73	83	95	105	7	14
Total Factory Revenue	872	934	891	989	1,007	1,113	1,235	1,356	1,471	1,562	4	9
Increase over Prior Year (%)	30	7	-5	11	2	11	11	10	9	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 8
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	70,635	68,539	86,288	97,420	93,010	96,000	100,800	105,800	110,600	114,700	7	4
Unit Shipments or Seats	80,256	74,103	94,937	105,794	99,083	101,400	105,800	110,500	115,000	119,000	5	4
CPU Installed Base	176,037	231,709	293,998	355,075	399,074	428,000	454,800	485,300	512,900	532,900	23	6
Installed Seats	216,161	276,498	345,483	410,973	454,898	481,500	505,100	531,800	555,200	571,000	20	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	75.2	69.1	63.4	58.0	42.0	37.6	35.2	33.0	31.4	30.2	-14	-6
Hardware-Only ASP	10.2	10.7	9.0	11.3	11.3	12.0	12.2	12.7	13.2	13.8	3	4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,512	1,520	1,624	1,724	1,449	1,450	1,474	1,527	1,597	1,672	-1	3
CPU Revenue	1,146	1,201	1,321	1,432	1,230	1,247	1,284	1,349	1,426	1,506	2	4
Terminal Revenue	186	130	119	121	97	91	84	80	78	77	-15	-5
Peripheral Revenue (Turnkey)	180	188	184	171	123	112	105	98	93	88	-9	-6
Software Revenue	614	760	865	873	782	792	830	870	912	955	6	4
Bundled	380	474	512	479	409	394	393	384	376	370	2	-2
Unbundled	234	287	353	394	373	398	437	486	536	585	12	9
Service Revenue	443	561	603	640	594	592	609	631	664	699	8	3
Total Factory Revenue	2,569	2,841	3,093	3,238	2,826	2,834	2,912	3,028	3,173	3,325	2	3
Increase over Prior Year (%)	20	11	9	5	-13	0	3	4	5	5		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 9
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	42,215	52,877	55,069	68,780	75,279	85,900	97,800	108,900	118,700	125,200	16	11
Unit Shipments or Seats	43,578	53,904	56,196	69,573	75,845	86,200	97,900	109,000	118,800	125,300	15	11
CPU Installed Base	102,438	147,666	188,181	233,985	276,838	315,800	359,300	412,000	466,400	513,500	28	13
Installed Seats	107,801	153,952	195,361	241,484	284,141	322,300	364,800	416,400	469,700	515,800	27	13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	55.8	45.4	41.3	34.0	26.4	23.1	21.6	20.4	19.4	18.9	-17	-6
Hardware-Only ASP	6.1	5.3	4.8	4.5	4.4	4.1	4.0	4.0	4.0	4.0	-8	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	418	450	453	490	464	472	505	539	571	593	3	5
CPU Revenue	345	384	390	424	420	434	468	502	534	556	5	6
Terminal Revenue	23	19	18	15	10	3	2	2	1	1	-19	-36
Peripheral Revenue (Turnkey)	51	46	46	51	35	35	35	35	36	37	-9	1
Software Revenue	185	228	277	331	313	339	373	407	440	467	14	8
Bundled	86	98	115	159	127	128	134	141	149	156	10	4
Unbundled	99	130	163	173	186	211	239	266	292	311	17	11
Service Revenue	98	120	116	140	129	126	133	140	151	161	7	5
Total Factory Revenue	702	798	847	961	906	937	1,011	1,086	1,162	1,222	7	6
Increase over Prior Year (%)	30	14	6	13	-6	3	8	7	7	5		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 10
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	13,551	14,931	15,793	22,812	27,212	31,900	37,300	43,700	51,000	58,700	19	17
Unit Shipments or Seats	14,619	16,304	16,878	23,523	27,690	32,300	37,600	43,900	51,200	58,800	17	16
CPU Installed Base	26,029	39,632	52,536	70,063	89,227	108,800	131,200	157,700	187,300	218,100	36	20
Installed Seats	29,692	44,608	58,470	76,407	95,570	114,900	136,700	162,400	191,000	220,800	34	18
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	80.5	63.4	70.8	53.9	40.6	37.1	34.3	32.0	30.4	29.3	-16	-6
Hardware-Only ASP	8.8	9.1	9.0	10.7	10.7	10.4	9.9	9.4	8.9	8.6	5	-4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	282	325	345	394	392	426	457	492	533	578	9	8
CPU Revenue	227	268	277	342	351	385	418	456	498	544	12	9
Terminal Revenue	16	15	14	13	8	7	6	4	3	3	-17	-18
Peripheral Revenue (Turnkey)	39	42	55	38	33	33	33	32	32	32	-4	-1
Software Revenue	137	182	185	219	246	276	311	349	391	436	16	12
Bundled	90	118	117	118	92	96	101	106	110	114	1	4
Unbundled	47	64	68	101	154	180	210	244	281	322	34	16
Service Revenue	82	114	112	162	180	202	224	251	276	306	22	11
Total Factory Revenue	501	621	641	775	818	903	992	1,093	1,201	1,320	13	10
Increase over Prior Year (%)	35	24	3	21	6	10	10	10	10	10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 11
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	41,778	36,910	39,633	35,037	36,385	39,100	41,500	44,000	46,700	50,700	-3	7
Unit Shipments or Seats	42,761	37,489	40,399	35,391	36,556	39,200	41,600	44,100	46,800	50,700	-4	7
CPU Installed Base	117,640	143,678	165,184	175,497	181,626	183,300	187,500	198,300	210,700	223,000	11	4
Installed Seats	121,214	147,795	169,939	180,338	186,069	187,200	190,800	200,900	212,300	223,900	11	4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	56.4	53.6	46.8	38.0	31.4	27.2	27.1	26.7	26.5	26.1	-14	-4
Hardware-Only ASP	9.2	10.4	10.5	11.2	10.4	10.0	10.0	10.2	10.5	10.7	3	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	498	479	484	430	396	401	422	456	496	546	-6	7
CPU Revenue	428	408	441	402	381	389	413	448	487	537	-3	7
Terminal Revenue	28	22	20	15	9	8	5	5	5	5	-24	-10
Peripheral Revenue (Turnkey)	42	49	23	13	6	4	4	3	3	3	-40	-12
Software Revenue	280	304	279	270	267	281	298	320	343	373	-1	7
Bundled	115	103	55	40	30	24	19	17	15	13	-29	-15
Unbundled	165	201	224	231	238	257	279	303	328	360	10	9
Service Revenue	150	189	158	165	169	167	175	186	200	216	3	5
Total Factory Revenue	928	972	921	865	832	849	895	962	1,038	1,135	-3	6
Increase over Prior Year (%)	18	5	-5	-6	-4	2	5	7	8	9		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 12
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	26,948	23,518	27,314	22,519	24,082	26,300	28,200	30,400	32,700	36,500	-3	9
Unit Shipments or Seats	27,300	23,704	27,475	22,562	24,088	26,400	28,200	30,400	32,700	36,500	-3	9
CPU Installed Base	60,544	79,432	98,568	108,728	115,731	118,800	122,700	131,300	141,700	153,000	18	6
Installed Seats	61,647	80,709	99,983	110,117	116,995	119,900	123,600	132,000	141,900	153,000	17	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	53.8	50.0	38.6	33.0	26.2	22.7	23.0	23.0	23.1	22.9	-16	-3
Hardware-Only ASP	7.4	8.5	8.8	10.2	9.5	9.6	9.7	10.0	10.3	10.4	6	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	273	256	273	252	238	258	279	307	338	384	-3	10
CPU Revenue	227	217	255	237	230	250	273	301	333	379	0	11
Terminal Revenue	11	7	6	6	4	3	3	3	3	3	-22	-7
Peripheral Revenue (Turnkey)	35	33	12	9	5	4	3	3	3	3	-39	-11
Software Revenue	157	177	177	175	179	189	202	217	234	259	3	8
Bundled	65	54	30	23	19	15	12	11	9	8	-27	-15
Unbundled	92	123	147	151	160	174	190	207	224	251	15	9
Service Revenue	76	96	85	95	101	105	112	121	131	145	7	8
Total Factory Revenue	505	529	535	522	518	551	593	645	703	789	1	9
Increase over Prior Year (%)	28	5	1	-3	-1	7	8	9	9	12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 13
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	2,614	1,785	2,143	1,715	2,147	2,000	2,100	2,200	2,300	2,300	-5	1
Unit Shipments or Seats	2,560	1,745	2,132	1,738	2,111	2,000	2,100	2,200	2,300	2,300	-5	2
CPU Installed Base	7,773	8,842	9,895	10,186	10,745	11,100	11,400	11,900	12,300	12,400	8	3
Installed Seats	7,930	8,989	10,045	10,398	10,845	11,100	11,400	11,800	12,100	12,200	8	2
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	53.4	54.8	43.4	37.0	46.9	45.4	44.4	42.9	42.1	41.6	-3	-2
Hardware-Only ASP	17.1	22.6	23.7	38.4	29.5	27.9	29.0	30.3	31.7	32.9	15	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	46	42	51	64	63	57	60	65	71	74	8	3
CPU Revenue	43	38	49	62	63	57	60	65	71	74	10	3
Terminal Revenue	1	1	1	2	0	0	0	0	0	0	-11	-100
Peripheral Revenue (Turnkey)	2	2	2	0	0	0	0	0	0	0	-100	NA
Software Revenue	30	31	33	37	36	37	39	43	47	50	4	7
Bundled	5	6	6	2	1	1	1	1	1	1	-29	-16
Unbundled	25	25	27	35	34	36	39	42	46	49	8	7
Service Revenue	16	21	25	25	29	27	29	31	34	36	16	5
Total Factory Revenue	92	94	110	125	128	121	128	140	153	160	8	5
Increase over Prior Year (%)	-1	1	17	14	2	-5	6	9	9	5		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 14
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	12,216	11,607	10,177	10,803	10,157	10,700	11,200	11,500	11,800	11,900	-5	3
Unit Shipments or Seats	12,901	12,040	10,793	11,090	10,357	10,800	11,300	11,600	11,800	11,900	-5	3
CPU Installed Base	49,324	55,404	56,721	56,583	55,150	53,300	53,400	55,000	56,700	57,600	3	1
Installed Seats	51,638	58,097	59,911	59,823	58,229	56,200	55,900	57,100	58,300	58,600	3	0
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	61.4	59.0	66.5	51.1	46.9	43.4	42.7	41.4	40.8	40.9	-7	-3
Hardware-Only ASP	11.5	12.4	12.7	9.0	8.4	7.6	7.0	7.1	7.2	7.2	-8	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	180	182	159	114	94	86	83	84	86	87	-15	-1
CPU Revenue	158	153	137	103	89	82	80	82	83	84	-13	-1
Terminal Revenue	17	14	13	7	5	4	3	3	3	3	-27	-11
Peripheral Revenue (Turnkey)	5	14	9	4	1	1	0	0	0	0	-37	-22
Software Revenue	92	96	69	59	53	55	57	59	62	64	-13	4
Bundled	45	43	19	15	10	7	6	5	5	4	-32	-16
Unbundled	48	53	50	44	43	47	51	54	58	60	-2	7
Service Revenue	58	72	48	45	40	35	34	34	34	35	-9	-3
Total Factory Revenue	330	349	277	218	187	177	174	178	183	186	-13	-0
Increase over Prior Year (%)	10	6	-21	-21	-14	-6	-2	2	3	2		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Software

CAD/CAM/CAE and GIS United Kingdom Forecast Update

Market Statistics

1994

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Product Code: CCAM-EU-MS-9419
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Note: All tables show estimated data.

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CAD/CAM/CAE and GIS United Kingdom Forecast Update

Fluctuating exchange rates masked true market performance in the 1993 CAD/CAM/CAE and GIS market. Japanese CAD/CAM/CAE and GIS total revenue grew a surprising 2.8 percent from 1992 to 1993 when measured in U.S. dollars, contrary to what would be expected in the worst recession Japan has experienced in 50 years. However, the dollar depreciated against the yen at a rate of 12.3 percent, so when measured in yen, Japanese CAD/CAM/CAE and GIS total revenue declined 9.8 percent from 1992 to 1993.

In the meantime, European CAD/CAM/CAE and GIS total revenue declined 7.8 percent from 1992 to 1993 when measured in U.S. dollars. With the dollar appreciating 10.0 percent against the ECU, European CAD/CAM/CAE and GIS total revenue grew 2.8 percent from 1992 to 1993 when measured in ECU. Table 1 shows the dramatic impact that currency fluctuation has on the CAD/CAM/CAE and GIS.

The yen has been strengthening against the dollar for the past three years, changing in 1993 at a rate twice that of previous years. And the end is not in sight. In contrast, Hong Kong and Singapore had relatively stable currency during 1993, while the currencies in China, Korea, and Taiwan weakened against the dollar. In Europe, 1993 was a year for weakening of local currencies against the dollar after having currencies strengthened against the dollar in 1992.

The midyear indications are that currencies are beginning to stabilize (see Table 2). Although Dataquest does not forecast currency exchange rates, we do forecast with the best information available. The exchange rate is calculated as the simple arithmetic mean of the 12 average monthly rates for each country. For the purpose of this forecast, Dataquest assumes the June exchange rate will apply for the future.

Dataquest's forecast is based on the updated market share data, gathered in March and April of this year. It includes country-level forecast for Asia and Europe.

This document contains Dataquest's detailed forecast information for the CAD/CAM/CAE and GIS industry. Included are the following:

- Five-year historical data
- Five-year forecast data

More detailed data is available through Dataquest's Client Inquiry service, which can provide custom analysis of the multidimensional database.

The CAD/CAM/CAE and GIS *Dataquest Perspective* (CCAM-WW-DP-9404), available in September, contains additional tables and analysis and is a companion piece to this book.

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Table 1
CAD/CAM/CAE and GIS Revenue Growth Comparison
(U.S. Dollars versus Local Currency for Both Europe and Japan)

	1992	1993	Forecast 1998	Growth (%) 1992-1993	Growth (%) 1993-1998
Europe (U.S.$ Million)					
Software Revenue	1,693.8	1,608.7	2,231.4	-5.0	6.8
Hardware Revenue	3,037.8	2,701.7	3,388.8	-11.1	4.6
Service Revenue	1,106.6	1,072.2	1,381.4	-3.1	5.2
Total Factory Revenue	5,838.2	5,382.6	7,001.6	-7.8	5.4
ECU/U.S.$ Exchange Rate	*0.7686*	*0.8566*	*0.8419**	*11.4*	*-0.3*
Europe (ECU Million)					
Software Revenue	1,301.8	1,378.0	1,878.6	5.9	6.4
Hardware Revenue	2,334.9	2,314.3	2,853.0	-0.9	4.3
Service Revenue	850.5	918.5	1,163.0	8.0	4.8
Total Factory Revenue	4,487.3	4,610.8	5,894.6	2.8	5.0
Japan (U.S.$ Million)					
Software Revenue	1,270.4	1,371.2	2,010.2	7.9	8.0
Hardware Revenue	2,420.1	2,397.0	2,759.8	-1.0	2.9
Service Revenue	617.4	665.5	887.7	7.8	5.9
Total Factory Revenue	4,317.8	4,438.8	5,657.8	2.8	5.0
Yen/U.S.$ Exchange Rate	*126.34*	*110.85*	*101.56**	*-12.3*	*-1.7*
Japan (Yen Million)					
Software Revenue	160,506	152,001	204,155	-5.3	6.1
Hardware Revenue	305,752	265,706	280,289	-13.1	1.1
Service Revenue	78,000	73,768	90,158	-5.4	4.1
Total Factory Revenue	545,508	492,037	574,603	-9.8	3.2
North America (U.S.$ Million)					
Software Revenue	1,562.5	1,754.6	3,085.6	12.3	12.0
Hardware Revenue	2,672.1	2,824.5	4,477.9	5.7	9.7
Service Revenue	931.5	1,092.3	1,904.2	17.3	11.8
Total Factory Revenue	5,166.6	5,671.3	9,467.7	9.8	10.8
Worldwide (U.S.$ Million)					
Software Revenue	4,717.1	5,021.5	7,956.1	6.5	9.6
Hardware Revenue	8,424.4	8,308.7	11,367.1	-1.4	6.5
Service Revenue	2,776.3	2,989.5	4,496.3	7.7	8.5
Total Factory Revenue	15,928.3	16,325.7	23,819.0	2.5	7.8

*Assuming a stable currency, the 1998 exchange rate is the June 1994 exchange rate.

Source: Dataquest (September 1994)

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Table 2
Foreign Currency/U.S. Dollar

		Actual				Current	Current	Year-to-Year Change (%)				
		1990	1991	1992	1993	1994	1995-1998	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995
European Community	ECU	NA	0.8079	0.7686	0.8566	0.8561	0.8419		-5	11	0	-2
France	Franc	5.4277	5.6183	5.2571	5.6641	5.6343	5.5346	4	-6	8	-1	-2
Germany	Mark	1.6111	1.6523	1.5513	1.6543	1.6485	1.6163	3	-6	7	0	-2
Italy	Lira	1195.03	1235.03	1220.85	1575.05	1610.71	1584.79	3	-1	29	2	-2
Netherlands	Guilder	1.81	1.86	1.75	1.86	1.85	1.8126	3	-6	6	0	-2
Spain	Peseta	101.70	103.48	101.50	127.10	135.40	133.39	2	-2	25	7	-1
Sweden	Krona	5.9137	6.0314	5.7770	7.8003	7.7955	7.7340	2	-4	35	0	-1
United Kingdom	Pound	0.5599	0.5658	0.5652	0.6665	0.6604	0.6549	1	0	18	-1	-1
China	Renminbi	4.7912	5.3340	5.5076	5.7580	8.5534	8.6895	11	3	5	49	2
Hong Kong	Dollar	7.7900	7.7712	7.7399	7.7351	7.7271	7.7280	0	0	0	0	0
Japan	Yen	144.05	134.59	126.34	110.85	103.08	101.56	-7	-6	-12	-7	-1
Korea	Won	242.70	730.67	782.41	799.42	806.49	805.80	201	7	2	1	0
Singapore	Dollar	1.8129	1.7277	1.6284	1.6155	1.5481	1.5300	-5	-6	-1	-4	-1
Taiwan	Dollar	26.64	26.49	24.93	26.15	26.77	26.98	-1	-6	5	2	1

NA = Not applicable

Source: Dataquest (September 1994)

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A new forecasting process for each application is being used to improve revenue and unit shipment control by region and by platform. This new process may cause some mismatch in market share tables and forecast tables. Please use the forecast tables to understand the year-to-year changes. Use the market share tables to compare company-to-company performance.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is the underlying philosophy that the best data and analyses come from a well-balanced program. This program includes the following: balance between primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from the more than 25 separate high-technology industries Dataquest covers; and balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macro environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at gross national product (GNP) growth, interest rate fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1994.

Figure 1 shows the CAD/CAM/CAE and GIS forecasting model. The overall forecasting process uses a combination of techniques such as time series and technological modeling. Market estimates and forecasts are derived using the following research techniques:

- "Bottom-up" aggregation—This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting—For each application segment tracked by the CAD/CAM/CAE and GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis—Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market model and a satisfied available market figure to assess the levels of penetration accurately. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Dataquest analysts also factor in the acceptance or ability for users to consume new technology.

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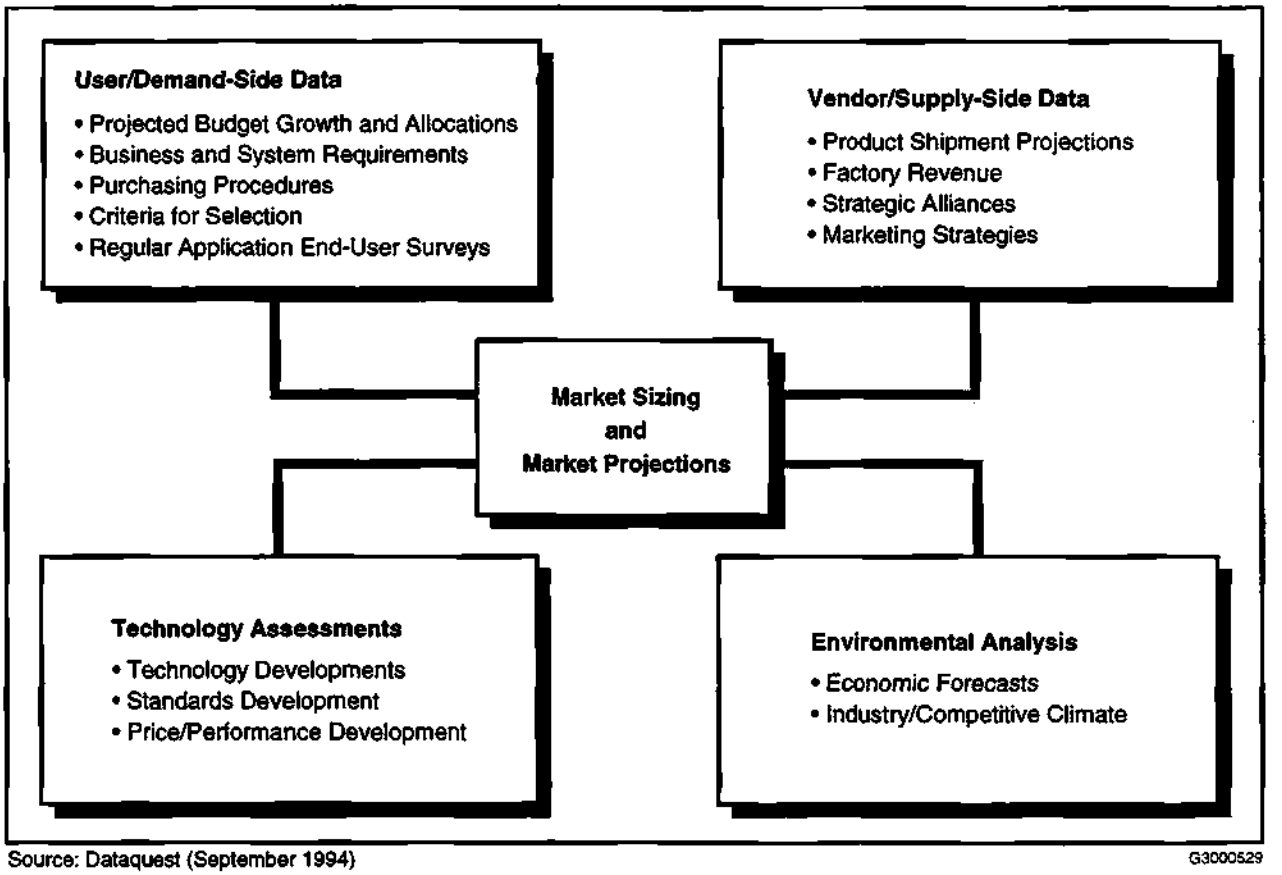
Figure 1
CAD/CAM/CAE and GIS Forecasting Model



Source: Dataquest (September 1994) G3000529

- Capacity-based analysis—This method involves identifying future shipment volume constraints. These constraints, or "ceilings," can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below the demand level.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and

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electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic computer-aided engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of ECAE applications are schematic capture and simulation.
- IC layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe (which includes Austria, Switzerland, and eastern Europe)

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong.

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Rest of World

Rest of World includes all other countries and regions, including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

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Line Items

Line item definitions are as follows:

- Average selling price (ASP) is defined as the average price of a product, inclusive of any discounts.
- CPU revenue is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
- CPU shipment is defined as the number of CPUs delivered.
- CPU installed base is defined as the total number of CPUs in active, day-to-day use.
- Unit shipment is defined as the number of products delivered (that is, seats).
- Seats are defined as the number of possible simultaneous users.
- Installed seats are defined as the total number of seats in active, day-to-day use.
- Hardware revenue is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
- Peripherals revenue is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
- Terminal revenue is defined as revenue derived from the sale of terminals used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform, as terminal revenue is contained within CPU revenue for technical workstations and PCs.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
- Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue that a company may receive from products sold to another company for resale (OEM revenue).

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Table 3
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: United Kingdom
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	29,642	31,300	30,420	32,356	33,551	38,500	41,500	44,400	47,100	49,700	3	8
Unit Shipments or Seats	32,551	32,719	32,138	33,371	34,379	39,400	42,300	45,000	47,700	50,300	1	8
CPU Installed Base	79,960	104,562	123,191	138,547	150,147	160,200	171,700	187,700	204,300	218,100	17	8
Installed Seats	90,439	116,240	136,102	151,460	162,299	171,200	181,500	196,000	211,100	223,800	16	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	67.8	61.9	53.9	45.8	38.9	33.1	30.9	29.0	27.4	26.4	-13	-7
Hardware-Only ASP	9.7	8.7	9.3	10.1	9.6	9.0	9.0	9.1	9.2	9.4	-0	-0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	486	456	458	444	412	424	440	459	481	504	-4	4
CPU Revenue	387	382	391	390	365	381	399	421	444	468	-1	5
Terminal Revenue	51	27	24	21	17	15	14	13	12	12	-24	-8
Peripheral Revenue (Turnkey)	47	46	43	33	29	28	27	26	25	24	-11	-4
Software Revenue	220	259	260	248	244	261	279	294	311	327	3	6
Bundled	117	119	112	113	95	95	96	94	93	91	-5	-1
Unbundled	103	141	148	135	149	166	183	200	218	236	10	10
Service Revenue	145	163	153	166	173	176	184	193	204	215	5	4
Total Factory Revenue	850	878	872	858	829	861	903	947	996	1,045	-1	5
Increase over Prior Year (%)	18	3	-1	-2	-3	4	5	5	5	5		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 4
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: United Kingdom
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	7,736	8,160	9,670	9,214	9,733	9,900	10,600	11,300	12,100	12,900	6	6
Unit Shipments or Seats	7,736	8,160	9,670	9,214	9,733	9,900	10,600	11,300	12,100	12,900	6	6
CPU Installed Base	18,688	25,754	33,422	39,588	44,888	49,300	53,100	56,700	60,200	62,900	24	7
Installed Seats	18,688	25,754	33,422	39,588	44,888	49,300	53,100	56,700	60,200	62,900	24	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	54.2	47.6	46.5	48.6	42.9	40.4	38.3	36.4	35.0	33.8	-6	-5
Hardware-Only ASP	16.9	20.8	20.7	24.4	24.3	23.9	23.4	22.8	22.2	21.7	10	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	214	219	250	249	244	235	240	245	253	262	3	1
CPU Revenue	183	190	221	222	220	215	221	228	236	246	5	2
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	30	29	29	26	24	20	19	18	17	16	-6	-8
Software Revenue	141	164	175	175	172	174	184	193	202	212	5	4
Bundled	83	85	85	100	83	76	75	74	72	71	-0	-3
Unbundled	58	80	91	75	90	98	108	119	130	141	12	10
Service Revenue	94	111	106	131	138	135	140	144	150	156	10	2
Total Factory Revenue	448	495	531	555	554	544	564	582	605	630	5	3
Increase over Prior Year (%)	34	10	7	4	-0	-2	4	3	4	4		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 5
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: United Kingdom
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,100	985	496	269	236	200	200	200	200	200	-32	-3
Unit Shipments or Seats	4,009	2,404	2,214	1,284	1,063	1,100	1,000	900	800	800	-28	-6
CPU Installed Base	3,173	4,034	4,276	4,165	3,912	3,600	3,200	2,800	2,600	2,300	5	-10
Installed Seats	13,651	15,712	17,187	17,078	16,064	14,700	13,000	11,100	9,400	8,000	4	-13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	320.0	335.8	292.6	399.8	329.6	288.3	269.2	249.7	231.2	214.9	1	-8
Hardware-Only ASP	122.0	88.4	194.6	246.2	214.3	211.4	204.9	197.5	190.6	183.8	15	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	173	133	104	70	52	48	43	40	37	34	-26	-8
CPU Revenue	109	94	73	48	34	31	28	26	24	22	-25	-8
Terminal Revenue	51	27	24	21	17	15	14	13	12	12	-24	-8
Peripheral Revenue (Turnkey)	13	11	8	1	1	1	1	1	1	1	-49	-1
Software Revenue	36	42	32	11	8	9	8	7	7	6	-31	-6
Bundled	29	30	21	5	4	6	5	5	4	4	-39	-2
Unbundled	8	12	11	6	4	4	3	3	3	3	-13	-10
Service Revenue	45	44	33	16	12	12	11	10	9	9	-28	-6
Total Factory Revenue	255	219	170	98	72	70	63	57	53	49	-27	-7
Increase over Prior Year (%)	-4	-14	-23	-42	-26	-4	-10	-9	-8	-6		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 6
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: United Kingdom
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	526	706	758	900	1,100	1,300	1,500	1,800	NA	19
Unit Shipments or Seats	NA	NA	526	706	758	900	1,100	1,300	1,500	1,800	NA	19
CPU Installed Base	NA	NA	526	1,232	1,948	2,800	3,600	4,500	5,300	6,200	NA	26
Installed Seats	NA	NA	526	1,232	1,948	2,800	3,600	4,500	5,300	6,200	NA	26
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	77.3	68.3	68.5	66.2	63.1	60.2	58.0	56.4	NA	-4
Hardware-Only ASP	NA	NA	43.1	61.5	63.7	61.9	60.8	59.8	58.8	57.7	NA	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	24	40	45	52	60	72	83	95	NA	16
CPU Revenue	NA	NA	21	39	44	50	59	71	82	93	NA	16
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	2	2	1	1	1	1	1	1	NA	2
Software Revenue	NA	NA	4	6	8	11	12	14	16	17	NA	18
Bundled	NA	NA	3	4	4	6	6	7	7	8	NA	13
Unbundled	NA	NA	1	2	3	5	6	7	9	10	NA	23
Service Revenue	NA	NA	10	13	15	19	22	26	30	34	NA	18
Total Factory Revenue	NA	NA	38	59	68	81	95	112	129	146	NA	17
Increase over Prior Year (%)	NA	NA	NA	56	14	20	17	18	16	13		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 7
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: United Kingdom
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	20,806	22,155	19,728	22,166	22,825	27,400	29,500	31,500	33,300	34,800	2	9
Unit Shipments or Seats	20,806	22,155	19,728	22,166	22,825	27,400	29,500	31,500	33,300	34,800	2	9
CPU Installed Base	58,100	74,774	84,968	93,562	99,399	104,500	111,900	123,700	136,200	146,700	14	8
Installed Seats	58,100	74,774	84,968	93,562	99,399	104,500	111,900	123,700	136,200	146,700	14	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	26.7	30.0	12.2	11.1	9.4	9.1	8.8	8.5	8.3	8.2	-23	-3
Hardware-Only ASP	4.3	4.4	3.9	3.6	3.0	3.0	3.0	3.1	3.1	3.1	-9	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	99	104	80	85	71	89	96	102	108	113	-8	10
CPU Revenue	95	98	77	81	68	84	90	97	102	107	-8	9
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	4	5	4	4	3	5	6	6	6	6	-7	12
Software Revenue	42	53	48	55	56	68	74	80	86	91	7	10
Bundled	5	4	3	4	4	8	9	9	9	9	-2	16
Unbundled	38	49	45	51	51	60	66	71	77	82	8	10
Service Revenue	6	8	4	6	8	10	12	13	15	16	8	16
Total Factory Revenue	147	164	133	146	135	167	182	196	209	220	-2	10
Increase over Prior Year (%)	25	12	-19	10	-8	24	9	8	7	5		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 8
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: United Kingdom
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	12,127	12,870	12,956	13,686	13,803	15,200	16,000	16,500	17,000	17,200	3	4
Unit Shipments or Seats	13,985	13,656	14,113	14,491	14,511	15,900	16,700	17,200	17,600	17,800	1	4
CPU Installed Base	34,283	44,289	52,180	58,625	63,185	66,500	70,100	74,900	79,200	82,000	17	5
Installed Seats	41,859	52,474	61,140	67,608	71,681	74,300	77,100	81,100	84,700	86,800	14	4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	67.4	68.4	60.4	52.4	39.3	36.1	33.8	31.7	30.0	28.9	-13	-6
Hardware-Only ASP	11.4	9.9	10.0	12.2	12.0	11.4	11.6	12.1	12.7	13.2	1	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	251	236	237	228	203	208	213	220	228	235	-5	3
CPU Revenue	193	195	198	195	177	183	190	199	208	216	-2	4
Terminal Revenue	36	19	17	15	14	13	12	11	11	10	-21	-6
Peripheral Revenue (Turnkey)	22	22	22	18	12	12	11	10	9	9	-13	-7
Software Revenue	101	129	135	121	114	122	129	134	138	142	3	4
Bundled	58	66	67	64	53	53	53	51	49	47	-2	-2
Unbundled	43	63	68	57	61	69	75	82	89	95	9	9
Service Revenue	76	83	87	89	89	91	95	98	102	105	4	3
Total Factory Revenue	427	448	458	439	407	420	436	451	468	482	-1	3
Increase over Prior Year (%)	12	5	2	-4	-7	3	4	3	4	3		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 9
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: United Kingdom
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	7,910	9,234	8,488	9,782	9,099	10,100	10,900	11,800	12,500	13,100	4	8
Unit Shipments or Seats	8,279	9,401	8,613	9,881	9,161	10,100	10,900	11,800	12,500	13,100	3	7
CPU Installed Base	19,208	27,055	32,841	38,356	41,514	43,300	45,400	48,900	52,900	56,300	21	6
Installed Seats	20,437	28,425	34,283	39,783	42,833	44,500	46,300	49,600	53,300	56,600	20	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	73.1	50.8	40.7	35.8	30.2	19.7	18.4	17.4	16.6	16.3	-20	-12
Hardware-Only ASP	6.5	5.5	4.9	5.0	4.5	4.4	4.3	4.3	4.2	4.2	-9	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	88	75	66	70	57	57	58	61	63	65	-10	3
CPU Revenue	72	66	58	62	50	52	53	55	57	59	-9	3
Terminal Revenue	5	2	2	2	1	1	0	0	0	0	-29	-32
Peripheral Revenue (Turnkey)	10	7	6	7	5	5	5	5	5	5	-17	0
Software Revenue	39	39	38	43	38	40	42	45	47	50	-1	5
Bundled	18	13	14	15	13	13	13	13	13	14	-8	1
Unbundled	21	26	24	28	25	27	29	32	34	36	5	7
Service Revenue	23	23	17	22	18	17	17	17	18	19	-5	1
Total Factory Revenue	150	137	121	135	113	114	117	123	128	133	-7	3
Increase over Prior Year (%)	33	-8	-12	12	-16	1	3	5	4	4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 10
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: United Kingdom
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	3,523	3,798	3,815	4,726	5,314	6,000	6,900	7,900	9,000	10,100	11	14
Unit Shipments or Seats	3,958	4,196	4,158	4,784	5,351	6,000	6,900	7,900	9,000	10,100	8	14
CPU Installed Base	6,366	9,896	13,055	16,498	19,773	22,700	26,000	30,200	34,800	39,400	33	15
Installed Seats	7,323	11,239	14,716	18,153	21,363	24,200	27,300	31,200	35,500	39,800	31	13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	76.7	59.3	49.1	40.9	43.4	39.9	36.8	34.4	32.6	31.4	-13	-6
Hardware-Only ASP	7.9	7.7	10.7	10.8	11.1	11.8	11.2	10.7	10.2	9.8	9	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	59	67	75	77	86	93	98	104	109	115	10	6
CPU Revenue	47	54	60	68	74	81	87	93	99	106	12	7
Terminal Revenue	4	2	2	2	1	1	1	1	1	0	-29	-16
Peripheral Revenue (Turnkey)	9	10	13	8	11	10	10	10	10	9	7	-3
Software Revenue	31	42	43	43	50	55	61	67	72	78	13	9
Bundled	18	23	24	27	24	25	26	27	28	28	8	3
Unbundled	14	20	20	16	26	30	35	40	45	50	17	14
Service Revenue	19	23	22	26	36	40	45	49	53	57	18	10
Total Factory Revenue	109	132	140	146	172	189	204	219	235	251	12	8
Increase over Prior Year (%)	29	21	6	4	18	10	8	7	7	7		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 11
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: United Kingdom
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	6,082	5,397	5,161	4,162	5,335	7,300	7,700	8,100	8,600	9,300	-3	12
Unit Shipments or Seats	6,328	5,466	5,254	4,214	5,356	7,300	7,700	8,200	8,600	9,400	-4	12
CPU Installed Base	20,103	23,322	25,115	25,067	25,675	27,700	30,200	33,800	37,400	40,500	6	10
Installed Seats	20,819	24,102	25,963	25,915	26,423	28,300	30,800	34,200	37,500	40,600	6	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	56.7	52.1	50.6	45.7	44.6	32.8	32.7	32.0	31.2	30.8	-6	-7
Hardware-Only ASP	12.0	12.3	14.2	15.3	11.6	8.8	8.9	9.0	9.3	9.4	-1	-4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	88	78	81	69	66	66	70	75	81	89	-7	6
CPU Revenue	75	67	75	65	64	65	69	74	80	88	-4	7
Terminal Revenue	7	3	3	2	1	1	1	1	1	1	-32	-12
Peripheral Revenue (Turnkey)	7	8	3	2	1	1	1	1	0	0	-42	-9
Software Revenue	48	49	44	40	42	44	47	49	53	57	-4	6
Bundled	22	17	8	7	5	4	3	3	2	2	-32	-16
Unbundled	26	32	36	33	37	40	44	47	50	55	9	8
Service Revenue	28	34	28	29	30	28	29	30	32	34	2	3
Total Factory Revenue	165	160	152	138	137	138	146	154	166	180	-4	6
Increase over Prior Year (%)	18	-3	-5	-9	-0	1	6	6	8	9		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
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Table 12
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: United Kingdom
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	3,633	3,201	3,023	2,282	3,367	5,000	5,300	5,700	6,200	6,900	-2	15
Unit Shipments or Seats	3,727	3,224	3,040	2,285	3,364	5,000	5,300	5,700	6,200	6,900	-3	15
CPU Installed Base	8,267	10,821	12,732	13,383	14,524	16,600	18,900	22,000	25,100	28,100	15	14
Installed Seats	8,504	11,079	12,999	13,636	14,740	16,800	19,100	22,100	25,100	28,100	15	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	55.7	50.6	47.2	45.0	42.0	27.8	28.1	27.9	27.8	27.7	-7	-8
Hardware-Only ASP	9.5	10.4	12.5	15.6	10.7	8.1	8.3	8.5	8.8	8.9	3	-4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	46	40	41	38	38	42	45	49	55	62	-5	10
CPU Revenue	37	34	39	36	37	41	44	49	54	61	-1	11
Terminal Revenue	3	1	1	1	1	0	0	0	0	0	-29	-12
Peripheral Revenue (Turnkey)	6	5	2	1	1	1	0	0	0	0	-43	-7
Software Revenue	25	27	25	24	26	28	30	32	34	38	1	8
Bundled	13	8	4	4	2	2	2	1	1	1	-34	-15
Unbundled	12	18	21	21	24	26	28	30	33	37	17	9
Service Revenue	14	17	14	16	17	16	17	18	20	22	5	5
Total Factory Revenue	85	84	80	79	81	85	92	99	109	122	-1	9
Increase over Prior Year (%)	39	-1	-4	-2	3	5	8	8	9	12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 13
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: United Kingdom
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	612	325	369	255	350	300	300	300	400	300	-13	-3
Unit Shipments or Seats	603	315	366	257	343	300	300	300	400	300	-13	-3
CPU Installed Base	1,914	2,045	2,140	2,028	2,008	2,000	2,000	2,000	2,000	2,000	1	-0
Installed Seats	1,930	2,060	2,155	2,057	2,011	2,000	2,000	2,000	2,000	2,000	1	-0
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	55.0	55.4	43.5	38.3	47.1	45.5	44.8	43.6	43.0	41.2	-4	-3
Hardware-Only ASP	15.8	22.8	24.0	40.4	30.0	27.7	28.8	30.0	31.3	32.5	17	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	10	8	9	10	11	9	10	10	11	11	1	1
CPU Revenue	9	7	8	10	10	9	10	10	11	11	3	2
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-16	-100
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-100	NA
Software Revenue	6	5	5	5	6	6	7	7	7	8	-0	6
Bundled	1	1	1	0	0	0	0	0	0	0	-32	-17
Unbundled	5	4	4	5	5	6	6	7	7	8	5	7
Service Revenue	3	4	4	4	5	5	5	5	6	6	14	3
Total Factory Revenue	19	16	18	19	21	20	22	22	24	25	3	3
Increase over Prior Year (%)	-5	-12	12	3	11	-4	6	1	10	3		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 14
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: United Kingdom
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,836	1,872	1,768	1,626	1,618	2,000	2,100	2,100	2,100	2,100	-3	5
Unit Shipments or Seats	1,998	1,926	1,848	1,672	1,648	2,000	2,100	2,100	2,100	2,100	-5	5
CPU Installed Base	9,922	10,456	10,243	9,656	9,143	9,100	9,300	9,800	10,200	10,400	-2	3
Installed Seats	10,385	10,963	10,808	10,222	9,672	9,600	9,700	10,100	10,400	10,500	-2	2
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	58.7	53.6	57.6	47.6	47.6	39.6	39.5	38.2	36.8	36.2	-5	-5
Hardware-Only ASP	15.6	13.8	15.2	11.0	9.7	7.1	7.0	7.1	7.2	7.2	-11	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	33	30	30	21	17	15	15	15	15	15	-15	-2
CPU Revenue	28	26	27	19	17	15	15	15	15	15	-12	-2
Terminal Revenue	4	2	2	1	1	0	0	0	0	0	-34	-11
Peripheral Revenue (Turnkey)	1	2	1	0	0	0	0	0	0	0	-32	-20
Software Revenue	18	17	14	11	10	10	11	11	11	11	-14	3
Bundled	9	7	3	3	2	2	1	1	1	1	-29	-17
Unbundled	9	10	11	7	8	9	9	10	10	11	-4	7
Service Revenue	11	13	10	9	8	7	7	6	6	6	-8	-4
Total Factory Revenue	62	60	54	40	35	32	32	33	33	33	-13	-1
Increase over Prior Year (%)	3	-2	-11	-25	-12	-8	0	1	2	0		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Software

CAD/CAM/CAE and GIS Spain Forecast Update

Market Statistics

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Program: CAD/CAM/CAE/GIS Europe
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Note: All tables show estimated data.

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CAD/CAM/CAE and GIS Spain Forecast Update

Fluctuating exchange rates masked true market performance in the 1993 CAD/CAM/CAE and GIS market. Japanese CAD/CAM/CAE and GIS total revenue grew a surprising 2.8 percent from 1992 to 1993 when measured in U.S. dollars, contrary to what would be expected in the worst recession Japan has experienced in 50 years. However, the dollar depreciated against the yen at a rate of 12.3 percent, so when measured in yen, Japanese CAD/CAM/CAE and GIS total revenue declined 9.8 percent from 1992 to 1993.

In the meantime, European CAD/CAM/CAE and GIS total revenue declined 7.8 percent from 1992 to 1993 when measured in U.S. dollars. With the dollar appreciating 10.0 percent against the ECU, European CAD/CAM/CAE and GIS total revenue grew 2.8 percent from 1992 to 1993 when measured in ECU. Table 1 shows the dramatic impact that currency fluctuation has on the CAD/CAM/CAE and GIS.

The yen has been strengthening against the dollar for the past three years, changing in 1993 at a rate twice that of previous years. And the end is not in sight. In contrast, Hong Kong and Singapore had relatively stable currency during 1993, while the currencies in China, Korea, and Taiwan weakened against the dollar. In Europe, 1993 was a year for weakening of local currencies against the dollar after having currencies strengthened against the dollar in 1992.

The midyear indications are that currencies are beginning to stabilize (see Table 2). Although Dataquest does not forecast currency exchange rates, we do forecast with the best information available. The exchange rate is calculated as the simple arithmetic mean of the 12 average monthly rates for each country. For the purpose of this forecast, Dataquest assumes the June exchange rate will apply for the future.

Dataquest's forecast is based on the updated market share data, gathered in March and April of this year. It includes country-level forecast for Asia and Europe.

This document contains Dataquest's detailed forecast information for the CAD/CAM/CAE and GIS industry. Included are the following:

- Five-year historical data
- Five-year forecast data

More detailed data is available through Dataquest's Client Inquiry service, which can provide custom analysis of the multidimensional database.

The CAD/CAM/CAE and GIS *Dataquest Perspective* (CCAM-WW-DP-9404), available in September, contains additional tables and analysis and is a companion piece to this book.

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Table 1
CAD/CAM/CAE and GIS Revenue Growth Comparison
(U.S. Dollars versus Local Currency for Both Europe and Japan)

	1992	1993	Forecast 1998	Growth (%) 1992-1993	Growth (%) 1993-1998
Europe (U.S.$ Million)					
Software Revenue	1,693.8	1,608.7	2,231.4	-5.0	6.8
Hardware Revenue	3,037.8	2,701.7	3,388.8	-11.1	4.6
Service Revenue	1,106.6	1,072.2	1,381.4	-3.1	5.2
Total Factory Revenue	5,838.2	5,382.6	7,001.6	-7.8	5.4
ECU/U.S.$ Exchange Rate	*0.7686*	*0.8566*	*0.8419**	*11.4*	*-0.3*
Europe (ECU Million)					
Software Revenue	1,301.8	1,378.0	1,878.6	5.9	6.4
Hardware Revenue	2,334.9	2,314.3	2,853.0	-0.9	4.3
Service Revenue	850.5	918.5	1,163.0	8.0	4.8
Total Factory Revenue	4,487.3	4,610.8	5,894.6	2.8	5.0
Japan (U.S.$ Million)					
Software Revenue	1,270.4	1,371.2	2,010.2	7.9	8.0
Hardware Revenue	2,420.1	2,397.0	2,759.8	-1.0	2.9
Service Revenue	617.4	665.5	887.7	7.8	5.9
Total Factory Revenue	4,317.8	4,438.8	5,657.8	2.8	5.0
Yen/U.S.$ Exchange Rate	*126.34*	*110.85*	*101.56**	*-12.3*	*-1.7*
Japan (Yen Million)					
Software Revenue	160,506	152,001	204,155	-5.3	6.1
Hardware Revenue	305,752	265,706	280,289	-13.1	1.1
Service Revenue	78,000	73,768	90,158	-5.4	4.1
Total Factory Revenue	545,508	492,037	574,603	-9.8	3.2
North America (U.S.$ Million)					
Software Revenue	1,562.5	1,754.6	3,085.6	12.3	12.0
Hardware Revenue	2,672.1	2,824.5	4,477.9	5.7	9.7
Service Revenue	931.5	1,092.3	1,904.2	17.3	11.8
Total Factory Revenue	5,166.6	5,671.3	9,467.7	9.8	10.8
Worldwide (U.S.$ Million)					
Software Revenue	4,717.1	5,021.5	7,956.1	6.5	9.6
Hardware Revenue	8,424.4	8,308.7	11,367.1	-1.4	6.5
Service Revenue	2,776.3	2,989.5	4,496.3	7.7	8.5
Total Factory Revenue	15,928.3	16,325.7	23,819.0	2.5	7.8

*Assuming a stable currency, the 1998 exchange rate is the June 1994 exchange rate.

Source: Dataquest (September 1994)

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Table 2
Foreign Currency/U.S. Dollar

		Actual				Current	Current	Year-to-Year Change (%)				
		1990	1991	1992	1993	1994	1995-1998	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995
European Community	ECU	NA	0.8079	0.7686	0.8566	0.8561	0.8419		-5	11	0	-2
France	Franc	5.4277	5.6183	5.2571	5.6641	5.6343	5.5346	4	-6	8	-1	-2
Germany	Mark	1.6111	1.6523	1.5513	1.6543	1.6485	1.6163	3	-6	7	0	-2
Italy	Lira	1195.03	1235.03	1220.85	1575.05	1610.71	1584.79	3	-1	29	2	-2
Netherlands	Guilder	1.81	1.86	1.75	1.86	1.85	1.8126	3	-6	6	0	-2
Spain	Peseta	101.70	103.48	101.50	127.10	135.40	133.39	2	-2	25	7	-1
Sweden	Krona	5.9137	6.0314	5.7770	7.8003	7.7955	7.7340	2	-4	35	0	-1
United Kingdom	Pound	0.5599	0.5658	0.5652	0.6665	0.6604	0.6549	1	0	18	-1	-1
China	Renminbi	4.7912	5.3340	5.5076	5.7580	8.5534	8.6895	11	3	5	49	2
Hong Kong	Dollar	7.7900	7.7712	7.7399	7.7351	7.7271	7.7280	0	0	0	0	0
Japan	Yen	144.05	134.59	126.34	110.85	103.08	101.56	-7	-6	-12	-7	-1
Korea	Won	242.70	730.67	782.41	799.42	806.49	805.80	201	7	2	1	0
Singapore	Dollar	1.8129	1.7277	1.6284	1.6155	1.5481	1.5300	-5	-6	-1	-4	-1
Taiwan	Dollar	26.64	26.49	24.93	26.15	26.77	26.98	-1	-6	5	2	1

NA = Not applicable

Source: Dataquest (September 1994)

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A new forecasting process for each application is being used to improve revenue and unit shipment control by region and by platform. This new process may cause some mismatch in market share tables and forecast tables. Please use the forecast tables to understand the year-to-year changes. Use the market share tables to compare company-to-company performance.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is the underlying philosophy that the best data and analyses come from a well-balanced program. This program includes the following: balance between primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from the more than 25 separate high-technology industries Dataquest covers; and balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macro environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at gross national product (GNP) growth, interest rate fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1994.

Figure 1 shows the CAD/CAM/CAE and GIS forecasting model. The overall forecasting process uses a combination of techniques such as time series and technological modeling. Market estimates and forecasts are derived using the following research techniques:

- "Bottom-up" aggregation—This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting—For each application segment tracked by the CAD/CAM/CAE and GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis—Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market model and a satisfied available market figure to assess the levels of penetration accurately. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Dataquest analysts also factor in the acceptance or ability for users to consume new technology.

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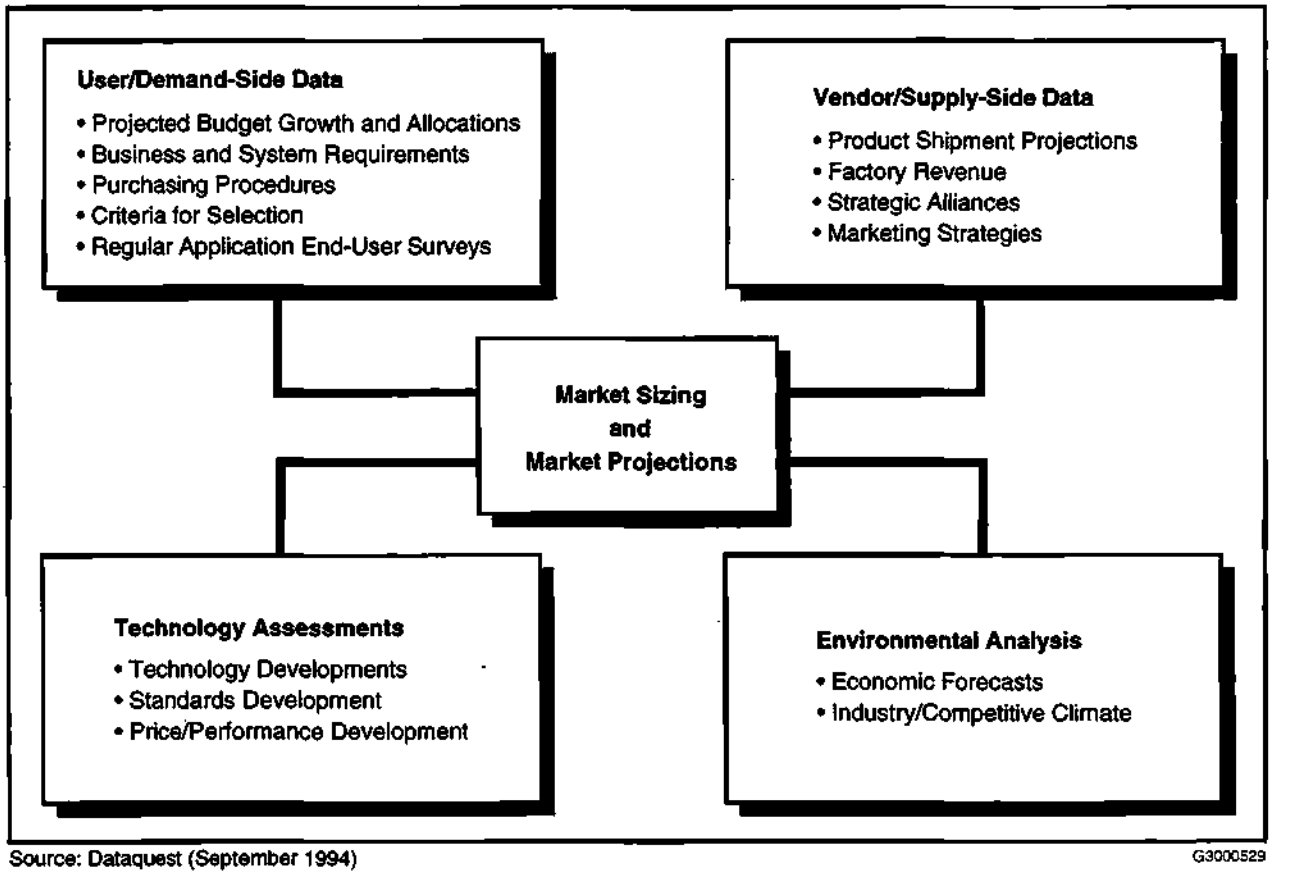
Figure 1
CAD/CAM/CAE and GIS Forecasting Model



Source: Dataquest (September 1994) G3000529

- Capacity-based analysis—This method involves identifying future shipment volume constraints. These constraints, or "ceilings," can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below the demand level.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and

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electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic computer-aided engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of ECAE applications are schematic capture and simulation.
- IC layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe (which includes Austria, Switzerland, and eastern Europe)

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong.

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Rest of World

Rest of World includes all other countries and regions, including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

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Line Items

Line item definitions are as follows:

- Average selling price (ASP) is defined as the average price of a product, inclusive of any discounts.
- CPU revenue is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
- CPU shipment is defined as the number of CPUs delivered.
- CPU installed base is defined as the total number of CPUs in active, day-to-day use.
- Unit shipment is defined as the number of products delivered (that is, seats).
- Seats are defined as the number of possible simultaneous users.
- Installed seats are defined as the total number of seats in active, day-to-day use.
- Hardware revenue is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
- Peripherals revenue is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
- Terminal revenue is defined as revenue derived from the sale of terminals used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform, as terminal revenue is contained within CPU revenue for technical workstations and PCs.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
- Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue that a company may receive from products sold to another company for resale (OEM revenue).

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Table 3
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Spain
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	6,723	8,808	8,635	7,874	7,600	8,400	9,200	10,200	11,100	NA	7
Unit Shipments or Seats	NA	7,082	9,229	8,930	8,121	7,800	8,500	9,400	10,300	11,300	NA	7
CPU Installed Base	NA	6,723	15,531	23,818	30,380	34,800	37,600	40,000	43,000	46,200	NA	9
Installed Seats	NA	7,082	16,311	24,893	31,695	36,300	39,200	41,700	44,500	47,600	NA	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	50.1	46.2	39.7	31.5	31.2	29.2	27.1	25.4	24.3	NA	-5
Hardware-Only ASP	NA	8.0	6.0	7.2	7.6	8.8	8.7	8.8	8.8	8.9	NA	3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	100	102	97	81	84	88	94	100	108	NA	6
CPU Revenue	NA	75	82	80	69	75	79	85	92	100	NA	8
Terminal Revenue	0	7	6	5	4	3	3	2	2	2	NA	-12
Peripheral Revenue (Turnkey)	NA	18	14	12	8	7	6	6	6	6	NA	-6
Software Revenue	NA	48	53	55	49	51	54	59	64	70	NA	7
Bundled	NA	26	27	25	19	18	18	18	18	18	NA	-0
Unbundled	NA	22	25	30	30	33	36	41	46	51	NA	11
Service Revenue	NA	35	32	36	33	36	38	40	43	47	NA	7
Total Factory Revenue	NA	183	187	188	163	171	180	193	208	225	NA	7
Increase over Prior Year (%)	NA	NA	2	1	-13	4	6	7	7	8		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 4
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Spain
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	1,770	1,741	1,909	1,821	2,000	2,200	2,400	2,600	2,800	NA	9
Unit Shipments or Seats	NA	1,770	1,741	1,909	1,821	2,000	2,200	2,400	2,600	2,800	NA	9
CPU Installed Base	NA	1,770	3,511	5,313	6,906	8,300	9,700	10,900	12,100	13,100	NA	14
Installed Seats	NA	1,770	3,511	5,313	6,906	8,300	9,700	10,900	12,100	13,100	NA	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	40.8	45.8	47.9	39.6	37.4	35.4	33.5	32.0	30.7	NA	-5
Hardware-Only ASP	NA	25.7	21.1	24.4	24.8	24.1	23.4	22.7	22.0	21.3	NA	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	49	49	53	46	49	50	51	54	57	NA	4
CPU Revenue	NA	38	40	45	41	44	45	47	50	53	NA	5
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	10	9	8	5	5	5	4	4	4	NA	-5
Software Revenue	NA	27	29	34	29	33	35	37	40	43	NA	8
Bundled	NA	18	18	19	14	14	14	14	14	14	NA	0
Unbundled	NA	9	10	15	15	19	21	23	26	29	NA	14
Service Revenue	NA	23	20	28	26	28	29	31	32	35	NA	6
Total Factory Revenue	NA	99	98	115	101	110	114	119	126	135	NA	6
Increase over Prior Year (%)	NA	NA	-1	17	-12	8	4	5	6	7		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 5
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Spain
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	111	60	42	30	0	0	0	0	0	NA	-100
Unit Shipments or Seats	NA	470	482	337	277	200	200	200	200	200	NA	-6
CPU Installed Base	NA	111	171	213	240	300	300	200	200	200	NA	-4
Installed Seats	NA	470	951	1,288	1,555	1,700	1,800	1,900	1,800	1,600	NA	1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	430.3	460.2	459.9	365.0	329.5	306.9	288.5	266.0	246.5	NA	-8
Hardware-Only ASP	NA	145.3	434.5	344.3	361.6	340.6	332.4	315.5	321.9	302.2	NA	-4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	24	22	15	10	7	7	6	6	5	NA	-11
CPU Revenue	NA	16	15	9	5	4	4	3	3	3	NA	-10
Terminal Revenue	0	7	6	5	4	3	3	2	2	2	NA	-12
Peripheral Revenue (Turnkey)	NA	2	2	1	0	0	0	0	0	0	NA	-7
Software Revenue	NA	9	6	3	2	2	2	1	1	1	NA	-10
Bundled	NA	7	5	2	1	1	1	1	1	1	NA	-9
Unbundled	NA	2	1	1	1	1	1	0	0	0	NA	-12
Service Revenue	NA	9	7	5	2	2	2	2	1	1	NA	-9
Total Factory Revenue	NA	42	35	23	14	11	10	9	8	8	NA	-11
Increase over Prior Year (%)	NA	NA	-15	-36	-39	-22	-9	-8	-10	-2		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 6
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Spain
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	66	118	121	200	200	300	400	400	NA	27
Unit Shipments or Seats	NA	NA	66	118	121	200	200	300	400	400	NA	27
CPU Installed Base	NA	NA	66	184	298	500	700	900	1,100	1,400	NA	36
Installed Seats	NA	NA	66	184	298	500	700	900	1,100	1,400	NA	36
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	80.5	63.9	67.6	64.4	61.5	58.7	56.5	54.5	NA	-4
Hardware-Only ASP	NA	NA	48.2	56.6	57.8	60.0	58.8	57.9	56.8	55.7	NA	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	3	6	6	12	13	17	19	22	NA	29
CPU Revenue	NA	NA	3	5	6	12	13	16	19	22	NA	29
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	0	0	0	0	0	0	0	0	NA	-2
Software Revenue	NA	NA	1	2	2	2	3	3	4	4	NA	14
Bundled	NA	NA	1	1	1	1	1	1	1	1	NA	8
Unbundled	NA	NA	0	1	1	1	2	2	2	3	NA	18
Service Revenue	NA	NA	2	2	3	4	5	6	7	8	NA	24
Total Factory Revenue	NA	NA	6	10	11	18	21	26	30	35	NA	25
Increase over Prior Year (%)	NA	NA	NA	61	11	60	15	23	16	16		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 7
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Spain
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	4,843	6,941	6,566	5,902	5,400	5,900	6,500	7,200	7,800	NA	6
Unit Shipments or Seats	NA	4,843	6,941	6,566	5,902	5,400	5,900	6,500	7,200	7,800	NA	6
CPU Installed Base	NA	4,843	11,784	18,108	22,936	25,700	26,900	28,000	29,600	31,600	NA	7
Installed Seats	NA	4,843	11,784	18,108	22,936	25,700	26,900	28,000	29,600	31,600	NA	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	23.1	14.4	11.1	10.9	8.3	8.2	7.8	7.5	7.3	NA	-8
Hardware-Only ASP	NA	4.8	3.5	3.1	2.9	2.9	2.9	2.9	2.9	2.9	NA	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	27	27	23	20	17	18	20	22	24	NA	4
CPU Revenue	NA	21	25	20	17	15	17	19	21	22	NA	5
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	6	3	3	2	1	1	1	1	1	NA	-9
Software Revenue	NA	12	17	16	15	14	15	17	19	21	NA	7
Bundled	NA	1	3	3	2	2	2	2	2	2	NA	-4
Unbundled	NA	11	13	14	13	12	13	15	17	19	NA	8
Service Revenue	NA	3	2	1	2	2	2	2	3	3	NA	9
Total Factory Revenue	NA	42	47	41	37	32	35	39	43	47	NA	5
Increase over Prior Year (%)	NA	NA	11	-12	-10	-13	11	11	11	9		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 8
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: Spain
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	2,785	4,656	4,180	3,262	2,900	3,000	3,200	3,300	3,400	NA	1
Unit Shipments or Seats	NA	3,003	4,961	4,413	3,459	3,100	3,200	3,300	3,400	3,500	NA	0
CPU Installed Base	NA	2,785	7,441	11,476	14,149	15,500	15,900	15,900	16,000	16,100	NA	3
Installed Seats	NA	3,003	7,964	12,232	15,098	16,600	17,200	17,200	17,200	17,200	NA	3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	54.2	49.0	41.8	38.2	41.0	38.5	36.3	34.6	33.3	NA	-3
Hardware-Only ASP	NA	8.1	5.4	6.9	8.3	11.5	11.7	12.6	13.2	13.9	NA	11
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	51	56	50	42	44	45	47	49	52	NA	5
CPU Revenue	NA	37	43	39	33	37	38	41	44	47	NA	7
Terminal Revenue	0	5	4	3	3	2	2	2	2	2	NA	-9
Peripheral Revenue (Turnkey)	NA	9	8	8	5	4	4	4	3	3	NA	-9
Software Revenue	NA	23	27	26	22	22	23	24	25	26	NA	3
Bundled	NA	14	17	14	11	11	11	10	10	10	NA	-3
Unbundled	NA	8	11	12	11	12	13	14	15	17	NA	9
Service Revenue	NA	19	18	18	18	19	19	20	21	22	NA	5
Total Factory Revenue	NA	92	101	93	81	85	87	91	96	100	NA	4
Increase over Prior Year (%)	NA	NA	9	-8	-13	5	2	5	4	5		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 9
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: Spain
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	2,129	2,326	2,261	2,352	2,300	2,600	2,900	3,300	3,600	NA	9
Unit Shipments or Seats	NA	2,176	2,369	2,286	2,373	2,300	2,600	2,900	3,300	3,600	NA	9
CPU Installed Base	NA	2,129	4,455	6,606	8,554	9,900	10,900	11,800	13,000	14,300	NA	11
Installed Seats	NA	2,176	4,544	6,720	8,688	10,100	11,000	12,000	13,100	14,400	NA	11
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	31.6	27.6	24.5	17.2	14.3	13.4	12.5	11.9	11.7	NA	-7
Hardware-Only ASP	NA	6.8	4.8	4.3	4.0	4.2	4.1	4.1	4.1	4.1	NA	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	21	18	14	12	12	12	13	15	16	NA	6
CPU Revenue	NA	15	15	12	11	11	11	12	14	15	NA	7
Terminal Revenue	0	1	1	0	0	0	0	0	0	0	NA	-52
Peripheral Revenue (Turnkey)	NA	5	2	1	1	1	1	1	1	1	NA	2
Software Revenue	NA	8	9	10	8	9	9	11	12	13	NA	9
Bundled	NA	3	4	4	3	3	3	3	3	3	NA	4
Unbundled	NA	5	6	6	6	6	7	8	9	10	NA	11
Service Revenue	NA	5	4	4	3	3	4	4	4	5	NA	7
Total Factory Revenue	NA	34	32	27	24	24	25	28	31	34	NA	7
Increase over Prior Year (%)	NA	NA	-6	-15	-13	0	6	10	11	9		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 10
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: Spain
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	753	864	1,352	1,536	1,800	2,000	2,400	2,800	3,200	NA	16
Unit Shipments or Seats	NA	811	900	1,371	1,554	1,800	2,100	2,400	2,800	3,200	NA	16
CPU Installed Base	NA	753	1,617	2,929	4,331	5,700	7,100	8,600	10,200	11,900	NA	22
Installed Seats	NA	811	1,710	3,041	4,460	5,900	7,300	8,700	10,300	12,000	NA	22
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	62.0	67.8	50.4	33.7	34.6	32.1	30.1	28.6	27.5	NA	-4
Hardware-Only ASP	NA	8.5	8.6	11.8	11.0	10.1	9.6	9.2	8.6	8.3	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	15	17	24	21	22	24	25	28	30	NA	8
CPU Revenue	NA	13	14	21	19	20	22	24	26	29	NA	9
Terminal Revenue	0	1	1	0	0	0	0	0	0	0	NA	-14
Peripheral Revenue (Turnkey)	NA	2	2	2	2	2	2	2	2	2	NA	-2
Software Revenue	NA	9	9	13	13	15	16	18	20	23	NA	12
Bundled	NA	5	6	6	4	4	5	5	5	5	NA	4
Unbundled	NA	4	4	7	9	10	12	14	16	18	NA	15
Service Revenue	NA	5	6	11	10	11	12	13	15	16	NA	10
Total Factory Revenue	NA	30	32	48	44	48	52	57	63	70	NA	10
Increase over Prior Year (%)	NA	NA	7	48	-7	8	10	10	10	11		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 11
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Spain
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	1,056	962	843	724	700	700	800	800	900	NA	4
Unit Shipments or Seats	NA	1,093	1,000	860	735	700	700	800	800	900	NA	4
CPU Installed Base	NA	1,056	2,018	2,806	3,347	3,600	3,600	3,700	3,800	4,000	NA	4
Installed Seats	NA	1,093	2,093	2,899	3,450	3,700	3,700	3,800	3,900	4,000	NA	3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	50.9	46.7	40.1	17.9	14.3	14.6	14.5	14.0	13.7	NA	-5
Hardware-Only ASP	NA	9.6	9.5	9.9	9.5	10.4	10.7	10.7	11.1	11.4	NA	4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	13	12	10	7	7	8	8	9	10	NA	8
CPU Revenue	NA	10	10	9	7	7	7	8	9	10	NA	9
Terminal Revenue	0	1	1	0	0	0	0	0	0	0	NA	-23
Peripheral Revenue (Turnkey)	NA	2	1	1	0	0	0	0	0	0	NA	-8
Software Revenue	NA	8	6	7	5	5	6	6	6	7	NA	8
Bundled	NA	3	2	1	0	0	0	0	0	0	NA	-15
Unbundled	NA	5	5	5	4	5	5	6	6	7	NA	9
Service Revenue	NA	5	4	4	2	2	3	3	3	3	NA	8
Total Factory Revenue	NA	26	21	20	14	14	16	17	19	21	NA	8
Increase over Prior Year (%)	NA	NA	-19	-5	-30	1	9	7	10	12		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 12
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Spain
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	718	654	586	542	500	500	600	600	700	NA	5
Unit Shipments or Seats	NA	732	666	591	547	500	500	600	600	700	NA	5
CPU Installed Base	NA	718	1,373	1,921	2,335	2,500	2,600	2,600	2,800	2,900	NA	4
Installed Seats	NA	732	1,397	1,951	2,370	2,600	2,600	2,700	2,800	3,000	NA	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	47.2	37.7	31.9	14.7	12.0	12.2	12.9	12.8	12.4	NA	-3
Hardware-Only ASP	NA	8.8	8.1	8.9	8.4	10.4	10.8	10.8	11.2	11.4	NA	6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	8	6	6	4	5	6	6	7	8	NA	12
CPU Revenue	NA	6	6	5	4	5	5	6	7	8	NA	12
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	-12
Peripheral Revenue (Turnkey)	NA	2	0	0	0	0	0	0	0	0	NA	-4
Software Revenue	NA	5	4	5	4	4	4	5	5	5	NA	8
Bundled	NA	2	1	1	0	0	0	0	0	0	NA	-14
Unbundled	NA	3	3	4	3	4	4	4	5	5	NA	10
Service Revenue	NA	3	2	2	1	2	2	2	2	3	NA	11
Total Factory Revenue	NA	16	12	13	10	10	12	13	14	16	NA	10
Increase over Prior Year (%)	NA	NA	-26	7	-26	9	11	8	11	13		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 13
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Spain
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	32	34	33	34	0	0	0	0	0	NA	-100
Unit Shipments or Seats	NA	32	35	35	35	0	0	0	0	0	NA	-100
CPU Installed Base	NA	32	66	97	128	200	200	200	200	200	NA	9
Installed Seats	NA	32	67	101	133	200	200	200	200	200	NA	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	55.8	44.8	39.6	46.2	48.4	50.8	.0	.0	.0	NA	-100
Hardware-Only ASP	NA	22.8	26.4	38.0	28.7	26.8	27.6	28.4	29.7	30.7	NA	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	1	1	1	1	1	1	1	1	1	NA	2
CPU Revenue	NA	1	1	1	1	1	1	1	1	1	NA	3
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	-100
Peripheral Revenue (Turnkey)	NA	0	0	NA	0	0	0	0	0	0	NA	NA
Software Revenue	NA	1	1	1	1	1	1	1	1	1	NA	7
Bundled	NA	0	0	0	0	0	0	0	0	0	NA	-100
Unbundled	NA	0	0	1	1	1	1	1	1	1	NA	7
Service Revenue	NA	0	0	1	0	0	0	0	0	1	NA	5
Total Factory Revenue	NA	2	2	2	2	2	2	2	2	2	NA	4
Increase over Prior Year (%)	NA	NA	3	36	-19	-7	5	2	10	13		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 14
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Spain
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	306	273	224	148	100	200	200	200	200	NA	6
Unit Shipments or Seats	NA	329	300	234	153	100	200	200	200	200	NA	5
CPU Installed Base	NA	306	579	788	883	900	900	800	800	800	NA	-2
Installed Seats	NA	329	628	846	947	1,000	900	900	900	900	NA	-1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	56.8	60.2	62.1	35.4	29.6	29.5	28.6	26.2	27.6	NA	-5
Hardware-Only ASP	NA	10.5	11.5	8.4	9.1	6.9	6.9	7.0	7.0	7.1	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	4	4	3	1	1	1	1	1	1	NA	-2
CPU Revenue	NA	3	4	2	1	1	1	1	1	1	NA	-0
Terminal Revenue	0	1	1	0	0	0	0	0	0	0	NA	-100
Peripheral Revenue (Turnkey)	NA	0	0	0	0	0	0	0	0	0	NA	-100
Software Revenue	NA	2	2	1	1	1	1	1	1	1	NA	6
Bundled	NA	1	1	0	0	0	0	0	0	0	NA	-17
Unbundled	NA	1	1	1	1	1	1	1	1	1	NA	8
Service Revenue	NA	2	1	1	0	0	0	0	0	0	NA	-2
Total Factory Revenue	NA	8	8	5	3	2	2	2	2	3	NA	0
Increase over Prior Year (%)	NA	NA	-10	-35	-48	-20	4	6	7	8		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Software

CAD/CAM/CAE and GIS Scandinavia Forecast Update

Market Statistics

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Note: All tables show estimated data.

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CAD/CAM/CAE and GIS Scandinavia Forecast Update

Fluctuating exchange rates masked true market performance in the 1993 CAD/CAM/CAE and GIS market. Japanese CAD/CAM/CAE and GIS total revenue grew a surprising 2.8 percent from 1992 to 1993 when measured in U.S. dollars, contrary to what would be expected in the worst recession Japan has experienced in 50 years. However, the dollar depreciated against the yen at a rate of 12.3 percent, so when measured in yen, Japanese CAD/CAM/CAE and GIS total revenue declined 9.8 percent from 1992 to 1993.

In the meantime, European CAD/CAM/CAE and GIS total revenue declined 7.8 percent from 1992 to 1993 when measured in U.S. dollars. With the dollar appreciating 10.0 percent against the ECU, European CAD/CAM/CAE and GIS total revenue grew 2.8 percent from 1992 to 1993 when measured in ECU. Table 1 shows the dramatic impact that currency fluctuation has on the CAD/CAM/CAE and GIS.

The yen has been strengthening against the dollar for the past three years, changing in 1993 at a rate twice that of previous years. And the end is not in sight. In contrast, Hong Kong and Singapore had relatively stable currency during 1993, while the currencies in China, Korea, and Taiwan weakened against the dollar. In Europe, 1993 was a year for weakening of local currencies against the dollar after having currencies strengthened against the dollar in 1992.

The midyear indications are that currencies are beginning to stabilize (see Table 2). Although Dataquest does not forecast currency exchange rates, we do forecast with the best information available. The exchange rate is calculated as the simple arithmetic mean of the 12 average monthly rates for each country. For the purpose of this forecast, Dataquest assumes the June exchange rate will apply for the future.

Dataquest's forecast is based on the updated market share data, gathered in March and April of this year. It includes country-level forecast for Asia and Europe.

This document contains Dataquest's detailed forecast information for the CAD/CAM/CAE and GIS industry. Included are the following:

- Five-year historical data
- Five-year forecast data

More detailed data is available through Dataquest's Client Inquiry service, which can provide custom analysis of the multidimensional database.

The CAD/CAM/CAE and GIS *Dataquest Perspective* (CCAM-WW-DP-9404), available in September, contains additional tables and analysis and is a companion piece to this book.

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Table 1
CAD/CAM/CAE and GIS Revenue Growth Comparison
(U.S. Dollars versus Local Currency for Both Europe and Japan)

	1992	1993	Forecast 1998	Growth (%) 1992-1993	Growth (%) 1993-1998
Europe (U.S.$ Million)					
Software Revenue	1,693.8	1,608.7	2,231.4	-5.0	6.8
Hardware Revenue	3,037.8	2,701.7	3,388.8	-11.1	4.6
Service Revenue	1,106.6	1,072.2	1,381.4	-3.1	5.2
Total Factory Revenue	5,838.2	5,382.6	7,001.6	-7.8	5.4
ECU/U.S.$ Exchange Rate	*0.7686*	*0.8566*	*0.8419**	*11.4*	*-0.3*
Europe (ECU Million)					
Software Revenue	1,301.8	1,378.0	1,878.6	5.9	6.4
Hardware Revenue	2,334.9	2,314.3	2,853.0	-0.9	4.3
Service Revenue	850.5	918.5	1,163.0	8.0	4.8
Total Factory Revenue	4,487.3	4,610.8	5,894.6	2.8	5.0
Japan (U.S.$ Million)					
Software Revenue	1,270.4	1,371.2	2,010.2	7.9	8.0
Hardware Revenue	2,420.1	2,397.0	2,759.8	-1.0	2.9
Service Revenue	617.4	665.5	887.7	7.8	5.9
Total Factory Revenue	4,317.8	4,438.8	5,657.8	2.8	5.0
Yen/U.S.$ Exchange Rate	*126.34*	*110.85*	*101.56**	*-12.3*	*-1.7*
Japan (Yen Million)					
Software Revenue	160,506	152,001	204,155	-5.3	6.1
Hardware Revenue	305,752	265,706	280,289	-13.1	1.1
Service Revenue	78,000	73,768	90,158	-5.4	4.1
Total Factory Revenue	545,508	492,037	574,603	-9.8	3.2
North America (U.S.$ Million)					
Software Revenue	1,562.5	1,754.6	3,085.6	12.3	12.0
Hardware Revenue	2,672.1	2,824.5	4,477.9	5.7	9.7
Service Revenue	931.5	1,092.3	1,904.2	17.3	11.8
Total Factory Revenue	5,166.6	5,671.3	9,467.7	9.8	10.8
Worldwide (U.S.$ Million)					
Software Revenue	4,717.1	5,021.5	7,956.1	6.5	9.6
Hardware Revenue	8,424.4	8,308.7	11,367.1	-1.4	6.5
Service Revenue	2,776.3	2,989.5	4,496.3	7.7	8.5
Total Factory Revenue	15,928.3	16,325.7	23,819.0	2.5	7.8

*Assuming a stable currency, the 1998 exchange rate is the June 1994 exchange rate.

Source: Dataquest (September 1994)

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Table 2
Foreign Currency/U.S. Dollar

		Actual				Current	Current	Year-to-Year Change (%)				
		1990	1991	1992	1993	1994	1995-1998	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995
European Community	ECU	NA	0.8079	0.7686	0.8566	0.8561	0.8419		-5	11	0	-2
France	Franc	5.4277	5.6183	5.2571	5.6641	5.6343	5.5346	4	-6	8	-1	-2
Germany	Mark	1.6111	1.6523	1.5513	1.6543	1.6485	1.6163	3	-6	7	0	-2
Italy	Lira	1195.03	1235.03	1220.85	1575.05	1610.71	1584.79	3	-1	29	2	-2
Netherlands	Guilder	1.81	1.86	1.75	1.86	1.85	1.8126	3	-6	6	0	-2
Spain	Peseta	101.70	103.48	101.50	127.10	135.40	133.39	2	-2	25	7	-1
Sweden	Krona	5.9137	6.0314	5.7770	7.8003	7.7955	7.7340	2	-4	35	0	-1
United Kingdom	Pound	0.5599	0.5658	0.5652	0.6665	0.6604	0.6549	1	0	18	-1	-1
China	Renminbi	4.7912	5.3340	5.5076	5.7580	8.5534	8.6895	11	3	5	49	2
Hong Kong	Dollar	7.7900	7.7712	7.7399	7.7351	7.7271	7.7280	0	0	0	0	0
Japan	Yen	144.05	134.59	126.34	110.85	103.08	101.56	-7	-6	-12	-7	-1
Korea	Won	242.70	730.67	782.41	799.42	806.49	805.80	201	7	2	1	0
Singapore	Dollar	1.8129	1.7277	1.6284	1.6155	1.5481	1.5300	-5	-6	-1	-4	-1
Taiwan	Dollar	26.64	26.49	24.93	26.15	26.77	26.98	-1	-6	5	2	1

NA = Not applicable

Source: Dataquest (September 1994)

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A new forecasting process for each application is being used to improve revenue and unit shipment control by region and by platform. This new process may cause some mismatch in market share tables and forecast tables. Please use the forecast tables to understand the year-to-year changes. Use the market share tables to compare company-to-company performance.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is the underlying philosophy that the best data and analyses come from a well-balanced program. This program includes the following: balance between primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from the more than 25 separate high-technology industries Dataquest covers; and balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macro environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at gross national product (GNP) growth, interest rate fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1994.

Figure 1 shows the CAD/CAM/CAE and GIS forecasting model. The overall forecasting process uses a combination of techniques such as time series and technological modeling. Market estimates and forecasts are derived using the following research techniques:

- "Bottom-up" aggregation—This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting—For each application segment tracked by the CAD/CAM/CAE and GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis—Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market model and a satisfied available market figure to assess the levels of penetration accurately. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Dataquest analysts also factor in the acceptance or ability for users to consume new technology.

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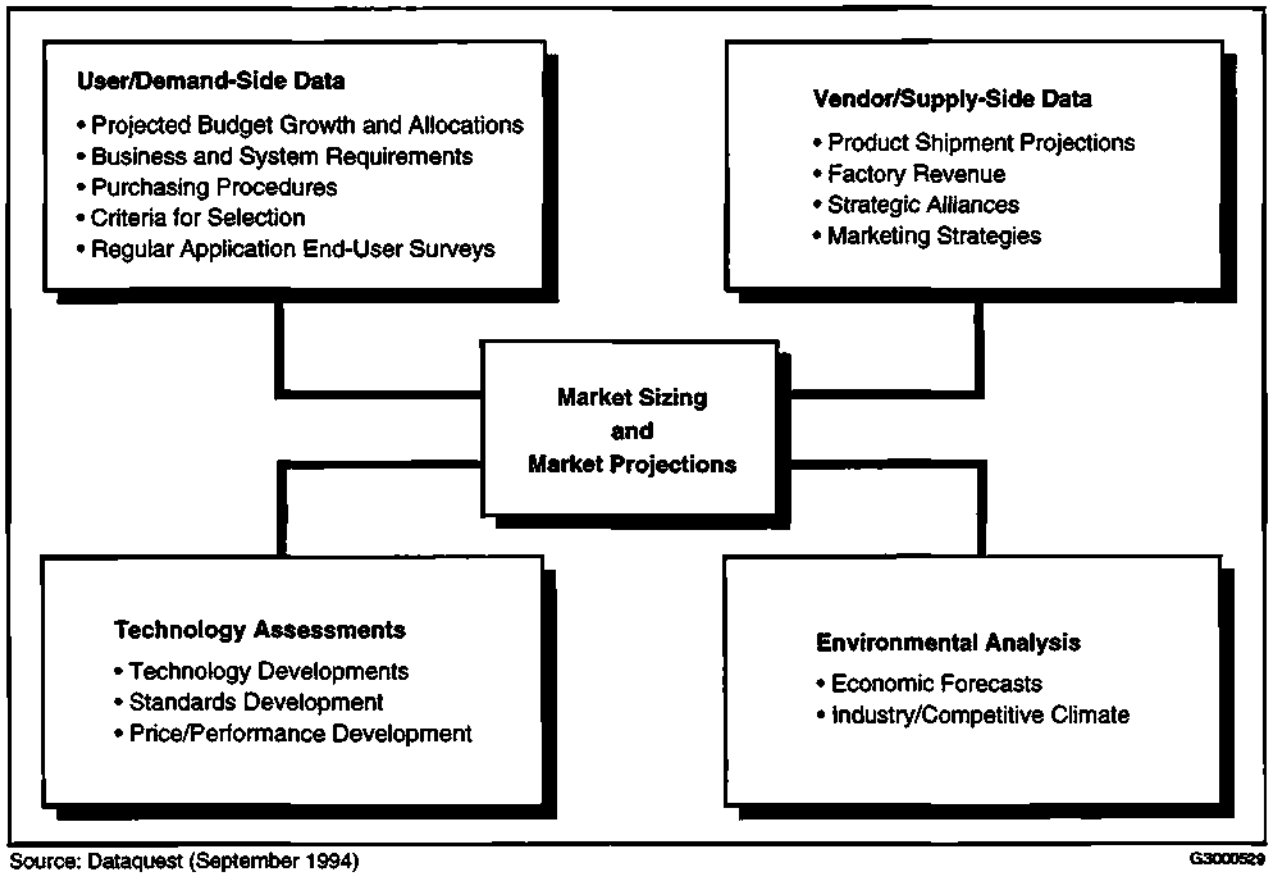
Figure 1
CAD/CAM/CAE and GIS Forecasting Model



Source: Dataquest (September 1994) G3000529

- Capacity-based analysis—This method involves identifying future shipment volume constraints. These constraints, or "ceilings," can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below the demand level.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and

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electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic computer-aided engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of ECAE applications are schematic capture and simulation.
- IC layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe (which includes Austria, Switzerland, and eastern Europe)

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong.

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Rest of World

Rest of World includes all other countries and regions, including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

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Line Items

Line item definitions are as follows:

- Average selling price (ASP) is defined as the average price of a product, inclusive of any discounts.
- CPU revenue is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
- CPU shipment is defined as the number of CPUs delivered.
- CPU installed base is defined as the total number of CPUs in active, day-to-day use.
- Unit shipment is defined as the number of products delivered (that is, seats).
- Seats are defined as the number of possible simultaneous users.
- Installed seats are defined as the total number of seats in active, day-to-day use.
- Hardware revenue is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
- Peripherals revenue is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
- Terminal revenue is defined as revenue derived from the sale of terminals used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform, as terminal revenue is contained within CPU revenue for technical workstations and PCs.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
- Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue that a company may receive from products sold to another company for resale (OEM revenue).

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Table 3
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Scandinavia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	15,514	12,434	11,798	13,564	14,241	15,900	17,400	18,900	20,300	21,900	-2	9
Unit Shipments or Seats	16,680	13,188	12,587	14,307	14,721	16,200	17,700	19,100	20,600	22,100	-3	8
CPU Installed Base	37,023	46,796	53,570	59,480	63,713	66,500	71,200	78,500	86,300	93,300	15	8
Installed Seats	42,083	52,509	59,843	66,035	70,016	72,200	76,100	82,600	89,500	95,900	14	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	66.7	73.8	62.9	59.2	46.9	36.6	34.1	31.9	30.1	28.9	-8	-9
Hardware-Only ASP	8.4	9.5	9.7	10.2	9.9	9.0	8.9	9.0	9.1	9.1	4	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	238	227	199	208	185	180	188	198	209	222	-6	4
CPU Revenue	188	183	163	179	164	161	170	181	192	206	-3	5
Terminal Revenue	23	18	12	12	8	6	5	5	4	4	-23	-12
Peripheral Revenue (Turnkey)	27	27	24	17	13	13	13	12	12	12	-17	-2
Software Revenue	92	104	98	104	105	110	119	127	136	146	3	7
Bundled	51	58	46	47	36	34	34	34	34	34	-8	-1
Unbundled	41	47	52	57	69	76	84	93	102	113	14	10
Service Revenue	71	83	70	78	78	75	79	83	89	95	2	4
Total Factory Revenue	401	414	367	390	369	365	386	408	433	463	-2	5
Increase over Prior Year (%)	20	3	-11	6	-5	-1	6	6	6	7		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 4
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Scandinavia
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	3,132	3,235	3,579	3,643	3,992	4,300	4,600	4,900	5,300	5,800	6	8
Unit Shipments or Seats	3,132	3,235	3,579	3,643	3,992	4,300	4,600	4,900	5,300	5,800	6	8
CPU Installed Base	6,797	9,726	12,643	15,200	17,552	19,700	21,700	23,600	25,500	27,200	27	9
Installed Seats	6,797	9,726	12,643	15,200	17,552	19,700	21,700	23,600	25,500	27,200	27	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	45.5	48.0	48.5	49.8	43.6	41.5	39.2	37.2	35.6	34.2	-1	-5
Hardware-Only ASP	19.3	21.4	20.9	24.1	24.1	23.8	23.3	22.8	22.4	21.9	6	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	89	95	100	102	102	105	108	112	116	123	4	4
CPU Revenue	72	80	85	90	93	96	100	104	109	115	7	4
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	16	16	16	12	9	9	9	8	8	7	-13	-4
Software Revenue	46	58	63	67	69	72	77	82	87	93	10	6
Bundled	32	35	33	36	27	27	27	26	26	26	-4	-1
Unbundled	15	22	30	31	42	45	50	55	61	67	30	10
Service Revenue	38	48	44	55	59	61	63	66	69	73	11	5
Total Factory Revenue	173	201	208	224	230	239	249	260	272	289	7	5
Increase over Prior Year (%)	37	16	4	7	3	4	4	4	5	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 5
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Scandinavia
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	557	519	220	176	134	100	100	100	100	100	-30	-6
Unit Shipments or Seats	1,723	1,273	1,009	919	615	400	400	300	300	300	-23	-13
CPU Installed Base	1,598	2,071	2,188	2,188	2,071	1,900	1,600	1,400	1,200	1,100	7	-12
Installed Seats	6,658	7,784	8,460	8,742	8,375	7,500	6,500	5,400	4,400	3,600	6	-16
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	483.4	428.0	339.1	438.5	370.0	342.8	313.7	286.5	262.7	241.1	-6	-8
Hardware-Only ASP	104.4	97.3	217.4	233.6	196.8	203.0	194.2	185.5	176.8	168.4	17	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	98	88	53	48	29	18	16	15	14	14	-26	-14
CPU Revenue	67	63	37	35	20	12	11	10	9	9	-26	-15
Terminal Revenue	23	18	12	12	8	6	5	5	4	4	-23	-12
Peripheral Revenue (Turnkey)	7	7	4	2	1	0	0	0	0	0	-41	-18
Software Revenue	21	26	13	8	6	3	3	3	2	2	-28	-16
Bundled	19	22	9	6	4	2	2	2	1	1	-32	-19
Unbundled	2	4	3	2	2	1	1	1	1	1	-3	-10
Service Revenue	29	31	17	13	8	5	4	4	4	4	-28	-15
Total Factory Revenue	147	145	83	70	43	26	24	22	20	20	-26	-15
Increase over Prior Year (%)	-1	-1	-43	-16	-38	-40	-9	-8	-6	-3		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 6
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Scandinavia
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	291	381	355	300	300	400	500	600	NA	11
Unit Shipments or Seats	NA	NA	291	381	355	300	300	400	500	600	NA	11
CPU Installed Base	NA	NA	291	671	1,004	1,200	1,400	1,700	1,900	2,100	NA	16
Installed Seats	NA	NA	291	671	1,004	1,200	1,400	1,700	1,900	2,100	NA	16
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	85.0	77.1	74.3	68.0	64.4	61.1	59.0	57.1	NA	-5
Hardware-Only ASP	NA	NA	45.3	66.8	66.6	66.6	65.5	64.5	63.5	62.5	NA	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	14	23	21	17	20	24	28	32	NA	8
CPU Revenue	NA	NA	13	21	20	16	19	23	27	31	NA	9
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	1	1	1	0	0	0	0	0	NA	-16
Software Revenue	NA	NA	4	6	6	4	5	6	7	8	NA	4
Bundled	NA	NA	3	4	3	2	2	2	2	3	NA	-6
Unbundled	NA	NA	1	1	3	3	3	4	4	5	NA	13
Service Revenue	NA	NA	7	8	9	6	8	9	11	12	NA	7
Total Factory Revenue	NA	NA	25	37	36	28	32	39	45	52	NA	7
Increase over Prior Year (%)	NA	NA	NA	45	-1	-23	17	19	16	15		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

Table 7
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Scandinavia
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	11,824	8,679	7,708	9,365	9,759	11,300	12,400	13,400	14,500	15,500	-5	10
Unit Shipments or Seats	11,824	8,679	7,708	9,365	9,759	11,300	12,400	13,400	14,500	15,500	-5	10
CPU Installed Base	28,628	34,999	38,449	41,422	43,085	43,700	46,500	51,900	57,700	63,000	11	8
Installed Seats	28,628	34,999	38,449	41,422	43,085	43,700	46,500	51,900	57,700	63,000	11	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	13.1	35.7	30.1	13.6	13.0	12.4	11.9	11.5	11.1	10.9	-0	-3
Hardware-Only ASP	4.2	4.7	3.8	3.6	3.2	3.2	3.3	3.3	3.3	3.3	-7	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	52	44	32	35	32	40	44	47	51	54	-11	11
CPU Revenue	49	40	28	33	31	37	41	44	47	50	-11	10
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	3	4	3	2	2	3	3	3	3	4	-12	14
Software Revenue	25	21	19	23	25	30	33	37	40	44	-0	12
Bundled	1	1	1	1	2	3	4	4	4	4	15	21
Unbundled	24	20	18	23	23	27	30	33	36	40	-1	11
Service Revenue	3	3	1	1	3	3	4	4	5	6	-6	16
Total Factory Revenue	81	68	51	59	60	73	81	89	96	103	-7	11
Increase over Prior Year (%)	42	-16	-24	16	1	22	11	9	8	7		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 8
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: Scandinavia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	6,556	4,882	5,147	5,567	5,317	5,500	5,700	6,000	6,200	6,400	-5	4
Unit Shipments or Seats	7,452	5,405	5,748	6,203	5,734	5,700	6,000	6,200	6,400	6,600	-6	3
CPU Installed Base	14,283	18,235	21,591	24,360	25,843	26,200	26,800	28,000	29,300	30,200	16	3
Installed Seats	18,077	22,471	26,247	29,290	30,631	30,600	30,600	31,300	32,000	32,500	14	1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	72.3	90.4	68.6	70.6	54.7	43.8	41.1	38.7	36.9	35.6	-7	-8
Hardware-Only ASP	9.5	11.3	10.4	12.8	12.6	12.3	12.5	13.0	13.5	14.0	7	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	132	126	103	110	93	86	88	90	94	99	-8	1
CPU Revenue	100	98	83	91	79	74	77	80	84	89	-6	2
Terminal Revenue	17	13	8	9	7	5	5	4	4	4	-21	-9
Peripheral Revenue (Turnkey)	15	14	12	9	7	7	7	6	6	5	-17	-5
Software Revenue	47	55	49	48	45	45	47	49	51	54	-1	4
Bundled	30	36	27	25	21	20	20	19	19	18	-8	-3
Unbundled	17	20	22	23	24	25	27	30	33	36	8	9
Service Revenue	39	45	37	40	37	35	36	38	39	42	-1	2
Total Factory Revenue	218	226	190	198	175	167	171	177	184	194	-5	2
Increase over Prior Year (%)	21	4	-16	4	-12	-5	3	3	4	5		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 9
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: Scandinavia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	4,243	3,676	3,027	3,505	3,400	4,400	5,000	5,500	6,000	6,300	-5	13
Unit Shipments or Seats	4,368	3,780	3,107	3,555	3,428	4,400	5,000	5,500	6,000	6,300	-6	13
CPU Installed Base	10,924	13,724	15,152	16,288	16,683	17,200	18,600	21,000	23,700	26,100	11	9
Installed Seats	11,510	14,404	15,887	17,023	17,365	17,800	19,100	21,400	23,900	26,200	11	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	49.4	53.2	44.3	40.2	32.8	21.2	19.8	18.6	17.8	17.4	-10	-12
Hardware-Only ASP	6.1	6.2	5.9	5.5	5.9	4.7	4.7	4.6	4.6	4.6	-1	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	42	40	31	30	27	27	29	30	32	34	-10	4
CPU Revenue	35	34	26	26	25	24	26	28	30	31	-8	5
Terminal Revenue	2	2	1	1	1	0	0	0	0	0	-29	-44
Peripheral Revenue (Turnkey)	5	4	3	3	2	3	3	3	3	3	-16	4
Software Revenue	18	19	18	18	17	18	20	22	23	25	-1	8
Bundled	8	9	8	9	7	7	7	7	8	8	-3	4
Unbundled	10	10	10	9	10	12	13	14	16	17	0	10
Service Revenue	12	14	10	10	11	9	9	9	10	11	-2	0
Total Factory Revenue	71	73	58	58	55	54	58	62	66	69	-6	5
Increase over Prior Year (%)	21	3	-20	-1	-5	-2	8	6	7	6		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 10
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: Scandinavia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,418	1,318	1,249	2,276	2,751	2,700	3,200	3,700	4,200	4,800	18	12
Unit Shipments or Seats	1,503	1,405	1,303	2,318	2,786	2,800	3,200	3,700	4,200	4,800	17	11
CPU Installed Base	2,632	3,827	4,792	6,530	8,480	10,000	11,800	13,800	16,100	18,300	34	17
Installed Seats	3,072	4,348	5,351	7,096	9,021	10,500	12,200	14,200	16,300	18,500	31	15
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	84.5	58.2	73.3	58.2	43.8	42.0	38.9	36.5	34.8	33.5	-15	-5
Hardware-Only ASP	8.1	8.4	9.3	8.4	8.0	9.3	8.9	8.5	8.0	7.6	-0	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	25	25	30	37	31	35	37	39	42	44	5	7
CPU Revenue	20	20	22	32	27	31	33	36	38	41	8	8
Terminal Revenue	2	1	1	1	1	0	0	0	0	0	-22	-29
Peripheral Revenue (Turnkey)	3	4	7	4	3	3	3	3	3	3	-2	0
Software Revenue	11	11	13	19	20	22	25	28	31	34	17	11
Bundled	6	6	8	10	5	6	6	6	6	6	-3	2
Unbundled	5	5	5	9	15	17	19	22	25	28	33	14
Service Revenue	9	10	11	16	14	16	18	20	21	23	10	11
Total Factory Revenue	45	47	54	72	65	73	80	87	94	101	9	9
Increase over Prior Year (%)	13	4	14	34	-9	13	9	9	8	7		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 11
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Scandinavia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	3,297	2,558	2,375	2,216	2,773	3,300	3,500	3,800	4,000	4,400	-4	10
Unit Shipments or Seats	3,357	2,598	2,429	2,231	2,773	3,300	3,500	3,800	4,000	4,400	-5	10
CPU Installed Base	9,185	11,010	12,035	12,302	12,707	13,100	14,000	15,600	17,200	18,700	8	8
Installed Seats	9,424	11,287	12,358	12,626	12,999	13,400	14,300	15,800	17,300	18,700	8	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	54.6	58.4	53.8	49.1	46.3	41.4	40.7	39.9	39.5	39.3	-4	-3
Hardware-Only ASP	9.5	11.4	12.9	13.1	11.7	9.3	9.5	9.8	10.1	10.3	5	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	39	36	35	31	34	32	35	38	41	46	-3	6
CPU Revenue	33	30	31	30	33	32	34	37	41	45	0	6
Terminal Revenue	2	2	2	1	1	0	0	0	0	0	-30	-35
Peripheral Revenue (Turnkey)	4	4	2	1	0	0	0	0	0	0	-43	-7
Software Revenue	16	19	18	19	24	25	26	28	30	33	9	7
Bundled	8	6	4	3	3	2	2	2	1	1	-22	-15
Unbundled	9	12	15	16	21	23	25	27	29	32	24	9
Service Revenue	11	14	12	12	17	15	16	17	18	19	11	3
Total Factory Revenue	67	68	66	62	75	72	77	83	89	99	3	6
Increase over Prior Year (%)	23	2	-4	-5	20	-4	7	8	8	10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 12
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Scandinavia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	2,176	1,525	1,680	1,506	1,807	2,200	2,300	2,600	2,700	3,100	-5	11
Unit Shipments or Seats	2,195	1,539	1,690	1,503	1,801	2,200	2,300	2,600	2,700	3,100	-5	11
CPU Installed Base	4,557	5,869	7,031	7,617	8,118	8,500	9,200	10,300	11,500	12,700	16	9
Installed Seats	4,625	5,949	7,119	7,698	8,186	8,500	9,200	10,300	11,500	12,600	15	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	51.0	49.7	40.0	44.8	42.6	37.3	37.0	36.4	36.4	36.3	-4	-3
Hardware-Only ASP	7.7	9.7	10.6	12.0	11.0	9.4	9.7	10.0	10.3	10.6	9	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	21	18	19	19	21	21	23	26	29	33	-1	9
CPU Revenue	18	15	18	19	20	21	23	26	29	32	4	10
Terminal Revenue	1	1	1	0	0	0	0	0	0	0	-27	-26
Peripheral Revenue (Turnkey)	3	2	1	0	0	0	0	0	0	0	-43	-6
Software Revenue	10	11	12	13	16	17	18	20	21	24	14	8
Bundled	4	3	2	1	2	1	1	1	1	1	-22	-15
Unbundled	5	7	10	12	15	16	17	19	21	23	28	9
Service Revenue	6	7	7	7	10	10	10	11	12	13	15	6
Total Factory Revenue	37	35	38	40	47	48	52	57	62	70	6	8
Increase over Prior Year (%)	-46	-5	8	5	19	1	9	10	9	12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 13
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Scandinavia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	153	123	189	100	146	100	100	200	200	200	-1	7
Unit Shipments or Seats	145	118	187	99	143	100	100	200	200	200	-0	7
CPU Installed Base	496	569	689	700	750	800	800	800	900	900	11	4
Installed Seats	506	577	697	712	756	800	800	800	800	900	11	4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	54.2	54.8	42.3	37.0	46.8	45.2	44.2	43.8	41.9	41.2	-4	-3
Hardware-Only ASP	22.9	26.7	23.9	42.7	31.3	27.4	28.5	29.5	30.7	31.8	8	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	4	3	5	4	5	4	4	4	5	5	7	3
CPU Revenue	3	3	4	4	5	4	4	4	5	5	9	3
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	0	-100
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-100	NA
Software Revenue	1	2	3	2	2	2	3	3	3	4	19	8
Bundled	0	1	1	0	0	0	0	0	0	0	-13	-15
Unbundled	1	1	2	2	2	2	3	3	3	3	26	9
Service Revenue	1	2	2	2	2	2	2	3	3	3	24	4
Total Factory Revenue	6	7	9	7	9	8	9	10	11	12	13	5
Increase over Prior Year (%)	-42	17	39	-21	26	-10	10	8	9	7		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 14
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Scandinavia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	968	910	506	609	820	1,000	1,000	1,000	1,100	1,100	-4	6
Unit Shipments or Seats	1,017	941	553	628	829	1,000	1,000	1,100	1,100	1,100	-5	6
CPU Installed Base	4,132	4,572	4,315	3,986	3,838	3,800	4,100	4,500	4,900	5,200	-2	6
Installed Seats	4,293	4,761	4,542	4,216	4,056	4,000	4,200	4,600	5,000	5,200	-1	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	60.7	71.5	86.7	58.2	53.8	50.8	49.9	48.8	48.3	48.5	-3	-2
Hardware-Only ASP	11.6	12.2	17.2	11.2	9.7	6.6	6.5	6.6	6.6	6.7	-4	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	14	15	11	8	9	7	7	7	7	8	-11	-3
CPU Revenue	12	12	9	7	9	7	7	7	7	8	-9	-2
Terminal Revenue	1	1	1	1	0	0	0	0	0	0	-34	-48
Peripheral Revenue (Turnkey)	1	2	1	0	0	0	0	0	0	0	-41	-13
Software Revenue	6	6	4	4	5	5	5	5	6	6	-3	5
Bundled	3	3	1	1	1	1	1	1	0	0	-24	-15
Unbundled	3	4	2	3	4	4	5	5	5	6	11	8
Service Revenue	4	5	3	3	4	3	3	3	3	3	-1	-6
Total Factory Revenue	24	27	18	15	18	15	15	16	16	17	-7	-1
Increase over Prior Year (%)	26	9	-31	-18	21	-15	-1	2	3	6		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Software

CAD/CAM/CAE and GIS Rest of Europe Forecast Update

Market Statistics

1994

Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9416
Publication Date: September 21, 1994

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Note: All tables show estimated data.

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CAD/CAM/CAE and GIS Rest of Europe Forecast Update

Fluctuating exchange rates masked true market performance in the 1993 CAD/CAM/CAE and GIS market. Japanese CAD/CAM/CAE and GIS total revenue grew a surprising 2.8 percent from 1992 to 1993 when measured in U.S. dollars, contrary to what would be expected in the worst recession Japan has experienced in 50 years. However, the dollar depreciated against the yen at a rate of 12.3 percent, so when measured in yen, Japanese CAD/CAM/CAE and GIS total revenue declined 9.8 percent from 1992 to 1993.

In the meantime, European CAD/CAM/CAE and GIS total revenue declined 7.8 percent from 1992 to 1993 when measured in U.S. dollars. With the dollar appreciating 10.0 percent against the ECU, European CAD/CAM/CAE and GIS total revenue grew 2.8 percent from 1992 to 1993 when measured in ECU. Table 1 shows the dramatic impact that currency fluctuation has on the CAD/CAM/CAE and GIS.

The yen has been strengthening against the dollar for the past three years, changing in 1993 at a rate twice that of previous years. And the end is not in sight. In contrast, Hong Kong and Singapore had relatively stable currency during 1993, while the currencies in China, Korea, and Taiwan weakened against the dollar. In Europe, 1993 was a year for weakening of local currencies against the dollar after having currencies strengthened against the dollar in 1992.

The midyear indications are that currencies are beginning to stabilize (see Table 2). Although Dataquest does not forecast currency exchange rates, we do forecast with the best information available. The exchange rate is calculated as the simple arithmetic mean of the 12 average monthly rates for each country. For the purpose of this forecast, Dataquest assumes the June exchange rate will apply for the future.

Dataquest's forecast is based on the updated market share data, gathered in March and April of this year. It includes country-level forecast for Asia and Europe.

This document contains Dataquest's detailed forecast information for the CAD/CAM/CAE and GIS industry. Included are the following:

- Five-year historical data
- Five-year forecast data

More detailed data is available through Dataquest's Client Inquiry service, which can provide custom analysis of the multidimensional database.

The CAD/CAM/CAE and GIS *Dataquest Perspective* (CCAM-WW-DP-9404), available in September, contains additional tables and analysis and is a companion piece to this book.

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Table 1
CAD/CAM/CAE and GIS Revenue Growth Comparison
(U.S. Dollars versus Local Currency for Both Europe and Japan)

	1992	1993	Forecast 1998	Growth (%) 1992-1993	Growth (%) 1993-1998
Europe (U.S.$ Million)					
Software Revenue	1,693.8	1,608.7	2,231.4	-5.0	6.8
Hardware Revenue	3,037.8	2,701.7	3,388.8	-11.1	4.6
Service Revenue	1,106.6	1,072.2	1,381.4	-3.1	5.2
Total Factory Revenue	5,838.2	5,382.6	7,001.6	-7.8	5.4
ECU/U.S.$ Exchange Rate	*0.7686*	*0.8566*	*0.8419**	*11.4*	*-0.3*
Europe (ECU Million)					
Software Revenue	1,301.8	1,378.0	1,878.6	5.9	6.4
Hardware Revenue	2,334.9	2,314.3	2,853.0	-0.9	4.3
Service Revenue	850.5	918.5	1,163.0	8.0	4.8
Total Factory Revenue	4,487.3	4,610.8	5,894.6	2.8	5.0
Japan (U.S.$ Million)					
Software Revenue	1,270.4	1,371.2	2,010.2	7.9	8.0
Hardware Revenue	2,420.1	2,397.0	2,759.8	-1.0	2.9
Service Revenue	617.4	665.5	887.7	7.8	5.9
Total Factory Revenue	4,317.8	4,438.8	5,657.8	2.8	5.0
Yen/U.S.$ Exchange Rate	*126.34*	*110.85*	*101.56**	*-12.3*	*-1.7*
Japan (Yen Million)					
Software Revenue	160,506	152,001	204,155	-5.3	6.1
Hardware Revenue	305,752	265,706	280,289	-13.1	1.1
Service Revenue	78,000	73,768	90,158	-5.4	4.1
Total Factory Revenue	545,508	492,037	574,603	-9.8	3.2
North America (U.S.$ Million)					
Software Revenue	1,562.5	1,754.6	3,085.6	12.3	12.0
Hardware Revenue	2,672.1	2,824.5	4,477.9	5.7	9.7
Service Revenue	931.5	1,092.3	1,904.2	17.3	11.8
Total Factory Revenue	5,166.6	5,671.3	9,467.7	9.8	10.8
Worldwide (U.S.$ Million)					
Software Revenue	4,717.1	5,021.5	7,956.1	6.5	9.6
Hardware Revenue	8,424.4	8,308.7	11,367.1	-1.4	6.5
Service Revenue	2,776.3	2,989.5	4,496.3	7.7	8.5
Total Factory Revenue	15,928.3	16,325.7	23,819.0	2.5	7.8

*Assuming a stable currency, the 1998 exchange rate is the June 1994 exchange rate.

Source: Dataquest (September 1994)

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Table 2
Foreign Currency/U.S. Dollar

		Actual				Current	Current	Year-to-Year Change (%)				
		1990	1991	1992	1993	1994	1995-1998	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995
European Community	ECU	NA	0.8079	0.7686	0.8566	0.8561	0.8419		-5	11	0	-2
France	Franc	5.4277	5.6183	5.2571	5.6641	5.6343	5.5346	4	-6	8	-1	-2
Germany	Mark	1.6111	1.6523	1.5513	1.6543	1.6485	1.6163	3	-6	7	0	-2
Italy	Lira	1195.03	1235.03	1220.85	1575.05	1610.71	1584.79	3	-1	29	2	-2
Netherlands	Guilder	1.81	1.86	1.75	1.86	1.85	1.8126	3	-6	6	0	-2
Spain	Peseta	101.70	103.48	101.50	127.10	135.40	133.39	2	-2	25	7	-1
Sweden	Krona	5.9137	6.0314	5.7770	7.8003	7.7955	7.7340	2	-4	35	0	-1
United Kingdom	Pound	0.5599	0.5658	0.5652	0.6665	0.6604	0.6549	1	0	18	-1	-1
China	Renminbi	4.7912	5.3340	5.5076	5.7580	8.5534	8.6895	11	3	5	49	2
Hong Kong	Dollar	7.7900	7.7712	7.7399	7.7351	7.7271	7.7280	0	0	0	0	0
Japan	Yen	144.05	134.59	126.34	110.85	103.08	101.56	-7	-6	-12	-7	-1
Korea	Won	242.70	730.67	782.41	799.42	806.49	805.80	201	7	2	1	0
Singapore	Dollar	1.8129	1.7277	1.6284	1.6155	1.5481	1.5300	-5	-6	-1	-4	-1
Taiwan	Dollar	26.64	26.49	24.93	26.15	26.77	26.98	-1	-6	5	2	1

NA = Not applicable

Source: Dataquest (September 1994)

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A new forecasting process for each application is being used to improve revenue and unit shipment control by region and by platform. This new process may cause some mismatch in market share tables and forecast tables. Please use the forecast tables to understand the year-to-year changes. Use the market share tables to compare company-to-company performance.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is the underlying philosophy that the best data and analyses come from a well-balanced program. This program includes the following: balance between primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from the more than 25 separate high-technology industries Dataquest covers; and balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macro environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at gross national product (GNP) growth, interest rate fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1994.

Figure 1 shows the CAD/CAM/CAE and GIS forecasting model. The overall forecasting process uses a combination of techniques such as time series and technological modeling. Market estimates and forecasts are derived using the following research techniques:

- "Bottom-up" aggregation—This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting—For each application segment tracked by the CAD/CAM/CAE and GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis—Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market model and a satisfied available market figure to assess the levels of penetration accurately. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Dataquest analysts also factor in the acceptance or ability for users to consume new technology.

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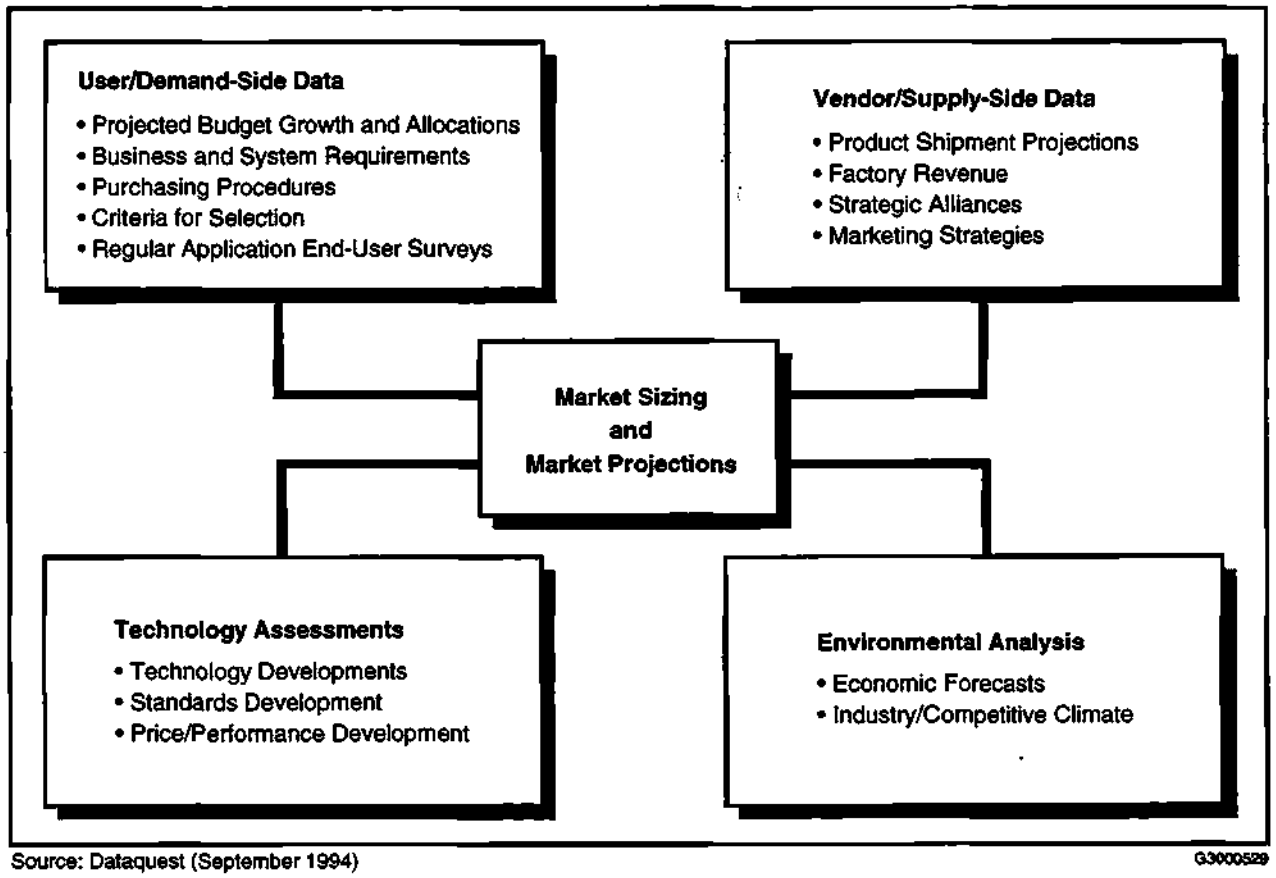
Figure 1
CAD/CAM/CAE and GIS Forecasting Model



Source: Dataquest (September 1994) G3000529

- Capacity-based analysis—This method involves identifying future shipment volume constraints. These constraints, or "ceilings," can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below the demand level.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and

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electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic computer-aided engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of ECAE applications are schematic capture and simulation.
- IC layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe (which includes Austria, Switzerland, and eastern Europe)

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong.

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Rest of World

Rest of World includes all other countries and regions, including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

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Line Items

Line item definitions are as follows:

- Average selling price (ASP) is defined as the average price of a product, inclusive of any discounts.
- CPU revenue is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
- CPU shipment is defined as the number of CPUs delivered.
- CPU installed base is defined as the total number of CPUs in active, day-to-day use.
- Unit shipment is defined as the number of products delivered (that is, seats).
- Seats are defined as the number of possible simultaneous users.
- Installed seats are defined as the total number of seats in active, day-to-day use.
- Hardware revenue is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
- Peripherals revenue is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
- Terminal revenue is defined as revenue derived from the sale of terminals used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform, as terminal revenue is contained within CPU revenue for technical workstations and PCs.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
- Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue that a company may receive from products sold to another company for resale (OEM revenue).

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Table 3
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Rest of Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	16,632	18,808	22,795	23,752	28,009	32,100	37,200	42,800	47,900	52,000	14	13
Unit Shipments or Seats	17,030	19,458	23,827	24,655	29,004	32,800	37,800	43,400	48,600	52,600	14	13
CPU Installed Base	35,560	52,360	70,695	86,805	103,351	118,400	136,000	158,300	182,700	205,800	31	15
Installed Seats	36,832	54,259	73,576	90,480	107,845	123,300	141,200	163,700	188,100	210,900	31	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	44.0	45.9	51.1	45.4	38.1	33.3	31.1	29.2	27.6	26.5	-4	-7
Hardware-Only ASP	6.1	6.6	6.0	7.7	7.2	7.1	6.9	6.9	6.8	6.9	4	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	172	225	264	281	288	305	332	365	394	419	14	8
CPU Revenue	134	178	215	238	249	270	298	330	360	385	17	9
Terminal Revenue	8	13	14	13	15	11	10	10	10	10	19	-8
Peripheral Revenue (Turnkey)	30	34	34	31	23	24	24	25	25	24	-6	1
Software Revenue	109	134	159	174	189	216	245	277	307	333	15	12
Bundled	38	66	75	75	79	84	90	96	100	103	20	5
Unbundled	71	69	84	99	110	132	155	181	207	230	12	16
Service Revenue	45	66	75	99	107	118	131	146	160	174	25	10
Total Factory Revenue	325	425	498	554	584	639	708	787	861	927	16	10
Increase over Prior Year (%)	17	31	17	11	5	9	11	11	9	8		

Note: In 1991, server was added as a platform, This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 4
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Rest of Europe
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	3,242	4,488	5,235	6,258	7,065	8,300	9,500	10,700	12,000	13,200	21	13
Unit Shipments or Seats	3,242	4,488	5,235	6,258	7,065	8,300	9,500	10,700	12,000	13,200	21	13
CPU Installed Base	7,373	11,561	16,057	21,092	26,214	31,800	37,700	43,900	50,400	56,400	37	17
Installed Seats	7,373	11,561	16,057	21,092	26,214	31,800	37,700	43,900	50,400	56,400	37	17
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	45.4	40.4	42.5	44.2	38.5	36.4	34.3	32.6	31.2	30.0	-4	-5
Hardware-Only ASP	16.4	20.9	20.8	24.8	24.9	24.2	23.5	22.8	22.1	21.3	11	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	75	106	126	161	168	188	202	219	235	251	23	8
CPU Revenue	63	91	107	142	151	171	185	202	218	234	25	9
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	12	15	19	19	17	17	17	17	17	17	10	-1
Software Revenue	55	82	97	114	119	139	155	174	191	207	21	12
Bundled	28	46	52	58	61	65	70	74	76	79	22	5
Unbundled	27	36	45	56	58	74	86	100	114	129	21	17
Service Revenue	29	43	48	72	82	94	104	114	124	134	29	10
Total Factory Revenue	159	232	270	347	369	421	461	507	550	592	23	10
Increase over Prior Year (%)	-7	46	17	28	6	14	9	10	9	8		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 5
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Rest of Europe
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	118	258	197	132	135	100	100	100	100	100	3	-6
Unit Shipments or Seats	516	908	1,229	1,034	1,129	800	800	800	800	700	22	-9
CPU Installed Base	348	597	770	865	938	1,000	1,000	900	900	900	28	-1
Installed Seats	1,620	2,495	3,651	4,541	5,432	5,900	6,200	6,400	6,300	6,000	35	2
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	343.9	298.1	357.6	410.7	349.1	317.9	294.4	272.1	250.5	231.6	0	-8
Hardware-Only ASP	176.4	147.4	436.8	355.4	345.9	313.3	308.2	298.6	289.1	278.9	18	-4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	25	47	59	44	40	29	28	27	26	26	12	-8
CPU Revenue	15	30	40	28	23	17	16	16	15	15	10	-8
Terminal Revenue	8	13	14	13	15	11	10	10	10	10	19	-8
Peripheral Revenue (Turnkey)	2	4	5	3	2	1	1	1	1	1	-6	-8
Software Revenue	26	18	18	12	11	8	7	7	7	7	-19	-10
Bundled	5	15	13	8	7	5	5	5	4	4	7	-10
Unbundled	20	4	5	4	4	3	2	2	2	2	-34	-10
Service Revenue	9	15	17	15	11	8	8	8	7	7	4	-8
Total Factory Revenue	60	80	94	70	62	45	43	42	40	40	1	-8
Increase over Prior Year (%)	66	33	18	-26	-12	-28	-4	-2	-4	-1		

Note: In 1991, server was added as a platform This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 6
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Rest of Europe
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	131	280	322	300	400	400	500	600	NA	13
Unit Shipments or Seats	NA	NA	131	280	322	300	400	400	500	600	NA	13
CPU Installed Base	NA	NA	131	411	716	1,000	1,200	1,500	1,800	2,000	NA	23
Installed Seats	NA	NA	131	411	716	1,000	1,200	1,500	1,800	2,000	NA	23
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	82.5	69.9	62.9	60.2	57.4	54.7	52.7	51.1	NA	-4
Hardware-Only ASP	NA	NA	49.5	60.6	74.4	73.6	72.7	71.8	70.7	69.6	NA	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	7	14	17	15	18	22	25	29	NA	10
CPU Revenue	NA	NA	6	13	16	14	17	20	24	28	NA	11
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	1	1	1	1	1	1	1	1	NA	-1
Software Revenue	NA	NA	2	6	8	9	11	13	16	18	NA	18
Bundled	NA	NA	2	4	4	5	5	6	7	8	NA	12
Unbundled	NA	NA	0	2	4	4	6	7	9	10	NA	23
Service Revenue	NA	NA	4	6	8	8	10	12	14	16	NA	15
Total Factory Revenue	NA	NA	13	26	34	32	39	47	55	63	NA	13
Increase over Prior Year (%)	NA	NA	NA	107	28	-4	20	20	17	15		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 7
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Rest of Europe
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	13,271	14,062	17,231	17,083	20,488	23,300	27,200	31,500	35,300	38,000	11	13
Unit Shipments or Seats	13,271	14,062	17,231	17,083	20,488	23,300	27,200	31,500	35,300	38,000	11	13
CPU Installed Base	27,839	40,202	53,737	64,436	75,483	84,700	96,100	111,900	129,600	146,400	28	14
Installed Seats	27,839	40,202	53,737	64,436	75,483	84,700	96,100	111,900	129,600	146,400	28	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	26.5	25.2	25.8	18.9	13.0	12.5	12.0	11.6	11.3	11.0	-16	-3
Hardware-Only ASP	3.9	3.8	3.2	3.0	2.8	2.8	2.8	2.8	2.8	2.8	-8	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	72	72	72	63	62	73	84	97	108	114	-4	13
CPU Revenue	56	57	62	55	59	68	80	92	102	109	1	13
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	16	15	10	8	3	4	5	5	6	6	-33	12
Software Revenue	29	34	41	42	52	60	71	83	93	102	16	15
Bundled	5	5	7	5	6	9	10	11	12	13	5	15
Unbundled	23	29	34	37	45	52	61	72	81	89	18	14
Service Revenue	6	7	7	6	6	8	10	12	15	16	1	21
Total Factory Revenue	107	113	121	111	120	141	165	192	216	232	3	14
Increase over Prior Year (%)	49	6	6	-8	8	17	17	16	13	8		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 8
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: Rest of Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	6,516	7,815	10,181	10,650	10,901	11,400	12,700	14,200	15,300	16,200	14	8
Unit Shipments or Seats	6,798	8,228	10,938	11,344	11,719	12,000	13,200	14,700	15,900	16,800	15	7
CPU Installed Base	14,482	21,466	29,830	37,377	43,623	47,900	52,400	58,000	63,900	69,200	32	10
Installed Seats	15,424	22,801	31,883	40,042	46,971	51,600	56,400	62,300	68,300	73,500	32	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	41.4	44.6	55.0	47.9	44.9	39.7	37.4	35.3	33.6	32.4	2	-6
Hardware-Only ASP	6.3	7.8	6.2	8.9	8.9	8.9	9.1	9.4	9.7	10.0	9	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	82	116	137	151	152	150	160	173	185	194	17	5
CPU Revenue	57	86	107	124	125	127	137	150	162	172	22	7
Terminal Revenue	6	9	10	10	12	8	8	8	9	9	21	-7
Peripheral Revenue (Turnkey)	20	22	20	18	15	15	15	15	14	14	-7	-1
Software Revenue	45	65	77	88	91	98	109	123	134	144	19	10
Bundled	17	34	42	43	48	50	53	55	56	57	30	3
Unbundled	28	31	36	44	42	48	57	67	78	87	11	15
Service Revenue	20	35	41	53	57	59	64	70	76	81	30	8
Total Factory Revenue	147	217	255	292	299	306	333	366	395	419	19	7
Increase over Prior Year (%)	-14	48	18	14	3	2	9	10	8	6		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 9
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: Rest of Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	5,153	6,438	6,993	7,644	10,258	12,900	15,400	18,200	20,600	22,100	19	17
Unit Shipments or Seats	5,198	6,512	7,124	7,728	10,337	12,900	15,500	18,200	20,600	22,100	19	16
CPU Installed Base	10,504	16,348	22,019	27,340	33,993	41,400	50,400	61,600	73,600	84,700	34	20
Installed Seats	10,646	16,562	22,359	27,753	34,465	41,900	50,900	62,100	74,100	85,100	34	20
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	38.5	35.4	37.7	33.0	25.4	21.4	20.0	18.9	18.1	17.6	-10	-7
Hardware-Only ASP	4.9	4.6	4.6	4.4	4.1	4.0	3.9	3.9	3.8	3.8	-4	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	40	48	58	51	57	66	74	83	92	97	9	11
CPU Revenue	34	41	49	44	52	60	68	78	86	91	11	12
Terminal Revenue	1	1	2	1	1	1	1	1	0	0	19	-22
Peripheral Revenue (Turnkey)	5	5	7	5	4	5	5	5	5	6	-6	6
Software Revenue	22	29	41	37	44	52	61	70	79	85	19	14
Bundled	11	13	18	15	17	19	21	23	26	28	13	10
Unbundled	11	16	23	22	27	33	40	46	53	57	24	17
Service Revenue	8	10	14	14	15	16	18	20	23	25	17	11
Total Factory Revenue	69	86	113	102	116	134	152	173	193	207	14	12
Increase over Prior Year (%)	67	24	31	-10	13	16	14	14	12	7		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 10
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: Rest of Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	829	1,260	1,380	2,329	3,651	5,000	6,100	7,300	8,700	10,200	45	23
Unit Shipments or Seats	859	1,359	1,453	2,406	3,709	5,000	6,100	7,300	8,700	10,200	44	22
CPU Installed Base	1,432	2,637	3,865	5,878	8,983	13,000	17,800	23,300	29,400	35,800	58	32
Installed Seats	1,546	2,848	4,145	6,226	9,372	13,400	18,200	23,700	29,700	36,100	57	31
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	80.1	61.9	71.4	58.6	40.2	36.1	33.4	31.2	29.7	28.7	-16	-7
Hardware-Only ASP	7.0	7.0	8.3	10.1	10.4	9.3	8.8	8.3	7.8	7.5	10	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	14	25	31	43	51	59	66	73	81	89	38	12
CPU Revenue	11	21	25	37	46	54	61	68	76	84	41	13
Terminal Revenue	1	1	1	1	1	1	1	0	0	0	14	-16
Peripheral Revenue (Turnkey)	2	3	5	5	4	4	5	5	5	5	22	3
Software Revenue	11	16	17	24	35	43	51	59	67	77	32	17
Bundled	4	11	11	14	12	13	15	16	17	18	28	9
Unbundled	7	5	5	10	23	30	36	43	50	59	35	21
Service Revenue	6	9	11	21	27	33	38	43	48	55	45	15
Total Factory Revenue	31	49	59	87	112	135	155	175	197	220	38	14
Increase over Prior Year (%)	169	57	19	48	29	20	15	13	12	12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 11
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Rest of Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	4,133	3,295	4,242	3,130	3,199	2,800	3,000	3,200	3,300	3,400	-6	1
Unit Shipments or Seats	4,174	3,359	4,312	3,176	3,239	2,800	3,000	3,200	3,300	3,500	-6	2
CPU Installed Base	9,141	11,910	14,980	16,210	16,752	16,000	15,500	15,500	15,700	16,000	16	-1
Installed Seats	9,216	12,048	15,188	16,460	17,037	16,300	15,700	15,800	16,000	16,200	17	-1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	50.8	64.1	47.6	42.0	23.3	26.3	26.2	25.7	25.7	25.5	-18	2
Hardware-Only ASP	6.8	7.8	7.4	10.2	8.5	10.6	10.6	10.9	11.1	11.2	6	6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	36	36	38	36	28	30	32	35	36	39	-6	7
CPU Revenue	32	30	34	33	27	29	31	34	36	38	-4	7
Terminal Revenue	1	2	1	1	1	1	1	1	1	1	7	-10
Peripheral Revenue (Turnkey)	3	4	3	2	0	0	0	0	0	0	-51	-18
Software Revenue	31	24	24	26	20	23	24	25	26	28	-10	7
Bundled	6	7	4	3	2	1	1	1	1	1	-28	-15
Unbundled	25	17	20	23	18	21	23	24	26	27	-7	8
Service Revenue	11	12	10	12	9	11	12	13	13	14	-4	9
Total Factory Revenue	78	73	72	74	57	64	68	73	76	80	-7	7
Increase over Prior Year (%)	40	-7	-1	3	-22	12	6	7	4	6		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 12
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Rest of Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	2,119	2,224	3,116	2,189	2,412	2,100	2,300	2,400	2,500	2,700	3	2
Unit Shipments or Seats	2,137	2,247	3,137	2,202	2,427	2,100	2,300	2,400	2,500	2,700	3	2
CPU Installed Base	3,446	5,542	8,320	9,819	11,005	11,200	11,100	11,300	11,600	12,000	34	2
Installed Seats	3,478	5,596	8,395	9,907	11,106	11,300	11,200	11,400	11,700	12,100	34	2
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	51.2	62.9	39.6	35.5	19.4	23.3	23.5	23.2	23.2	23.2	-22	4
Hardware-Only ASP	6.1	6.2	5.7	8.2	6.7	9.6	9.7	10.1	10.3	10.5	2	9
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	18	21	22	21	17	20	22	24	26	28	-2	11
CPU Revenue	15	18	20	19	16	20	21	24	25	28	1	11
Terminal Revenue	0	0	0	0	0	1	1	1	1	1	11	6
Peripheral Revenue (Turnkey)	2	3	1	1	0	0	0	0	0	0	-54	-15
Software Revenue	15	14	15	16	13	16	17	18	19	20	-4	8
Bundled	4	4	3	2	1	1	1	1	1	1	-23	-14
Unbundled	12	10	12	14	12	15	16	17	18	19	1	10
Service Revenue	6	7	5	7	6	8	8	9	9	10	1	12
Total Factory Revenue	39	42	42	44	36	44	47	51	54	58	-2	10
Increase over Prior Year (%)	81	8	-1	4	-18	22	8	8	5	8		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 13
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Rest of Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	479	222	192	287	258	200	200	200	200	200	-14	-5
Unit Shipments or Seats	479	223	194	293	257	200	200	200	200	200	-14	-5
CPU Installed Base	666	869	1,000	1,197	1,294	1,400	1,400	1,400	1,400	1,400	18	2
Installed Seats	669	873	1,007	1,209	1,305	1,400	1,400	1,400	1,400	1,400	18	1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	44.5	52.6	45.8	34.4	45.5	46.2	45.5	38.1	40.0	42.6	1	-1
Hardware-Only ASP	14.3	16.6	20.2	31.3	26.4	26.7	27.6	28.5	29.5	30.4	17	3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	7	4	4	9	7	6	7	7	7	7	-1	-0
CPU Revenue	7	4	4	9	7	6	7	7	7	7	-0	-0
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	0	-100
Peripheral Revenue (Turnkey)	0	0	0	NA	0	0	0	0	0	0	-100	NA
Software Revenue	9	4	3	7	4	4	5	5	5	5	-17	3
Bundled	0	0	0	0	0	0	0	0	0	0	-41	-24
Unbundled	9	4	3	7	4	4	5	5	5	5	-16	3
Service Revenue	3	1	2	3	2	2	2	2	3	3	-6	1
Total Factory Revenue	19	9	9	19	14	13	14	14	14	14	-8	1
Increase over Prior Year (%)	339	-53	-3	111	-27	-3	2	4	2	-0		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 14
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Rest of Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,536	849	934	654	529	500	500	500	500	500	-23	-1
Unit Shipments or Seats	1,558	889	981	681	555	500	500	500	500	500	-23	-2
CPU Installed Base	5,029	5,499	5,660	5,194	4,454	3,500	3,000	2,800	2,700	2,700	-3	-10
Installed Seats	5,070	5,579	5,786	5,344	4,626	3,700	3,100	3,000	2,800	2,800	-2	-10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	51.1	67.9	84.3	80.1	60.9	48.0	46.0	45.8	45.7	46.6	4	-5
Hardware-Only ASP	5.5	9.5	10.4	7.2	7.4	6.6	6.5	6.6	6.6	6.7	8	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	11	11	12	6	4	3	4	4	4	4	-20	-3
CPU Revenue	10	9	10	5	4	3	3	4	4	4	-21	0
Terminal Revenue	0	1	1	1	1	0	0	0	0	0	4	-100
Peripheral Revenue (Turnkey)	0	1	1	1	0	0	0	0	0	0	-37	-28
Software Revenue	6	6	6	3	2	2	3	3	3	3	-23	6
Bundled	2	3	1	1	0	0	0	0	0	0	-39	-15
Unbundled	4	4	5	2	2	2	2	2	3	3	-18	8
Service Revenue	2	4	3	2	1	1	1	1	1	1	-17	1
Total Factory Revenue	19	21	21	11	8	7	7	7	8	8	-21	0
Increase over Prior Year (%)	-35	10	-3	-46	-31	-10	4	2	3	4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Software

CAD/CAM/CAE and GIS Italy Forecast Update

Market Statistics

1994

Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9415
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Note: All tables show estimated data.

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CAD/CAM/CAE and GIS Italy Forecast Update

Fluctuating exchange rates masked true market performance in the 1993 CAD/CAM/CAE and GIS market. Japanese CAD/CAM/CAE and GIS total revenue grew a surprising 2.8 percent from 1992 to 1993 when measured in U.S. dollars, contrary to what would be expected in the worst recession Japan has experienced in 50 years. However, the dollar depreciated against the yen at a rate of 12.3 percent, so when measured in yen, Japanese CAD/CAM/CAE and GIS total revenue declined 9.8 percent from 1992 to 1993.

In the meantime, European CAD/CAM/CAE and GIS total revenue declined 7.8 percent from 1992 to 1993 when measured in U.S. dollars. With the dollar appreciating 10.0 percent against the ECU, European CAD/CAM/CAE and GIS total revenue grew 2.8 percent from 1992 to 1993 when measured in ECU. Table 1 shows the dramatic impact that currency fluctuation has on the CAD/CAM/CAE and GIS.

The yen has been strengthening against the dollar for the past three years, changing in 1993 at a rate twice that of previous years. And the end is not in sight. In contrast, Hong Kong and Singapore had relatively stable currency during 1993, while the currencies in China, Korea, and Taiwan weakened against the dollar. In Europe, 1993 was a year for weakening of local currencies against the dollar after having currencies strengthened against the dollar in 1992.

The midyear indications are that currencies are beginning to stabilize (see Table 2). Although Dataquest does not forecast currency exchange rates, we do forecast with the best information available. The exchange rate is calculated as the simple arithmetic mean of the 12 average monthly rates for each country. For the purpose of this forecast, Dataquest assumes the June exchange rate will apply for the future.

Dataquest's forecast is based on the updated market share data, gathered in March and April of this year. It includes country-level forecast for Asia and Europe.

This document contains Dataquest's detailed forecast information for the CAD/CAM/CAE and GIS industry. Included are the following:

- Five-year historical data
- Five-year forecast data

More detailed data is available through Dataquest's Client Inquiry service, which can provide custom analysis of the multidimensional database.

The CAD/CAM/CAE and GIS *Dataquest Perspective* (CCAM-WW-DP-9404), available in September, contains additional tables and analysis and is a companion piece to this book.

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Table 1
CAD/CAM/CAE and GIS Revenue Growth Comparison
(U.S. Dollars versus Local Currency for Both Europe and Japan)

	1992	1993	Forecast 1998	Growth (%) 1992-1993	Growth (%) 1993-1998
Europe (U.S.$ Million)					
Software Revenue	1,693.8	1,608.7	2,231.4	-5.0	6.8
Hardware Revenue	3,037.8	2,701.7	3,388.8	-11.1	4.6
Service Revenue	1,106.6	1,072.2	1,381.4	-3.1	5.2
Total Factory Revenue	5,838.2	5,382.6	7,001.6	-7.8	5.4
ECU/U.S.$ Exchange Rate	*0.7686*	*0.8566*	*0.8419**	*11.4*	*-0.3*
Europe (ECU Million)					
Software Revenue	1,301.8	1,378.0	1,878.6	5.9	6.4
Hardware Revenue	2,334.9	2,314.3	2,853.0	-0.9	4.3
Service Revenue	850.5	918.5	1,163.0	8.0	4.8
Total Factory Revenue	4,487.3	4,610.8	5,894.6	2.8	5.0
Japan (U.S.$ Million)					
Software Revenue	1,270.4	1,371.2	2,010.2	7.9	8.0
Hardware Revenue	2,420.1	2,397.0	2,759.8	-1.0	2.9
Service Revenue	617.4	665.5	887.7	7.8	5.9
Total Factory Revenue	4,317.8	4,438.8	5,657.8	2.8	5.0
Yen/U.S.$ Exchange Rate	*126.34*	*110.85*	*101.56**	*-12.3*	*-1.7*
Japan (Yen Million)					
Software Revenue	160,506	152,001	204,155	-5.3	6.1
Hardware Revenue	305,752	265,706	280,289	-13.1	1.1
Service Revenue	78,000	73,768	90,158	-5.4	4.1
Total Factory Revenue	545,508	492,037	574,603	-9.8	3.2
North America (U.S.$ Million)					
Software Revenue	1,562.5	1,754.6	3,085.6	12.3	12.0
Hardware Revenue	2,672.1	2,824.5	4,477.9	5.7	9.7
Service Revenue	931.5	1,092.3	1,904.2	17.3	11.8
Total Factory Revenue	5,166.6	5,671.3	9,467.7	9.8	10.8
Worldwide (U.S.$ Million)					
Software Revenue	4,717.1	5,021.5	7,956.1	6.5	9.6
Hardware Revenue	8,424.4	8,308.7	11,367.1	-1.4	6.5
Service Revenue	2,776.3	2,989.5	4,496.3	7.7	8.5
Total Factory Revenue	15,928.3	16,325.7	23,819.0	2.5	7.8

*Assuming a stable currency, the 1998 exchange rate is the June 1994 exchange rate.

Source: Dataquest (September 1994)

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Table 2
Foreign Currency/U.S. Dollar

		Actual				Current	Current	Year-to-Year Change (%)				
		1990	1991	1992	1993	1994	1995-1998	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995
European Community	ECU	NA	0.8079	0.7686	0.8566	0.8561	0.8419		-5	11	0	-2
France	Franc	5.4277	5.6183	5.2571	5.6641	5.6343	5.5346	4	-6	8	-1	-2
Germany	Mark	1.6111	1.6523	1.5513	1.6543	1.6485	1.6163	3	-6	7	0	-2
Italy	Lira	1195.03	1235.03	1220.85	1575.05	1610.71	1584.79	3	-1	29	2	-2
Netherlands	Guilder	1.81	1.86	1.75	1.86	1.85	1.8126	3	-6	6	0	-2
Spain	Peseta	101.70	103.48	101.50	127.10	135.40	133.39	2	-2	25	7	-1
Sweden	Krona	5.9137	6.0314	5.7770	7.8003	7.7955	7.7340	2	-4	35	0	-1
United Kingdom	Pound	0.5599	0.5658	0.5652	0.6665	0.6604	0.6549	1	0	18	-1	-1
China	Renminbi	4.7912	5.3340	5.5076	5.7580	8.5534	8.6895	11	3	5	49	2
Hong Kong	Dollar	7.7900	7.7712	7.7399	7.7351	7.7271	7.7280	0	0	0	0	0
Japan	Yen	144.05	134.59	126.34	110.85	103.08	101.56	-7	-6	-12	-7	-1
Korea	Won	242.70	730.67	782.41	799.42	806.49	805.80	201	7	2	1	0
Singapore	Dollar	1.8129	1.7277	1.6284	1.6155	1.5481	1.5300	-5	-6	-1	-4	-1
Taiwan	Dollar	26.64	26.49	24.93	26.15	26.77	26.98	-1	-6	5	2	1

NA = Not applicable

Source: Dataquest (September 1994)

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A new forecasting process for each application is being used to improve revenue and unit shipment control by region and by platform. This new process may cause some mismatch in market share tables and forecast tables. Please use the forecast tables to understand the year-to-year changes. Use the market share tables to compare company-to-company performance.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is the underlying philosophy that the best data and analyses come from a well-balanced program. This program includes the following: balance between primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from the more than 25 separate high-technology industries Dataquest covers; and balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macro environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at gross national product (GNP) growth, interest rate fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1994.

Figure 1 shows the CAD/CAM/CAE and GIS forecasting model. The overall forecasting process uses a combination of techniques such as time series and technological modeling. Market estimates and forecasts are derived using the following research techniques:

- "Bottom-up" aggregation—This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting—For each application segment tracked by the CAD/CAM/CAE and GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis—Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market model and a satisfied available market figure to assess the levels of penetration accurately. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Dataquest analysts also factor in the acceptance or ability for users to consume new technology.

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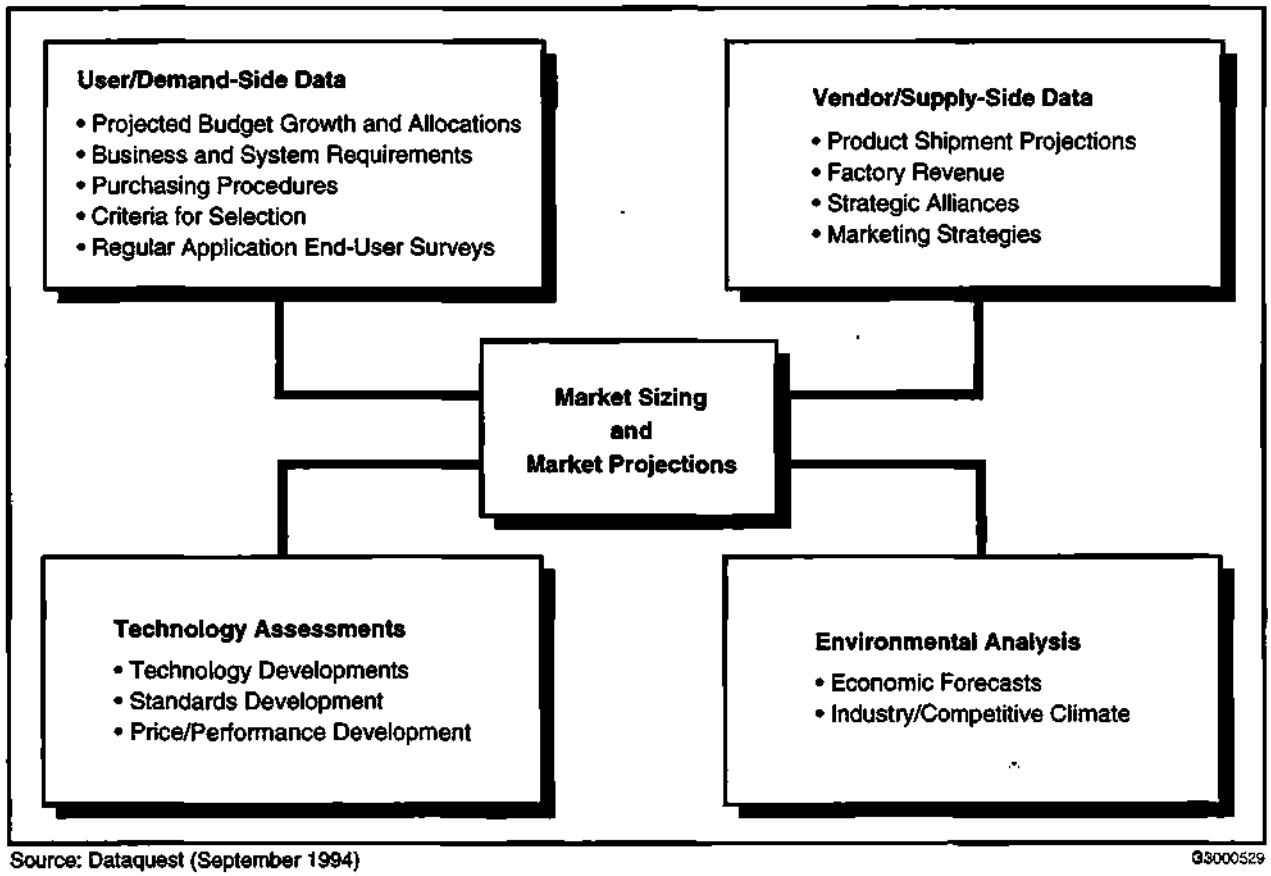
Figure 1
CAD/CAM/CAE and GIS Forecasting Model



Source: Dataquest (September 1994) G3000529

- Capacity-based analysis—This method involves identifying future shipment volume constraints. These constraints, or "ceilings," can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below the demand level.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and

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electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic computer-aided engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of ECAE applications are schematic capture and simulation.
- IC layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe (which includes Austria, Switzerland, and eastern Europe)

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong.

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Rest of World

Rest of World includes all other countries and regions, including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

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Line Items

Line item definitions are as follows:

- Average selling price (ASP) is defined as the average price of a product, inclusive of any discounts.
- CPU revenue is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
- CPU shipment is defined as the number of CPUs delivered.
- CPU installed base is defined as the total number of CPUs in active, day-to-day use.
- Unit shipment is defined as the number of products delivered (that is, seats).
- Seats are defined as the number of possible simultaneous users.
- Installed seats are defined as the total number of seats in active, day-to-day use.
- Hardware revenue is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
- Peripherals revenue is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
- Terminal revenue is defined as revenue derived from the sale of terminals used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform, as terminal revenue is contained within CPU revenue for technical workstations and PCs.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
- Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue that a company may receive from products sold to another company for resale (OEM revenue).

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Table 3
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Italy
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	13,105	11,760	14,847	17,371	18,149	19,700	20,900	22,700	24,600	26,500	8	8
Unit Shipments or Seats	14,342	12,634	16,147	18,530	18,834	20,100	21,400	23,100	25,000	26,800	7	7
CPU Installed Base	35,342	44,587	54,572	64,525	73,071	80,000	87,600	96,500	105,400	113,300	20	9
Installed Seats	40,782	50,803	61,843	72,468	80,869	87,200	94,100	102,200	110,200	117,200	19	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	83.9	74.1	77.0	62.7	38.3	35.0	32.9	30.8	29.0	27.7	-18	-6
Hardware-Only ASP	10.6	12.0	9.2	11.6	9.7	10.5	10.8	11.3	11.6	12.0	-2	4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	252	256	274	296	232	248	259	280	305	331	-2	7
CPU Revenue	198	204	226	253	204	227	240	262	287	314	1	9
Terminal Revenue	26	22	20	18	11	7	6	6	6	5	-19	-14
Peripheral Revenue (Turnkey)	28	30	28	25	16	14	13	12	12	12	-13	-7
Software Revenue	107	131	152	161	134	135	141	151	162	174	6	5
Bundled	61	74	86	78	56	52	52	51	50	50	-2	-2
Unbundled	47	56	66	82	78	82	90	100	112	124	14	10
Service Revenue	72	99	109	120	97	100	105	112	121	132	7	6
Total Factory Revenue	432	486	534	577	463	482	505	543	589	637	2	7
Increase over Prior Year (%)	24	13	10	8	-20	4	5	8	8	8		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 4
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Italy
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	3,764	4,178	4,586	5,821	5,310	5,500	5,800	6,200	6,700	7,300	9	7
Unit Shipments or Seats	3,764	4,178	4,586	5,821	5,310	5,500	5,800	6,200	6,700	7,300	9	7
CPU Installed Base	8,878	12,541	16,216	20,564	23,757	26,400	28,800	30,800	33,000	34,800	28	8
Installed Seats	8,878	12,541	16,216	20,564	23,757	26,400	28,800	30,800	33,000	34,800	28	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	57.4	48.9	58.7	55.2	39.3	37.1	35.1	33.2	31.9	30.7	-9	-5
Hardware-Only ASP	18.3	22.6	20.9	24.6	24.5	24.0	23.4	22.8	22.2	21.6	8	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	111	119	138	165	128	125	125	129	135	143	4	2
CPU Revenue	93	102	121	147	117	115	117	121	128	136	6	3
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	18	17	18	18	11	10	9	8	8	7	-12	-8
Software Revenue	69	84	102	118	90	91	95	101	108	116	7	5
Bundled	40	48	63	64	43	42	41	40	39	39	2	-2
Unbundled	29	36	40	54	46	49	54	61	69	77	12	11
Service Revenue	42	62	73	92	74	73	75	77	82	87	15	3
Total Factory Revenue	222	265	314	375	292	289	295	308	325	345	7	3
Increase over Prior Year (%)	43	19	18	20	-22	-1	2	4	6	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 5
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Italy
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	487	389	301	220	153	100	100	100	100	100	-25	-8
Unit Shipments or Seats	1,724	1,262	1,601	1,379	838	600	500	500	500	400	-16	-14
CPU Installed Base	1,478	1,810	2,006	2,041	1,978	1,800	1,600	1,400	1,300	1,100	8	-11
Installed Seats	6,918	8,026	9,277	9,983	9,775	9,000	8,100	7,100	6,000	5,100	9	-12
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	494.7	620.9	452.8	465.6	407.6	381.0	351.9	323.3	296.4	273.3	-5	-8
Hardware-Only ASP	133.3	143.8	208.0	257.3	213.8	222.6	214.3	205.2	197.2	187.9	13	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	100	97	86	66	37	22	20	19	17	17	-22	-15
CPU Revenue	68	67	61	46	25	14	13	12	11	11	-22	-15
Terminal Revenue	26	22	20	18	11	7	6	6	6	5	-19	-14
Peripheral Revenue (Turnkey)	7	7	6	2	1	1	1	1	1	1	-37	-12
Software Revenue	22	31	23	12	9	6	5	5	4	4	-21	-13
Bundled	19	25	18	9	5	4	3	3	3	3	-28	-13
Unbundled	3	6	5	3	3	2	2	2	2	2	6	-14
Service Revenue	27	32	28	18	10	6	6	5	5	5	-22	-14
Total Factory Revenue	150	161	137	97	56	34	31	29	27	26	-22	-14
Increase over Prior Year (%)	16	7	-15	-29	-43	-39	-8	-8	-7	-4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 6
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Italy
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	201	382	384	900	1,100	1,300	1,600	1,900	NA	38
Unit Shipments or Seats	NA	NA	201	382	384	900	1,100	1,300	1,600	1,900	NA	38
CPU Installed Base	NA	NA	201	583	944	1,800	2,700	3,800	4,900	6,100	NA	45
Installed Seats	NA	NA	201	583	944	1,800	2,700	3,800	4,900	6,100	NA	45
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	82.1	72.6	68.4	65.1	61.7	58.8	56.8	55.0	NA	-4
Hardware-Only ASP	NA	NA	58.9	63.8	64.9	66.3	65.1	63.9	62.7	61.5	NA	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	11	23	23	57	67	82	99	115	NA	38
CPU Revenue	NA	NA	10	22	23	56	66	82	98	114	NA	38
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	1	1	1	1	1	1	1	1	NA	1
Software Revenue	NA	NA	3	3	5	5	5	6	7	8	NA	12
Bundled	NA	NA	2	2	2	3	3	3	3	4	NA	14
Unbundled	NA	NA	1	1	3	2	2	3	4	5	NA	11
Service Revenue	NA	NA	5	7	8	17	20	24	29	34	NA	34
Total Factory Revenue	NA	NA	19	33	36	78	92	113	135	157	NA	34
Increase over Prior Year (%)	NA	NA	NA	73	8	118	18	22	20	16		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 7
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Italy
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	8,854	7,193	9,758	10,948	12,302	13,200	14,000	15,100	16,200	17,200	9	7
Unit Shipments or Seats	8,854	7,193	9,758	10,948	12,302	13,200	14,000	15,100	16,200	17,200	9	7
CPU Installed Base	24,986	30,235	36,149	41,338	46,393	50,000	54,600	60,500	66,300	71,300	17	9
Installed Seats	24,986	30,235	36,149	41,338	46,393	50,000	54,600	60,500	66,300	71,300	17	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	28.0	30.5	25.5	24.1	14.9	11.1	10.8	10.5	10.0	9.8	-15	-8
Hardware-Only ASP	4.4	5.2	3.6	3.4	3.0	3.1	3.1	3.1	3.1	3.1	-9	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	41	40	38	42	43	44	46	50	54	56	2	5
CPU Revenue	37	35	35	38	40	41	44	47	51	53	2	6
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	3	5	3	4	4	3	3	3	3	3	3	-4
Software Revenue	16	16	24	27	31	33	36	39	43	47	18	8
Bundled	1	1	3	3	6	4	4	5	5	5	65	-2
Unbundled	15	15	21	24	26	29	31	34	38	42	14	10
Service Revenue	3	4	2	3	4	4	4	5	6	6	9	8
Total Factory Revenue	60	60	64	72	79	80	86	94	102	109	7	7
Increase over Prior Year (%)	-5	1	7	12	10	2	7	9	9	7		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 8
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: Italy
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	6,828	5,591	8,564	10,956	10,580	11,400	11,900	12,400	13,000	13,500	12	5
Unit Shipments or Seats	7,782	6,189	9,580	11,920	11,180	11,800	12,300	12,800	13,300	13,900	9	4
CPU Installed Base	19,489	23,638	29,478	36,344	41,768	46,400	51,100	55,600	59,400	62,000	21	8
Installed Seats	23,821	28,482	35,133	42,561	47,919	52,100	56,300	60,300	63,500	65,500	19	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	89.5	83.9	75.0	64.9	39.7	40.0	37.7	35.6	33.9	32.7	-18	-4
Hardware-Only ASP	10.9	13.9	9.6	11.8	10.5	12.8	13.5	14.6	15.7	16.7	-1	10
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	151	157	184	201	154	177	185	198	213	230	1	8
CPU Revenue	115	123	150	169	132	160	169	183	199	216	3	10
Terminal Revenue	19	16	14	14	9	6	6	6	5	5	-16	-11
Peripheral Revenue (Turnkey)	17	18	20	18	13	11	10	9	9	8	-6	-9
Software Revenue	62	80	101	104	84	83	86	89	93	97	8	3
Bundled	34	48	61	54	43	40	40	38	37	36	6	-3
Unbundled	28	32	40	50	41	43	46	51	56	61	11	8
Service Revenue	43	61	76	80	65	71	74	78	84	90	11	7
Total Factory Revenue	255	298	360	385	303	331	345	366	390	416	4	7
Increase over Prior Year (%)	15	17	21	7	-21	9	4	6	7	7		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 9
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: Italy
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,907	2,422	3,160	3,120	3,568	3,700	4,000	4,600	5,300	5,700	17	10
Unit Shipments or Seats	2,021	2,521	3,293	3,198	3,603	3,700	4,000	4,600	5,300	5,700	16	10
CPU Installed Base	6,636	8,508	10,652	12,284	13,971	15,100	16,500	18,300	20,400	22,600	20	10
Installed Seats	7,092	9,058	11,317	12,994	14,644	15,700	16,900	18,600	20,700	22,700	20	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	81.9	51.4	83.9	52.4	27.0	17.6	16.3	15.4	14.6	14.3	-24	-12
Hardware-Only ASP	9.9	7.5	5.1	5.9	4.7	4.5	4.4	4.4	4.4	4.3	-17	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	30	28	32	29	22	20	21	23	25	27	-8	4
CPU Revenue	24	23	26	25	20	18	19	21	23	25	-5	5
Terminal Revenue	2	2	2	2	1	0	0	0	0	0	-28	-49
Peripheral Revenue (Turnkey)	4	3	3	3	2	2	2	2	2	2	-19	4
Software Revenue	12	12	18	19	15	15	16	18	20	22	5	8
Bundled	6	6	9	10	6	5	5	6	6	7	-0	4
Unbundled	6	6	9	9	9	10	11	12	14	15	10	10
Service Revenue	8	9	10	12	7	6	6	6	7	8	-5	3
Total Factory Revenue	51	49	60	61	44	40	42	47	52	56	-4	5
Increase over Prior Year (%)	15	-3	22	2	-28	-7	5	11	12	8		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 10
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: Italy
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,236	1,015	1,073	1,557	1,806	1,900	2,100	2,500	3,000	3,600	10	15
Unit Shipments or Seats	1,332	1,138	1,151	1,635	1,850	1,900	2,100	2,600	3,100	3,600	9	14
CPU Installed Base	2,447	3,337	4,130	5,199	6,320	7,200	8,300	9,700	11,300	13,200	27	16
Installed Seats	2,799	3,806	4,666	5,783	6,897	7,800	8,800	10,100	11,600	13,300	25	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	92.1	70.3	98.5	67.3	42.4	34.8	32.2	30.0	28.7	27.6	-18	-8
Hardware-Only ASP	9.8	14.3	9.6	15.3	11.6	10.4	9.9	9.5	8.9	8.6	4	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	29	30	26	34	26	24	24	27	30	34	-3	5
CPU Revenue	24	24	22	29	24	22	23	26	29	33	1	6
Terminal Revenue	2	2	1	1	1	0	0	0	0	0	-26	-33
Peripheral Revenue (Turnkey)	3	4	3	3	1	1	1	1	1	1	-21	-2
Software Revenue	14	18	17	20	16	16	17	20	23	27	3	11
Bundled	11	14	13	11	5	5	5	5	5	6	-18	2
Unbundled	3	4	4	8	11	12	13	15	18	21	36	14
Service Revenue	9	12	10	15	12	11	12	14	16	18	8	8
Total Factory Revenue	53	60	53	69	54	51	54	61	69	79	1	8
Increase over Prior Year (%)	82	14	-10	29	-21	-6	5	13	13	14		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 11
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Italy
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	3,134	2,732	2,049	1,737	2,194	2,700	2,900	3,100	3,300	3,700	-9	11
Unit Shipments or Seats	3,207	2,786	2,124	1,777	2,201	2,700	2,900	3,100	3,300	3,700	-9	11
CPU Installed Base	6,769	9,105	10,312	10,698	11,012	11,300	11,800	12,900	14,300	15,600	13	7
Installed Seats	7,071	9,457	10,727	11,131	11,410	11,600	12,100	13,100	14,400	15,600	13	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	57.1	53.0	55.3	47.7	39.3	26.3	26.0	25.6	25.4	25.2	-9	-9
Hardware-Only ASP	10.6	12.5	14.0	17.2	12.8	9.9	10.0	10.4	10.8	11.0	5	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	42	41	33	32	30	27	29	32	36	41	-8	7
CPU Revenue	35	33	29	29	28	27	29	32	36	40	-5	7
Terminal Revenue	3	2	2	2	1	0	0	0	0	0	-29	-36
Peripheral Revenue (Turnkey)	4	5	2	1	0	0	0	0	0	0	-42	-7
Software Revenue	19	21	16	18	19	20	22	24	26	29	0	9
Bundled	9	8	4	3	2	2	2	1	1	1	-29	-13
Unbundled	10	14	13	15	17	18	20	22	25	28	15	11
Service Revenue	13	18	12	13	13	12	12	13	15	16	1	4
Total Factory Revenue	74	80	61	62	62	60	64	69	77	86	-4	7
Increase over Prior Year (%)	39	8	-24	2	-1	-3	6	9	11	11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 12
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Italy
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	2,277	1,834	1,289	1,055	1,398	1,700	1,800	2,000	2,200	2,500	-11	12
Unit Shipments or Seats	2,300	1,850	1,305	1,060	1,393	1,700	1,800	2,000	2,200	2,500	-12	12
CPU Installed Base	4,104	5,740	6,578	6,833	7,031	7,100	7,300	8,100	9,000	10,100	14	8
Installed Seats	4,178	5,829	6,681	6,936	7,122	7,200	7,400	8,100	9,000	10,100	14	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	54.6	48.1	45.7	42.4	32.8	20.0	20.2	20.2	20.4	20.5	-12	-9
Hardware-Only ASP	8.0	9.9	11.8	16.5	12.0	10.1	10.3	10.7	11.0	11.3	11	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	24	22	17	18	17	17	19	21	24	28	-7	10
CPU Revenue	20	18	15	17	17	17	19	21	24	28	-4	11
Terminal Revenue	1	1	1	1	0	0	0	0	0	0	-27	-25
Peripheral Revenue (Turnkey)	3	3	1	0	0	0	0	0	0	0	-43	-5
Software Revenue	11	13	10	11	13	13	14	16	17	20	3	9
Bundled	6	4	2	1	1	1	1	1	1	1	-29	-13
Unbundled	6	9	8	10	11	12	13	15	17	19	18	11
Service Revenue	7	9	6	7	8	7	8	8	9	11	3	7
Total Factory Revenue	42	43	32	37	38	38	41	45	51	59	-2	9
Increase over Prior Year (%)	58	4	-26	15	2	-0	9	11	12	16		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 13
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Italy
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	199	112	128	111	138	100	100	100	200	200	-9	8
Unit Shipments or Seats	191	108	127	113	134	100	100	100	200	200	-8	8
CPU Installed Base	585	657	710	720	734	700	700	800	800	800	6	2
Installed Seats	617	687	738	751	755	700	700	800	800	800	5	1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	54.5	55.5	42.4	35.6	45.6	43.6	43.5	41.2	40.4	42.4	-4	-1
Hardware-Only ASP	19.3	28.8	29.1	45.4	32.3	28.2	29.3	30.8	32.1	33.4	14	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	4	3	4	5	4	4	4	4	5	5	3	3
CPU Revenue	4	3	3	5	4	4	4	4	5	5	5	3
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-10	-100
Peripheral Revenue (Turnkey)	0	0	0	NA	0	0	0	0	0	0	-100	NA
Software Revenue	2	2	2	2	2	2	2	3	3	3	3	8
Bundled	0	1	0	0	0	0	0	0	0	0	-29	-16
Unbundled	2	1	2	2	2	2	2	3	3	3	9	9
Service Revenue	1	2	2	2	2	2	2	2	3	3	13	4
Total Factory Revenue	7	7	8	9	9	8	8	9	11	11	5	4
Increase over Prior Year (%)	-13	-6	10	17	1	-9	4	13	18	-1		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 14
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Italy
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	657	786	632	571	658	900	900	900	1,000	1,000	0	9
Unit Shipments or Seats	716	828	692	604	673	900	900	900	1,000	1,000	-2	8
CPU Installed Base	2,081	2,708	3,024	3,145	3,246	3,500	3,700	4,100	4,400	4,700	12	8
Installed Seats	2,276	2,941	3,308	3,443	3,533	3,700	4,000	4,300	4,500	4,800	12	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	61.7	59.2	71.9	56.8	53.8	47.1	46.2	45.6	45.2	44.9	-3	-4
Hardware-Only ASP	17.7	16.8	15.9	13.0	10.4	6.8	6.7	6.8	6.8	6.9	-12	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	14	16	12	9	8	7	7	7	7	7	-14	-1
CPU Revenue	12	13	10	8	7	7	7	7	7	7	-12	0
Terminal Revenue	2	1	1	1	0	0	0	0	0	0	-31	-51
Peripheral Revenue (Turnkey)	1	2	1	0	0	0	0	0	0	0	-33	-17
Software Revenue	6	7	5	4	4	5	5	5	5	6	-8	7
Bundled	3	3	2	1	1	1	1	1	1	0	-28	-13
Unbundled	2	4	3	3	3	4	4	5	5	5	8	11
Service Revenue	5	7	4	4	3	3	3	3	3	3	-9	-4
Total Factory Revenue	25	30	21	16	15	14	14	15	15	16	-12	1
Increase over Prior Year (%)	35	20	-29	-23	-7	-6	-0	2	5	5		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Software

CAD/CAM/CAE and GIS Germany Forecast Update

Market Statistics

1994

Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9414
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Note: All tables show estimated data.

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CAD/CAM/CAE and GIS Germany Forecast Update

Fluctuating exchange rates masked true market performance in the 1993 CAD/CAM/CAE and GIS market. Japanese CAD/CAM/CAE and GIS total revenue grew a surprising 2.8 percent from 1992 to 1993 when measured in U.S. dollars, contrary to what would be expected in the worst recession Japan has experienced in 50 years. However, the dollar depreciated against the yen at a rate of 12.3 percent, so when measured in yen, Japanese CAD/CAM/CAE and GIS total revenue declined 9.8 percent from 1992 to 1993.

In the meantime, European CAD/CAM/CAE and GIS total revenue declined 7.8 percent from 1992 to 1993 when measured in U.S. dollars. With the dollar appreciating 10.0 percent against the ECU, European CAD/CAM/CAE and GIS total revenue grew 2.8 percent from 1992 to 1993 when measured in ECU. Table 1 shows the dramatic impact that currency fluctuation has on the CAD/CAM/CAE and GIS.

The yen has been strengthening against the dollar for the past three years, changing in 1993 at a rate twice that of previous years. And the end is not in sight. In contrast, Hong Kong and Singapore had relatively stable currency during 1993, while the currencies in China, Korea, and Taiwan weakened against the dollar. In Europe, 1993 was a year for weakening of local currencies against the dollar after having currencies strengthened against the dollar in 1992.

The midyear indications are that currencies are beginning to stabilize (see Table 2). Although Dataquest does not forecast currency exchange rates, we do forecast with the best information available. The exchange rate is calculated as the simple arithmetic mean of the 12 average monthly rates for each country. For the purpose of this forecast, Dataquest assumes the June exchange rate will apply for the future.

Dataquest's forecast is based on the updated market share data, gathered in March and April of this year. It includes country-level forecast for Asia and Europe.

This document contains Dataquest's detailed forecast information for the CAD/CAM/CAE and GIS industry. Included are the following:

- Five-year historical data
- Five-year forecast data

More detailed data is available through Dataquest's Client Inquiry service, which can provide custom analysis of the multidimensional database.

The CAD/CAM/CAE and GIS *Dataquest Perspective* (CCAM-WW-DP-9404), available in September, contains additional tables and analysis and is a companion piece to this book.

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Table 1
CAD/CAM/CAE and GIS Revenue Growth Comparison
(U.S. Dollars versus Local Currency for Both Europe and Japan)

	1992	1993	Forecast 1998	Growth (%) 1992-1993	Growth (%) 1993-1998
Europe (U.S.$ Million)					
Software Revenue	1,693.8	1,608.7	2,231.4	-5.0	6.8
Hardware Revenue	3,037.8	2,701.7	3,388.8	-11.1	4.6
Service Revenue	1,106.6	1,072.2	1,381.4	-3.1	5.2
Total Factory Revenue	5,838.2	5,382.6	7,001.6	-7.8	5.4
ECU/U.S.$ Exchange Rate	*0.7686*	*0.8566*	*0.8419**	*11.4*	*-0.3*
Europe (ECU Million)					
Software Revenue	1,301.8	1,378.0	1,878.6	5.9	6.4
Hardware Revenue	2,334.9	2,314.3	2,853.0	-0.9	4.3
Service Revenue	850.5	918.5	1,163.0	8.0	4.8
Total Factory Revenue	4,487.3	4,610.8	5,894.6	2.8	5.0
Japan (U.S.$ Million)					
Software Revenue	1,270.4	1,371.2	2,010.2	7.9	8.0
Hardware Revenue	2,420.1	2,397.0	2,759.8	-1.0	2.9
Service Revenue	617.4	665.5	887.7	7.8	5.9
Total Factory Revenue	4,317.8	4,438.8	5,657.8	2.8	5.0
Yen/U.S.$ Exchange Rate	*126.34*	*110.85*	*101.56**	*-12.3*	*-1.7*
Japan (Yen Million)					
Software Revenue	160,506	152,001	204,155	-5.3	6.1
Hardware Revenue	305,752	265,706	280,289	-13.1	1.1
Service Revenue	78,000	73,768	90,158	-5.4	4.1
Total Factory Revenue	545,508	492,037	574,603	-9.8	3.2
North America (U.S.$ Million)					
Software Revenue	1,562.5	1,754.6	3,085.6	12.3	12.0
Hardware Revenue	2,672.1	2,824.5	4,477.9	5.7	9.7
Service Revenue	931.5	1,092.3	1,904.2	17.3	11.8
Total Factory Revenue	5,166.6	5,671.3	9,467.7	9.8	10.8
Worldwide (U.S.$ Million)					
Software Revenue	4,717.1	5,021.5	7,956.1	6.5	9.6
Hardware Revenue	8,424.4	8,308.7	11,367.1	-1.4	6.5
Service Revenue	2,776.3	2,989.5	4,496.3	7.7	8.5
Total Factory Revenue	15,928.3	16,325.7	23,819.0	2.5	7.8

*Assuming a stable currency, the 1998 exchange rate is the June 1994 exchange rate.
Source: Dataquest (September 1994)

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Table 2
Foreign Currency/U.S. Dollar

		Actual				Current	Current	Year-to-Year Change (%)				
		1990	1991	1992	1993	1994	1995-1998	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995
European Community	ECU	NA	0.8079	0.7686	0.8566	0.8561	0.8419		-5	11	0	-2
France	Franc	5.4277	5.6183	5.2571	5.6641	5.6343	5.5346	4	-6	8	-1	-2
Germany	Mark	1.6111	1.6523	1.5513	1.6543	1.6485	1.6163	3	-6	7	0	-2
Italy	Lira	1195.03	1235.03	1220.85	1575.05	1610.71	1584.79	3	-1	29	2	-2
Netherlands	Guilder	1.81	1.86	1.75	1.86	1.85	1.8126	3	-6	6	0	-2
Spain	Peseta	101.70	103.48	101.50	127.10	135.40	133.39	2	-2	25	7	-1
Sweden	Krona	5.9137	6.0314	5.7770	7.8003	7.7955	7.7340	2	-4	35	0	-1
United Kingdom	Pound	0.5599	0.5658	0.5652	0.6665	0.6604	0.6549	1	0	18	-1	-1
China	Renminbi	4.7912	5.3340	5.5076	5.7580	8.5534	8.6895	11	3	5	49	2
Hong Kong	Dollar	7.7900	7.7712	7.7399	7.7351	7.7271	7.7280	0	0	0	0	0
Japan	Yen	144.05	134.59	126.34	110.85	103.08	101.56	-7	-6	-12	-7	-1
Korea	Won	242.70	730.67	782.41	799.42	806.49	805.80	201	7	2	1	0
Singapore	Dollar	1.8129	1.7277	1.6284	1.6155	1.5481	1.5300	-5	-6	-1	-4	-1
Taiwan	Dollar	26.64	26.49	24.93	26.15	26.77	26.98	-1	-6	5	2	1

NA = Not applicable

Source: Dataquest (September 1994)

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A new forecasting process for each application is being used to improve revenue and unit shipment control by region and by platform. This new process may cause some mismatch in market share tables and forecast tables. Please use the forecast tables to understand the year-to-year changes. Use the market share tables to compare company-to-company performance.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is the underlying philosophy that the best data and analyses come from a well-balanced program. This program includes the following: balance between primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from the more than 25 separate high-technology industries Dataquest covers; and balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macro environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at gross national product (GNP) growth, interest rate fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1994.

Figure 1 shows the CAD/CAM/CAE and GIS forecasting model. The overall forecasting process uses a combination of techniques such as time series and technological modeling. Market estimates and forecasts are derived using the following research techniques:

- "Bottom-up" aggregation—This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting—For each application segment tracked by the CAD/CAM/CAE and GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis—Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market model and a satisfied available market figure to assess the levels of penetration accurately. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Dataquest analysts also factor in the acceptance or ability for users to consume new technology.

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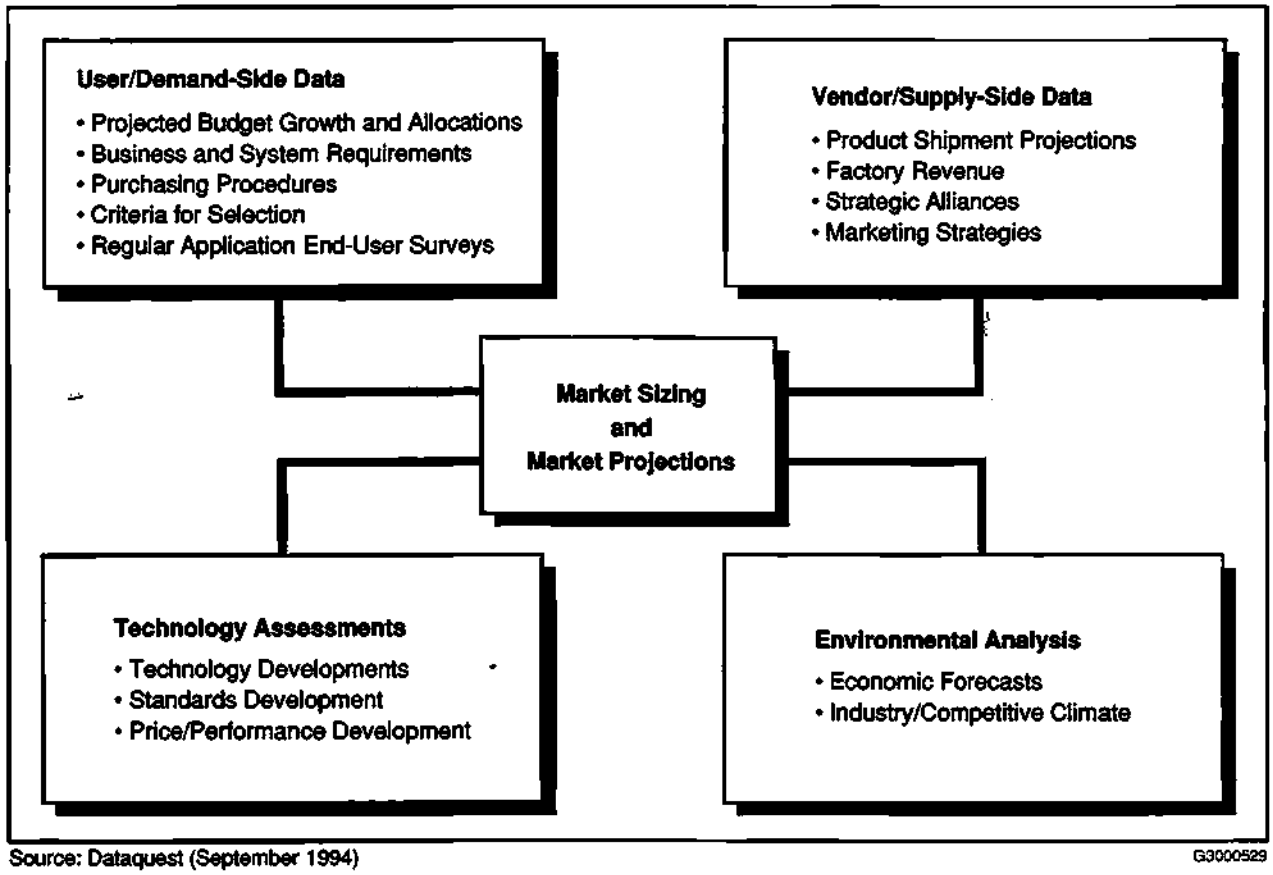
Figure 1
CAD/CAM/CAE and GIS Forecasting Model



Source: Dataquest (September 1994) G3000529

- Capacity-based analysis—This method involves identifying future shipment volume constraints. These constraints, or "ceilings," can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below the demand level.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and

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electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic computer-aided engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of ECAE applications are schematic capture and simulation.
- IC layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe (which includes Austria, Switzerland, and eastern Europe)

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong.

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Rest of World

Rest of World includes all other countries and regions, including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

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Line Items

Line item definitions are as follows:

- Average selling price (ASP) is defined as the average price of a product, inclusive of any discounts.
- CPU revenue is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
- CPU shipment is defined as the number of CPUs delivered.
- CPU installed base is defined as the total number of CPUs in active, day-to-day use.
- Unit shipment is defined as the number of products delivered (that is, seats).
- Seats are defined as the number of possible simultaneous users.
- Installed seats are defined as the total number of seats in active, day-to-day use.
- Hardware revenue is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
- Peripherals revenue is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
- Terminal revenue is defined as revenue derived from the sale of terminals used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform, as terminal revenue is contained within CPU revenue for technical workstations and PCs.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
- Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue that a company may receive from products sold to another company for resale (OEM revenue).

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Table 3
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Germany
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	64,043	63,047	74,086	87,714	87,404	92,600	101,800	110,600	119,300	127,100	8	8
Unit Shipments or Seats	68,465	65,723	77,880	91,594	90,190	95,100	104,000	112,600	121,200	128,900	7	7
CPU Installed Base	163,946	213,189	263,293	316,121	357,918	388,500	422,200	464,000	506,900	544,500	22	9
Installed Seats	180,251	231,816	284,960	340,104	382,273	412,300	444,900	485,000	525,700	561,400	21	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	70.7	61.9	56.4	46.9	34.9	32.6	30.3	28.4	26.9	25.9	-16	-6
Hardware-Only ASP	7.9	7.6	7.3	7.8	7.9	7.9	7.7	7.7	7.8	8.0	0	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,013	960	1,038	1,095	970	970	995	1,038	1,096	1,159	-1	4
CPU Revenue	799	792	876	926	853	860	894	943	1,004	1,069	2	5
Terminal Revenue	90	58	56	59	45	45	40	37	36	36	-16	-4
Peripheral Revenue (Turnkey)	124	109	106	110	72	65	61	58	56	55	-13	-5
Software Revenue	452	517	588	629	574	591	630	671	717	767	6	6
Bundled	268	302	311	321	262	251	252	251	254	257	-1	-0
Unbundled	183	215	277	308	313	339	377	419	464	510	14	10
Service Revenue	263	322	345	380	375	374	387	404	430	459	9	4
Total Factory Revenue	1,728	1,799	1,971	2,104	1,918	1,936	2,012	2,113	2,242	2,385	3	4
Increase over Prior Year (%)	27	4	10	7	-9	1	4	5	6	6		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 4
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Germany
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	15,130	16,313	20,603	23,181	22,227	23,000	24,400	26,100	28,100	30,500	10	7
Unit Shipments or Seats	15,130	16,313	20,603	23,181	22,227	23,000	24,400	26,100	28,100	30,500	10	7
CPU Installed Base	33,836	48,442	65,657	83,340	97,243	109,200	119,500	128,900	138,300	145,800	30	8
Installed Seats	33,836	48,442	65,657	83,340	97,243	109,200	119,500	128,900	138,300	145,800	30	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	56.8	51.2	48.3	45.5	41.1	38.4	36.2	34.3	32.8	31.6	-8	-5
Hardware-Only ASP	17.5	20.9	20.8	24.4	24.4	23.9	23.4	22.9	22.4	21.9	9	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	470	483	562	606	551	535	539	550	571	602	4	2
CPU Revenue	389	412	487	523	497	485	493	508	531	563	6	3
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	82	71	74	82	55	49	46	42	40	39	-10	-7
Software Revenue	277	327	390	423	377	384	403	424	450	482	8	5
Bundled	190	220	234	258	199	195	194	192	192	194	1	-1
Unbundled	87	107	155	165	178	189	209	232	258	287	20	10
Service Revenue	165	209	224	274	292	288	295	304	319	338	15	3
Total Factory Revenue	912	1,018	1,175	1,303	1,221	1,207	1,236	1,278	1,341	1,422	8	3
Increase over Prior Year (%)	42	12	15	11	-6	-1	2	3	5	6		

NA = Not applicable
Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 5
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Germany
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,648	1,465	1,002	724	551	500	500	500	500	500	-24	-2
Unit Shipments or Seats	6,070	4,141	4,796	4,604	3,337	3,000	2,700	2,500	2,400	2,300	-14	-7
CPU Installed Base	5,093	6,394	7,018	7,164	6,894	6,500	6,000	5,500	5,100	4,800	8	-7
Installed Seats	21,399	25,021	28,686	31,147	31,248	30,300	28,600	26,400	24,000	21,700	10	-7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	341.0	346.6	356.9	389.4	322.8	298.2	274.1	251.2	230.0	211.7	-1	-8
Hardware-Only ASP	147.0	132.7	220.4	285.7	252.1	253.5	244.7	233.7	224.1	215.1	14	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	320	267	252	213	135	124	109	102	98	96	-19	-7
CPU Revenue	204	186	177	143	85	75	66	61	59	58	-20	-7
Terminal Revenue	90	58	56	59	45	45	40	37	36	36	-16	-4
Peripheral Revenue (Turnkey)	27	23	20	11	5	4	4	3	3	3	-34	-11
Software Revenue	74	82	65	40	27	21	19	17	16	15	-23	-11
Bundled	61	68	54	34	21	15	14	12	11	10	-23	-14
Unbundled	12	14	11	6	5	6	5	5	5	5	-19	-3
Service Revenue	83	97	87	66	37	31	28	26	25	24	-18	-8
Total Factory Revenue	477	445	404	318	198	176	156	144	138	135	-20	-7
Increase over Prior Year (%)	7	-7	-9	-21	-38	-11	-11	-7	-4	-2		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 6
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Germany
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	720	1,044	1,151	1,600	1,800	2,200	2,600	3,100	NA	22
Unit Shipments or Seats	NA	NA	720	1,044	1,151	1,600	1,800	2,200	2,600	3,100	NA	22
CPU Installed Base	NA	NA	720	1,763	2,852	4,300	5,700	7,300	8,800	10,400	NA	30
Installed Seats	NA	NA	720	1,763	2,852	4,300	5,700	7,300	8,800	10,400	NA	30
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	78.5	75.1	64.7	62.2	58.9	56.0	53.9	52.1	NA	-4
Hardware-Only ASP	NA	NA	51.6	65.4	65.4	63.4	62.3	61.3	60.4	59.3	NA	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	37	63	67	86	98	117	138	159	NA	19
CPU Revenue	NA	NA	32	58	65	83	96	115	135	157	NA	19
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	4	5	2	3	3	2	2	2	NA	1
Software Revenue	NA	NA	9	12	13	21	24	28	32	36	NA	23
Bundled	NA	NA	7	9	8	13	14	16	17	18	NA	17
Unbundled	NA	NA	2	3	4	8	10	12	14	17	NA	32
Service Revenue	NA	NA	17	21	22	31	35	42	49	57	NA	21
Total Factory Revenue	NA	NA	62	96	101	138	158	187	218	252	NA	20
Increase over Prior Year (%)	NA	NA	NA	54	6	36	14	18	17	15		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 7
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Germany
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	47,265	45,270	51,762	62,766	63,474	67,500	75,100	81,800	88,100	93,000	8	8
Unit Shipments or Seats	47,265	45,270	51,762	62,766	63,474	67,500	75,100	81,800	88,100	93,000	8	8
CPU Installed Base	125,016	158,353	189,898	223,853	250,930	268,500	291,100	322,300	354,700	383,500	19	9
Installed Seats	125,016	158,353	189,898	223,853	250,930	268,500	291,100	322,300	354,700	383,500	19	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	35.5	28.5	17.9	14.9	12.6	11.9	11.4	11.1	10.9	10.7	-23	-3
Hardware-Only ASP	4.0	4.0	3.3	3.0	2.9	2.9	2.9	2.9	2.9	2.9	-8	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	222	210	187	214	217	226	249	270	289	301	-1	7
CPU Revenue	206	194	180	202	207	217	239	260	278	291	0	7
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	15	16	8	12	10	9	10	10	10	11	-11	1
Software Revenue	101	108	124	155	158	165	184	202	220	235	12	8
Bundled	17	14	15	21	33	28	30	32	33	34	17	1
Unbundled	84	94	109	134	125	136	154	170	186	201	11	10
Service Revenue	15	17	17	19	24	25	29	32	37	40	12	11
Total Factory Revenue	338	335	329	387	399	416	462	504	545	576	4	8
Increase over Prior Year (%)	27	-1	-2	18	3	4	11	9	8	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 8
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: Germany
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	26,424	22,689	30,221	34,935	30,925	30,200	31,200	32,500	34,000	35,500	4	3
Unit Shipments or Seats	29,791	24,462	33,076	38,072	33,179	32,300	33,200	34,300	35,700	37,200	3	2
CPU Installed Base	62,933	80,934	102,653	124,796	138,576	145,300	151,000	157,700	163,700	167,900	22	4
Installed Seats	75,365	94,857	118,839	142,904	157,074	163,700	168,700	174,500	179,300	182,300	20	3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	77.1	67.5	60.2	56.7	40.5	36.3	33.8	31.7	30.0	28.9	-15	-7
Hardware-Only ASP	9.4	10.3	8.8	10.5	11.4	12.9	13.0	13.5	14.0	14.4	5	5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	567	519	579	620	511	498	492	499	517	540	-3	1
CPU Revenue	427	411	472	508	427	417	418	430	450	475	-0	2
Terminal Revenue	67	40	38	43	34	37	34	32	31	31	-15	-2
Peripheral Revenue (Turnkey)	73	69	68	69	49	44	41	37	35	34	-9	-7
Software Revenue	226	255	309	313	267	262	269	278	291	305	4	3
Bundled	153	176	197	187	155	146	144	139	137	136	0	-3
Unbundled	73	79	111	126	111	116	125	139	154	169	11	9
Service Revenue	157	191	217	224	213	206	207	210	219	230	8	2
Total Factory Revenue	950	965	1,105	1,158	990	966	968	987	1,027	1,075	1	2
Increase over Prior Year (%)	33	2	15	5	-14	-3	0	2	4	5		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 9
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: Germany
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	16,494	20,803	21,852	32,389	36,598	40,700	46,600	51,500	55,700	58,300	22	10
Unit Shipments or Seats	16,928	21,103	22,202	32,697	36,853	40,800	46,700	51,600	55,700	58,300	21	10
CPU Installed Base	41,539	58,986	74,661	97,573	121,107	142,700	166,800	193,600	219,800	241,400	31	15
Installed Seats	43,057	60,772	76,728	99,807	123,382	144,800	168,600	195,100	221,000	242,300	30	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	54.9	46.8	39.7	32.1	25.4	25.8	24.1	22.8	21.8	21.2	-18	-4
Hardware-Only ASP	5.5	4.6	4.5	4.0	4.2	3.8	3.8	3.8	3.7	3.7	-7	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	149	157	171	223	221	222	239	253	266	274	10	4
CPU Revenue	123	138	150	193	202	208	225	238	251	259	13	5
Terminal Revenue	8	6	6	5	4	1	1	0	0	0	-14	-43
Peripheral Revenue (Turnkey)	18	14	15	25	15	14	14	14	14	14	-4	-1
Software Revenue	66	84	112	158	148	158	175	189	202	213	22	8
Bundled	33	39	48	87	66	67	70	73	76	80	19	4
Unbundled	33	45	64	72	81	92	105	116	126	133	25	10
Service Revenue	29	34	39	55	54	56	60	63	67	71	17	5
Total Factory Revenue	244	275	322	436	423	437	474	504	535	557	15	6
Increase over Prior Year (%)	29	13	17	35	-3	3	8	6	6	4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 10
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: Germany
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	4,096	4,602	4,983	6,405	6,721	8,300	9,700	11,400	13,400	15,600	13	18
Unit Shipments or Seats	4,352	5,006	5,298	6,710	6,921	8,400	9,800	11,500	13,500	15,600	12	18
CPU Installed Base	9,389	13,371	17,185	21,705	25,797	30,300	35,400	41,800	49,300	57,400	29	17
Installed Seats	10,579	14,941	19,024	23,742	27,872	32,300	37,300	43,400	50,600	58,500	27	16
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	77.4	65.9	81.5	61.3	39.3	33.6	31.1	29.1	27.7	26.7	-16	-7
Hardware-Only ASP	10.0	9.2	7.9	9.9	11.4	11.0	10.5	9.9	9.4	9.0	3	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	112	111	113	107	101	110	118	128	140	154	-3	9
CPU Revenue	91	94	93	91	93	101	110	121	133	147	0	10
Terminal Revenue	5	5	5	5	3	3	3	2	1	1	-14	-14
Peripheral Revenue (Turnkey)	16	12	15	11	5	5	5	5	5	6	-24	1
Software Revenue	53	64	61	64	66	74	83	93	105	118	6	12
Bundled	40	46	43	33	28	29	31	32	34	36	-9	5
Unbundled	13	18	18	31	38	45	52	61	71	82	31	17
Service Revenue	26	36	35	46	48	53	58	65	72	81	16	11
Total Factory Revenue	192	211	209	217	215	236	259	286	317	353	3	10
Increase over Prior Year (%)	19	10	-1	4	-1	10	10	11	11	11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 11
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Germany
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	17,030	14,953	17,030	13,986	13,161	13,500	14,300	15,300	16,300	17,800	-6	6
Unit Shipments or Seats	17,394	15,152	17,304	14,115	13,237	13,600	14,400	15,300	16,300	17,800	-7	6
CPU Installed Base	50,085	59,899	68,794	72,047	72,438	70,100	69,000	70,900	74,000	77,800	10	1
Installed Seats	51,251	61,246	70,369	73,651	73,944	71,500	70,200	72,000	74,800	78,300	10	1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	56.5	53.1	43.2	31.5	27.0	31.1	30.8	30.4	30.2	29.9	-17	2
Hardware-Only ASP	8.0	8.6	8.6	9.4	9.9	10.0	9.9	10.2	10.4	10.6	5	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	185	172	175	145	137	141	146	159	173	191	-7	7
CPU Revenue	158	149	161	135	131	134	142	155	169	188	-5	7
Terminal Revenue	10	7	7	5	3	5	3	3	3	3	-24	-3
Peripheral Revenue (Turnkey)	17	16	8	5	2	2	1	1	1	1	-43	-12
Software Revenue	106	114	106	93	94	97	103	111	119	130	-3	7
Bundled	42	41	23	15	12	9	8	7	6	5	-27	-15
Unbundled	64	73	83	79	82	87	95	104	113	125	6	9
Service Revenue	51	61	53	54	59	60	62	66	71	78	4	6
Total Factory Revenue	342	347	335	293	289	297	310	336	364	400	-4	7
Increase over Prior Year (%)	18	2	-4	-13	-1	3	5	8	8	10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 12
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Germany
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	11,386	9,933	12,640	9,669	9,044	9,300	10,000	10,900	11,800	13,300	-6	8
Unit Shipments or Seats	11,515	9,993	12,694	9,692	9,058	9,300	10,000	10,900	11,800	13,300	-6	8
CPU Installed Base	28,185	35,567	44,005	47,723	48,992	47,900	47,300	48,900	51,600	55,300	15	2
Installed Seats	28,528	35,965	44,451	48,171	49,418	48,300	47,600	49,100	51,700	55,300	15	2
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	54.1	48.9	35.0	27.4	22.7	28.1	28.2	28.1	28.0	27.9	-20	4
Hardware-Only ASP	6.6	7.0	7.3	8.3	9.1	9.2	9.5	9.8	10.1	10.2	8	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	109	96	109	90	86	90	99	109	121	138	-6	10
CPU Revenue	90	83	102	84	83	88	97	107	119	136	-2	10
Terminal Revenue	4	2	2	2	1	1	1	1	1	1	-21	-10
Peripheral Revenue (Turnkey)	15	11	5	5	2	1	1	1	1	1	-43	-11
Software Revenue	64	70	74	64	65	68	73	78	85	94	1	8
Bundled	24	22	14	10	8	7	6	5	4	4	-23	-14
Unbundled	39	48	60	54	57	61	67	74	80	90	10	10
Service Revenue	27	31	31	32	37	38	41	45	49	54	8	8
Total Factory Revenue	200	198	213	186	187	196	213	232	254	287	-2	9
Increase over Prior Year (%)	27	-1	8	-13	1	5	8	9	9	13		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 13
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Germany
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	648	454	571	448	663	600	600	700	700	700	1	1
Unit Shipments or Seats	634	442	568	459	651	600	600	700	700	700	1	1
CPU Installed Base	2,260	2,456	2,664	2,689	2,908	3,100	3,200	3,400	3,600	3,700	7	5
Installed Seats	2,341	2,527	2,729	2,758	2,940	3,100	3,200	3,400	3,600	3,700	6	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	54.2	55.5	43.9	38.6	46.8	45.3	44.0	42.8	41.8	41.7	-4	-2
Hardware-Only ASP	17.7	24.1	24.5	40.8	29.3	27.8	28.9	30.2	31.5	32.7	13	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	12	11	14	18	19	17	18	20	22	23	13	4
CPU Revenue	11	10	13	17	19	17	18	20	22	23	15	4
Terminal Revenue	0	0	0	1	0	0	0	0	0	0	-17	-100
Peripheral Revenue (Turnkey)	1	1	1	0	0	0	0	0	0	0	-100	NA
Software Revenue	7	7	9	10	11	11	12	13	15	16	13	8
Bundled	2	2	2	0	0	0	0	0	0	0	-26	-16
Unbundled	5	6	7	9	10	11	12	13	14	15	19	8
Service Revenue	4	6	7	7	9	8	9	10	11	12	21	5
Total Factory Revenue	23	24	30	34	39	37	39	43	47	50	15	5
Increase over Prior Year (%)	-15	8	23	14	15	-6	7	10	10	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 14
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Germany
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	4,996	4,566	3,819	3,869	3,454	3,600	3,600	3,700	3,800	3,800	-9	2
Unit Shipments or Seats	5,245	4,717	4,042	3,964	3,527	3,700	3,700	3,800	3,900	3,800	-9	1
CPU Installed Base	19,639	21,876	22,124	21,635	20,538	19,200	18,400	18,500	18,800	18,800	1	-2
Installed Seats	20,382	22,754	23,189	22,722	21,586	20,200	19,400	19,400	19,500	19,300	1	-2
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	61.6	59.7	67.9	51.2	48.8	44.1	43.8	42.4	42.5	42.2	-6	-3
Hardware-Only ASP	10.0	10.7	10.5	8.5	8.3	9.0	7.7	7.7	7.8	7.9	-5	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	64	65	53	38	31	33	29	30	30	30	-16	-1
CPU Revenue	57	56	46	35	29	30	27	28	28	28	-15	-1
Terminal Revenue	6	5	5	2	2	4	2	2	2	2	-26	2
Peripheral Revenue (Turnkey)	1	4	2	1	0	0	0	0	0	0	-39	-27
Software Revenue	36	37	24	20	18	18	18	19	20	20	-16	3
Bundled	17	18	8	4	3	2	2	2	1	1	-34	-17
Unbundled	19	19	16	16	15	16	16	18	19	19	-7	6
Service Revenue	20	23	16	15	13	13	12	12	12	12	-9	-2
Total Factory Revenue	120	125	92	73	63	64	59	61	62	63	-15	0
Increase over Prior Year (%)	14	5	-27	-21	-14	2	-8	3	2	1		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Software

CAD/CAM/CAE and GIS France Forecast Update

Market Statistics

1994

Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9413
Publication Date: September 12, 1994

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Note: All tables show estimated data.

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CAD/CAM/CAE and GIS France Forecast Update

Fluctuating exchange rates masked true market performance in the 1993 CAD/CAM/CAE and GIS market. Japanese CAD/CAM/CAE and GIS total revenue grew a surprising 2.8 percent from 1992 to 1993 when measured in U.S. dollars, contrary to what would be expected in the worst recession Japan has experienced in 50 years. However, the dollar depreciated against the yen at a rate of 12.3 percent, so when measured in yen, Japanese CAD/CAM/CAE and GIS total revenue declined 9.8 percent from 1992 to 1993.

In the meantime, European CAD/CAM/CAE and GIS total revenue declined 7.8 percent from 1992 to 1993 when measured in U.S. dollars. With the dollar appreciating 10.0 percent against the ECU, European CAD/CAM/CAE and GIS total revenue grew 2.8 percent from 1992 to 1993 when measured in ECU. Table 1 shows the dramatic impact that currency fluctuation has on the CAD/CAM/CAE and GIS.

The yen has been strengthening against the dollar for the past three years, changing in 1993 at a rate twice that of previous years. And the end is not in sight. In contrast, Hong Kong and Singapore had relatively stable currency during 1993, while the currencies in China, Korea, and Taiwan weakened against the dollar. In Europe, 1993 was a year for weakening of local currencies against the dollar after having currencies strengthened against the dollar in 1992.

The midyear indications are that currencies are beginning to stabilize (see Table 2). Although Dataquest does not forecast currency exchange rates, we do forecast with the best information available. The exchange rate is calculated as the simple arithmetic mean of the 12 average monthly rates for each country. For the purpose of this forecast, Dataquest assumes the June exchange rate will apply for the future.

Dataquest's forecast is based on the updated market share data, gathered in March and April of this year. It includes country-level forecast for Asia and Europe.

This document contains Dataquest's detailed forecast information for the CAD/CAM/CAE and GIS industry. Included are the following:

- Five-year historical data
- Five-year forecast data

More detailed data is available through Dataquest's Client Inquiry service, which can provide custom analysis of the multidimensional database.

The CAD/CAM/CAE and GIS *Dataquest Perspective* (CCAM-WW-DP-9404), available in September, contains additional tables and analysis and is a companion piece to this book.

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Table 1
CAD/CAM/CAE and GIS Revenue Growth Comparison
(U.S. Dollars versus Local Currency for Both Europe and Japan)

	1992	1993	Forecast 1998	Growth (%) 1992-1993	Growth (%) 1993-1998
Europe (U.S.$ Million)					
Software Revenue	1,693.8	1,608.7	2,231.4	-5.0	6.8
Hardware Revenue	3,037.8	2,701.7	3,388.8	-11.1	4.6
Service Revenue	1,106.6	1,072.2	1,381.4	-3.1	5.2
Total Factory Revenue	5,838.2	5,382.6	7,001.6	-7.8	5.4
ECU/U.S.$ Exchange Rate	*0.7686*	*0.8566*	*0.8419**	*11.4*	*-0.3*
Europe (ECU Million)					
Software Revenue	1,301.8	1,378.0	1,878.6	5.9	6.4
Hardware Revenue	2,334.9	2,314.3	2,853.0	-0.9	4.3
Service Revenue	850.5	918.5	1,163.0	8.0	4.8
Total Factory Revenue	4,487.3	4,610.8	5,894.6	2.8	5.0
Japan (U.S.$ Million)					
Software Revenue	1,270.4	1,371.2	2,010.2	7.9	8.0
Hardware Revenue	2,420.1	2,397.0	2,759.8	-1.0	2.9
Service Revenue	617.4	665.5	887.7	7.8	5.9
Total Factory Revenue	4,317.8	4,438.8	5,657.8	2.8	5.0
Yen/U.S.$ Exchange Rate	*126.34*	*110.85*	*101.56**	*-12.3*	*-1.7*
Japan (Yen Million)					
Software Revenue	160,506	152,001	204,155	-5.3	6.1
Hardware Revenue	305,752	265,706	280,289	-13.1	1.1
Service Revenue	78,000	73,768	90,158	-5.4	4.1
Total Factory Revenue	545,508	492,037	574,603	-9.8	3.2
North America (U.S.$ Million)					
Software Revenue	1,562.5	1,754.6	3,085.6	12.3	12.0
Hardware Revenue	2,672.1	2,824.5	4,477.9	5.7	9.7
Service Revenue	931.5	1,092.3	1,904.2	17.3	11.8
Total Factory Revenue	5,166.6	5,671.3	9,467.7	9.8	10.8
Worldwide (U.S.$ Million)					
Software Revenue	4,717.1	5,021.5	7,956.1	6.5	9.6
Hardware Revenue	8,424.4	8,308.7	11,367.1	-1.4	6.5
Service Revenue	2,776.3	2,989.5	4,496.3	7.7	8.5
Total Factory Revenue	15,928.3	16,325.7	23,819.0	2.5	7.8

*Assuming a stable currency, the 1998 exchange rate is the June 1994 exchange rate.

Source: Dataquest (September 1994)

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Table 2
Foreign Currency/U.S. Dollar

		Actual				Current	Current	Year-to-Year Change (%)				
		1990	1991	1992	1993	1994	1995-1998	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995
European Community	ECU	NA	0.8079	0.7686	0.8566	0.8561	0.8419		-5	11	0	-2
France	Franc	5.4277	5.6183	5.2571	5.6641	5.6343	5.5346	4	-6	8	-1	-2
Germany	Mark	1.6111	1.6523	1.5513	1.6543	1.6485	1.6163	3	-6	7	0	-2
Italy	Lira	1195.03	1235.03	1220.85	1575.05	1610.71	1584.79	3	-1	29	2	-2
Netherlands	Guilder	1.81	1.86	1.75	1.86	1.85	1.8126	3	-6	6	0	-2
Spain	Peseta	101.70	103.48	101.50	127.10	135.40	133.39	2	-2	25	7	-1
Sweden	Krona	5.9137	6.0314	5.7770	7.8003	7.7955	7.7340	2	-4	35	0	-1
United Kingdom	Pound	0.5599	0.5658	0.5652	0.6665	0.6604	0.6549	1	0	18	-1	-1
China	Renminbi	4.7912	5.3340	5.5076	5.7580	8.5534	8.6895	11	3	5	49	2
Hong Kong	Dollar	7.7900	7.7712	7.7399	7.7351	7.7271	7.7280	0	0	0	0	0
Japan	Yen	144.05	134.59	126.34	110.85	103.08	101.56	-7	-6	-12	-7	-1
Korea	Won	242.70	730.67	782.41	799.42	806.49	805.80	201	7	2	1	0
Singapore	Dollar	1.8129	1.7277	1.6284	1.6155	1.5481	1.5300	-5	-6	-1	-4	-1
Taiwan	Dollar	26.64	26.49	24.93	26.15	26.77	26.98	-1	-6	5	2	1

NA = Not applicable

Source: Dataquest (September 1994)

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A new forecasting process for each application is being used to improve revenue and unit shipment control by region and by platform. This new process may cause some mismatch in market share tables and forecast tables. Please use the forecast tables to understand the year-to-year changes. Use the market share tables to compare company-to-company performance.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is the underlying philosophy that the best data and analyses come from a well-balanced program. This program includes the following: balance between primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from the more than 25 separate high-technology industries Dataquest covers; and balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macro environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at gross national product (GNP) growth, interest rate fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1994.

Figure 1 shows the CAD/CAM/CAE and GIS forecasting model. The overall forecasting process uses a combination of techniques such as time series and technological modeling. Market estimates and forecasts are derived using the following research techniques:

- "Bottom-up" aggregation—This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting—For each application segment tracked by the CAD/CAM/CAE and GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis—Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market model and a satisfied available market figure to assess the levels of penetration accurately. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Dataquest analysts also factor in the acceptance or ability for users to consume new technology.

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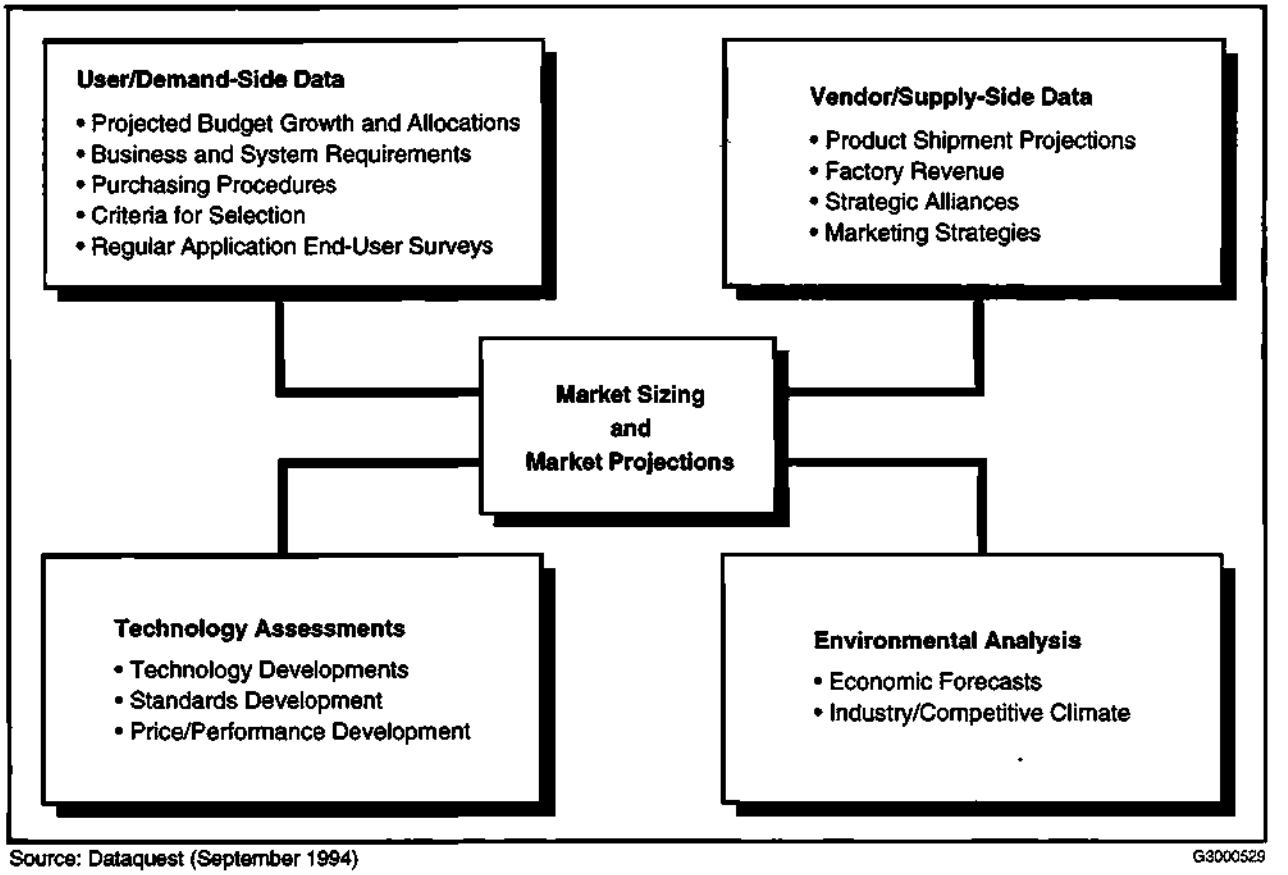
Figure 1
CAD/CAM/CAE and GIS Forecasting Model



Source: Dataquest (September 1994) G3000529

- Capacity-based analysis—This method involves identifying future shipment volume constraints. These constraints, or "ceilings," can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below the demand level.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and

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electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic computer-aided engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of ECAE applications are schematic capture and simulation.
- IC layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe (which includes Austria, Switzerland, and eastern Europe)

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong.

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Rest of World

Rest of World includes all other countries and regions, including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

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Line Items

Line item definitions are as follows:

- Average selling price (ASP) is defined as the average price of a product, inclusive of any discounts.
- CPU revenue is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
- CPU shipment is defined as the number of CPUs delivered.
- CPU installed base is defined as the total number of CPUs in active, day-to-day use.
- Unit shipment is defined as the number of products delivered (that is, seats).
- Seats are defined as the number of possible simultaneous users.
- Installed seats are defined as the total number of seats in active, day-to-day use.
- Hardware revenue is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
- Peripherals revenue is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
- Terminal revenue is defined as revenue derived from the sale of terminals used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform, as terminal revenue is contained within CPU revenue for technical workstations and PCs.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
- Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue that a company may receive from products sold to another company for resale (OEM revenue).

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Table 3
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: France
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	20,876	20,932	24,060	29,301	30,545	32,900	35,100	37,400	39,700	42,100	10	7
Unit Shipments or Seats	22,838	22,171	25,924	31,087	31,514	33,900	36,000	38,200	40,500	42,800	8	6
CPU Installed Base	48,818	66,309	83,845	103,124	119,724	133,300	146,300	160,800	174,400	185,600	25	9
Installed Seats	58,606	77,114	96,022	116,094	132,114	144,700	156,600	169,800	182,200	192,300	23	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	80.7	67.3	67.1	61.2	41.1	34.2	32.2	30.3	28.8	27.7	-16	-8
Hardware-Only ASP	10.0	10.5	9.6	10.6	9.9	9.9	9.8	9.9	10.1	10.2	-0	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	381	380	409	454	386	390	400	417	438	461	0	4
CPU Revenue	306	313	341	394	344	348	361	381	403	428	3	4
Terminal Revenue	39	28	28	27	16	17	16	14	14	14	-19	-4
Peripheral Revenue (Turnkey)	36	40	40	33	26	24	23	22	21	20	-8	-5
Software Revenue	166	205	221	243	232	236	249	264	279	296	9	5
Bundled	94	106	105	102	85	80	79	77	75	74	-2	-3
Unbundled	72	99	116	141	147	156	170	187	204	222	19	9
Service Revenue	121	155	153	171	154	152	157	165	175	186	6	4
Total Factory Revenue	668	740	783	868	772	778	806	846	891	943	4	4
Increase over Prior Year (%)	19	11	6	11	-11	1	4	5	5	6		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 4
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: France
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	5,655	6,570	7,684	8,594	8,900	9,000	9,600	10,200	10,900	11,800	12	6
Unit Shipments or Seats	5,655	6,570	7,684	8,594	8,900	9,000	9,600	10,200	10,900	11,800	12	6
CPU Installed Base	12,730	18,649	25,017	31,532	37,253	42,100	46,300	50,200	53,800	56,700	31	9
Installed Seats	12,730	18,649	25,017	31,532	37,253	42,100	46,300	50,200	53,800	56,700	31	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	59.4	52.2	50.7	54.5	43.7	41.3	39.1	37.2	35.7	34.4	-7	-5
Hardware-Only ASP	17.2	20.5	20.5	24.5	24.3	23.8	23.4	22.9	22.5	22.0	9	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	170	189	208	244	223	216	220	226	235	246	7	2
CPU Revenue	147	164	183	222	204	199	204	212	221	233	9	3
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	23	26	24	23	19	17	16	14	14	13	-5	-7
Software Revenue	105	135	146	168	161	160	167	176	185	196	11	4
Bundled	65	77	74	80	69	64	63	60	59	58	1	-3
Unbundled	40	58	71	88	92	96	105	115	126	138	23	8
Service Revenue	75	104	99	125	120	117	121	126	131	138	12	3
Total Factory Revenue	351	428	452	538	504	493	508	528	551	580	9	3
Increase over Prior Year (%)	48	22	6	19	-6	-2	3	4	4	5		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 5
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: France
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	787	718	443	326	234	300	200	200	200	200	-26	-3
Unit Shipments or Seats	2,749	1,957	2,307	2,112	1,204	1,200	1,100	1,000	900	900	-19	-6
CPU Installed Base	2,676	3,292	3,518	3,513	3,320	3,100	2,900	2,600	2,500	2,300	6	-7
Installed Seats	12,464	14,097	15,695	16,483	15,710	14,500	13,100	11,700	10,300	9,000	6	-11
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	474.1	462.3	432.0	479.6	377.9	347.3	318.8	292.5	267.9	246.6	-6	-8
Hardware-Only ASP	119.8	113.0	209.5	256.7	211.3	204.0	198.6	192.0	184.6	178.1	15	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	145	124	123	102	54	55	50	46	44	42	-22	-5
CPU Revenue	97	87	86	71	36	37	33	30	29	28	-22	-5
Terminal Revenue	39	28	28	27	16	17	16	14	14	14	-19	-4
Peripheral Revenue (Turnkey)	9	9	9	4	1	1	1	1	1	1	-37	-10
Software Revenue	32	37	32	19	10	9	8	7	7	6	-24	-9
Bundled	26	26	24	14	7	6	5	5	4	4	-28	-11
Unbundled	6	11	8	6	4	3	3	3	3	2	-11	-7
Service Revenue	40	43	40	28	14	14	13	12	11	11	-22	-5
Total Factory Revenue	216	204	195	149	79	79	71	65	62	60	-22	-6
Increase over Prior Year (%)	-16	-5	-5	-23	-47	-0	-10	-9	-5	-4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 6
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: France
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	411	699	733	700	900	1,100	1,300	1,500	NA	15
Unit Shipments or Seats	NA	NA	411	699	733	700	900	1,100	1,300	1,500	NA	15
CPU Installed Base	NA	NA	411	1,110	1,801	2,400	3,100	3,800	4,400	5,100	NA	23
Installed Seats	NA	NA	411	1,110	1,801	2,400	3,100	3,800	4,400	5,100	NA	23
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	75.0	75.5	69.1	65.4	62.1	59.2	57.1	55.2	NA	-4
Hardware-Only ASP	NA	NA	49.9	59.7	62.0	61.0	59.8	58.9	57.9	56.9	NA	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	20	40	42	42	48	58	68	78	NA	13
CPU Revenue	NA	NA	18	38	41	41	48	58	68	78	NA	14
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	2	2	1	1	1	1	1	1	NA	-13
Software Revenue	NA	NA	5	7	8	8	9	11	12	14	NA	11
Bundled	NA	NA	4	5	5	4	4	5	5	5	NA	3
Unbundled	NA	NA	1	3	4	4	5	6	7	8	NA	19
Service Revenue	NA	NA	9	13	14	14	16	19	22	26	NA	13
Total Factory Revenue	NA	NA	35	60	64	64	74	88	103	118	NA	13
Increase over Prior Year (%)	NA	NA	NA	73	8	-1	16	20	17	14		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 7
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: France
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	14,435	13,643	15,522	19,682	20,678	22,900	24,400	25,900	27,300	28,600	9	7
Unit Shipments or Seats	14,435	13,643	15,522	19,682	20,678	22,900	24,400	25,900	27,300	28,600	9	7
CPU Installed Base	33,412	44,368	54,898	66,969	77,350	85,600	94,100	104,200	113,700	121,400	23	9
Installed Seats	33,412	44,368	54,898	66,969	77,350	85,600	94,100	104,200	113,700	121,400	23	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	27.2	21.2	16.4	11.6	10.4	9.2	9.0	8.9	8.7	8.6	-21	-4
Hardware-Only ASP	4.3	4.7	3.6	3.3	3.0	3.1	3.1	3.1	3.1	3.1	-9	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	66	67	59	68	67	76	82	87	91	94	0	7
CPU Revenue	63	62	54	64	63	71	76	81	85	89	0	7
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	4	5	5	4	4	5	5	6	6	6	3	7
Software Revenue	29	33	38	49	53	59	64	69	75	80	16	9
Bundled	3	3	3	3	5	6	7	7	7	7	15	9
Unbundled	26	30	35	46	48	53	58	63	68	73	16	9
Service Revenue	6	8	4	5	6	7	8	9	10	11	-1	15
Total Factory Revenue	101	108	101	121	125	142	153	165	176	185	5	8
Increase over Prior Year (%)	48	7	-7	20	3	14	8	7	7	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 8
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: France
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	8,876	8,905	10,760	13,613	14,040	15,300	15,800	16,400	16,900	17,400	12	4
Unit Shipments or Seats	10,416	9,776	12,187	15,165	14,892	16,100	16,600	17,100	17,600	18,100	9	4
CPU Installed Base	21,051	28,556	36,529	45,872	53,975	61,100	67,500	73,700	78,800	82,000	27	9
Installed Seats	28,666	36,861	45,867	55,963	63,708	70,200	75,900	81,400	85,600	88,100	22	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	91.6	75.1	73.5	71.8	45.1	36.2	33.7	31.5	29.8	28.7	-16	-9
Hardware-Only ASP	12.0	13.0	10.8	13.5	12.3	12.2	12.3	12.8	13.3	13.8	1	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	232	226	244	286	225	223	224	229	237	246	-1	2
CPU Revenue	181	183	199	243	196	193	196	204	213	223	2	3
Terminal Revenue	29	19	20	21	13	15	14	13	13	12	-17	-2
Peripheral Revenue (Turnkey)	22	24	25	23	16	15	14	13	12	11	-8	-7
Software Revenue	96	118	130	142	128	127	132	136	141	147	7	3
Bundled	63	76	79	75	64	60	59	57	55	53	0	-4
Unbundled	34	42	51	67	65	67	73	80	87	94	18	8
Service Revenue	77	96	99	111	91	87	88	91	95	99	4	2
Total Factory Revenue	405	440	472	539	444	437	444	457	473	492	2	2
Increase over Prior Year (%)	23	8	7	14	-18	-2	2	3	4	4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 9
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: France
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	4,695	5,859	6,487	6,798	6,451	7,200	7,800	8,500	9,100	9,600	8	8
Unit Shipments or Seats	4,876	6,013	6,676	6,906	6,511	7,200	7,800	8,500	9,100	9,600	7	8
CPU Installed Base	9,137	14,429	19,782	24,604	27,916	30,200	32,200	34,900	37,900	40,600	32	8
Installed Seats	10,076	15,504	21,002	25,846	29,085	31,200	33,000	35,500	38,300	40,800	30	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	49.0	45.1	42.0	34.7	28.0	25.1	23.5	22.2	21.2	20.7	-13	-6
Hardware-Only ASP	6.8	5.8	4.8	4.9	5.0	4.5	4.4	4.4	4.4	4.3	-7	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	46	53	52	47	42	41	42	44	46	48	-2	3
CPU Revenue	37	45	42	41	38	37	38	41	43	44	0	3
Terminal Revenue	4	3	3	2	1	0	0	0	0	0	-25	-46
Peripheral Revenue (Turnkey)	5	6	6	5	4	4	3	4	4	4	-9	1
Software Revenue	19	25	28	30	26	27	29	31	33	34	9	6
Bundled	6	10	9	11	8	8	8	8	8	9	6	1
Unbundled	12	16	18	19	18	19	21	23	24	26	11	7
Service Revenue	12	16	13	15	12	11	11	12	13	14	0	2
Total Factory Revenue	77	95	93	93	81	79	82	87	92	96	1	4
Increase over Prior Year (%)	37	24	-2	0	-13	-2	4	6	5	5		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 10
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: France
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,656	1,268	1,516	2,465	3,343	3,700	4,300	5,000	5,800	6,600	19	15
Unit Shipments or Seats	1,765	1,398	1,651	2,545	3,387	3,700	4,300	5,100	5,900	6,600	18	14
CPU Installed Base	2,457	3,636	4,927	6,919	9,482	11,900	14,700	17,900	21,300	24,800	40	21
Installed Seats	2,805	4,107	5,517	7,556	10,116	12,500	15,200	18,400	21,700	25,100	38	20
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	95.6	69.7	84.5	57.0	39.2	41.9	38.7	36.3	34.5	33.2	-20	-3
Hardware-Only ASP	9.1	11.8	8.9	10.8	10.3	10.5	10.0	9.6	9.1	8.8	3	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	26	31	34	43	47	52	57	61	65	70	16	8
CPU Revenue	21	25	26	39	42	47	51	56	60	65	18	9
Terminal Revenue	2	2	2	2	1	1	1	0	0	0	-21	-19
Peripheral Revenue (Turnkey)	3	4	6	3	5	5	5	5	5	5	13	1
Software Revenue	10	13	14	21	26	30	34	38	42	46	28	12
Bundled	7	7	8	10	9	9	9	10	10	10	7	4
Unbundled	3	6	7	11	18	21	24	28	32	36	52	15
Service Revenue	7	10	10	15	20	23	26	28	31	34	28	12
Total Factory Revenue	44	54	58	79	93	105	116	127	138	150	21	10
Increase over Prior Year (%)	68	23	8	36	18	13	10	10	9	8		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 11
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: France
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	5,649	4,900	5,296	6,424	6,711	6,800	7,100	7,500	7,900	8,500	4	5
Unit Shipments or Seats	5,781	4,984	5,411	6,471	6,725	6,800	7,100	7,500	7,900	8,500	4	5
CPU Installed Base	16,173	19,687	22,606	25,729	28,352	30,100	31,900	34,300	36,400	38,200	15	6
Installed Seats	17,059	20,643	23,636	26,729	29,205	30,800	32,500	34,600	36,600	38,300	14	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	61.4	53.3	50.7	41.5	34.0	19.4	19.6	19.5	19.3	18.8	-14	-11
Hardware-Only ASP	10.3	12.3	13.5	11.1	10.3	10.9	10.8	11.0	11.2	11.4	0	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	76	70	80	76	72	74	77	82	89	97	-1	6
CPU Revenue	66	60	74	72	69	72	75	81	87	95	1	6
Terminal Revenue	4	3	3	2	1	1	1	1	1	1	-27	-5
Peripheral Revenue (Turnkey)	5	6	3	2	2	1	1	1	1	1	-26	-18
Software Revenue	41	49	49	51	51	52	55	59	63	69	6	6
Bundled	18	14	9	6	4	3	3	2	2	2	-30	-16
Unbundled	23	35	40	45	47	49	52	57	61	67	19	7
Service Revenue	25	32	31	30	31	31	32	34	36	39	5	5
Total Factory Revenue	142	152	160	157	154	157	164	175	188	204	2	6
Increase over Prior Year (%)	-6	7	5	-2	-2	2	5	7	7	9		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 12
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: France
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	3,731	2,824	3,496	4,108	4,344	4,500	4,600	4,900	5,200	5,800	4	6
Unit Shipments or Seats	3,776	2,850	3,521	4,110	4,340	4,500	4,600	4,900	5,200	5,800	4	6
CPU Installed Base	8,983	11,103	13,397	15,735	17,715	19,000	20,300	21,900	23,500	25,000	19	7
Installed Seats	9,230	11,374	13,689	16,018	17,964	19,200	20,400	22,000	23,500	25,000	18	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	55.8	50.9	46.9	38.7	30.6	14.5	14.8	15.1	15.3	15.0	-14	-13
Hardware-Only ASP	7.8	10.4	11.3	9.9	9.4	10.9	10.9	11.0	11.3	11.3	5	4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	38	35	44	44	43	48	50	53	58	65	3	9
CPU Revenue	32	29	41	42	41	46	48	52	57	64	6	10
Terminal Revenue	2	1	1	1	1	1	1	1	1	1	-23	3
Peripheral Revenue (Turnkey)	4	4	2	1	1	1	1	1	1	1	-21	-17
Software Revenue	23	26	29	32	33	35	36	38	41	46	10	6
Bundled	10	7	4	3	2	2	1	1	1	1	-30	-16
Unbundled	13	20	25	29	31	33	35	37	40	45	24	7
Service Revenue	11	16	16	16	18	19	20	21	23	25	12	7
Total Factory Revenue	72	77	89	92	94	102	106	113	122	136	7	8
Increase over Prior Year (%)	-16	8	15	4	2	9	4	7	9	11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 13
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: France
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	364	355	543	359	452	400	400	500	500	500	6	2
Unit Shipments or Seats	353	348	541	361	446	400	400	500	500	500	6	2
CPU Installed Base	1,175	1,433	1,819	1,963	2,156	2,300	2,400	2,500	2,600	2,700	16	5
Installed Seats	1,235	1,492	1,878	2,028	2,194	2,300	2,400	2,500	2,600	2,600	15	3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	53.9	53.1	42.7	33.9	47.7	46.0	44.6	43.0	42.2	42.0	-3	-3
Hardware-Only ASP	18.4	21.3	21.4	36.1	28.9	27.3	28.3	29.4	30.5	31.6	12	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	7	8	12	13	13	12	12	14	15	16	18	3
CPU Revenue	6	7	12	12	13	12	12	14	15	16	19	4
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-12	-100
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-100	NA
Software Revenue	4	8	9	8	8	8	9	10	10	11	20	7
Bundled	1	1	2	0	0	0	0	0	0	0	-29	-16
Unbundled	3	7	7	8	7	8	8	10	10	11	28	8
Service Revenue	3	4	6	5	6	6	6	7	7	8	25	5
Total Factory Revenue	13	20	27	26	27	26	27	31	32	34	20	5
Increase over Prior Year (%)	-25	53	36	-6	5	-5	6	13	6	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 14
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: France
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,555	1,720	1,257	1,957	1,915	1,900	2,100	2,100	2,200	2,200	5	3
Unit Shipments or Seats	1,652	1,786	1,350	2,000	1,939	1,900	2,100	2,100	2,200	2,200	4	3
CPU Installed Base	6,016	7,151	7,390	8,031	8,481	8,700	9,300	9,800	10,300	10,600	9	5
Installed Seats	6,594	7,777	8,070	8,683	9,047	9,200	9,600	10,100	10,500	10,700	8	3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	69.5	56.4	62.5	46.2	38.7	40.8	39.4	37.5	36.7	38.2	-14	-0
Hardware-Only ASP	14.9	13.7	16.8	8.8	7.8	7.0	6.8	6.9	6.9	7.0	-15	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	32	28	24	20	16	14	15	15	15	16	-15	-1
CPU Revenue	28	24	21	18	16	14	14	15	15	15	-13	-0
Terminal Revenue	3	2	2	1	1	0	0	0	0	0	-30	-12
Peripheral Revenue (Turnkey)	1	2	1	0	0	0	0	0	0	0	-40	-24
Software Revenue	15	15	11	11	10	9	10	11	11	12	-10	4
Bundled	7	6	3	3	2	1	1	1	1	1	-29	-16
Unbundled	7	9	8	8	8	8	9	10	11	11	2	7
Service Revenue	11	12	8	8	7	6	6	6	6	7	-11	-2
Total Factory Revenue	57	55	44	39	33	30	32	32	33	34	-13	1
Increase over Prior Year (%)	16	-4	-20	-10	-15	-11	7	2	3	2		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Software

CAD/CAM/CAE and GIS Benelux Forecast Update

Market Statistics

1994

Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9412
Publication Date: September 5, 1994

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Note: All tables show estimated data.

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CAD/CAM/CAE and GIS Benelux Forecast Update

Fluctuating exchange rates masked true market performance in the 1993 CAD/CAM/CAE and GIS market. Japanese CAD/CAM/CAE and GIS total revenue grew a surprising 2.8 percent from 1992 to 1993 when measured in U.S. dollars, contrary to what would be expected in the worst recession Japan has experienced in 50 years. However, the dollar depreciated against the yen at a rate of 12.3 percent, so when measured in yen, Japanese CAD/CAM/CAE and GIS total revenue declined 9.8 percent from 1992 to 1993.

In the meantime, European CAD/CAM/CAE and GIS total revenue declined 7.8 percent from 1992 to 1993 when measured in U.S. dollars. With the dollar appreciating 10.0 percent against the ECU, European CAD/CAM/CAE and GIS total revenue grew 2.8 percent from 1992 to 1993 when measured in ECU. Table 1 shows the dramatic impact that currency fluctuation has on the CAD/CAM/CAE and GIS.

The yen has been strengthening against the dollar for the past three years, changing in 1993 at a rate twice that of previous years. And the end is not in sight. In contrast, Hong Kong and Singapore had relatively stable currency during 1993, while the currencies in China, Korea, and Taiwan weakened against the dollar. In Europe, 1993 was a year for weakening of local currencies against the dollar after having currencies strengthened against the dollar in 1992.

The midyear indications are that currencies are beginning to stabilize (see Table 2). Although Dataquest does not forecast currency exchange rates, we do forecast with the best information available. The exchange rate is calculated as the simple arithmetic mean of the 12 average monthly rates for each country. For the purpose of this forecast, Dataquest assumes the June exchange rate will apply for the future.

Dataquest's forecast is based on the updated market share data, gathered in March and April of this year. It includes country-level forecast for Asia and Europe.

This document contains Dataquest's detailed forecast information for the CAD/CAM/CAE and GIS industry. Included are the following:

- Five-year historical data
- Five-year forecast data

More detailed data is available through Dataquest's Client Inquiry service, which can provide custom analysis of the multidimensional database.

The CAD/CAM/CAE and GIS *Dataquest Perspective* (CCAM-WW-DP-9404), available in September, contains additional tables and analysis and is a companion piece to this book.

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Table 1
CAD/CAM/CAE and GIS Revenue Growth Comparison
(U.S. Dollars versus Local Currency for Both Europe and Japan)

	1992	1993	Forecast 1998	Growth (%) 1992-1993	Growth (%) 1993-1998
Europe (U.S.$ Million)					
Software Revenue	1,693.8	1,608.7	2,231.4	-5.0	6.8
Hardware Revenue	3,037.8	2,701.7	3,388.8	-11.1	4.6
Service Revenue	1,106.6	1,072.2	1,381.4	-3.1	5.2
Total Factory Revenue	5,838.2	5,382.6	7,001.6	-7.8	5.4
ECU/U.S.$ Exchange Rate	*0.7686*	*0.8566*	*0.8419**	*11.4*	*-0.3*
Europe (ECU Million)					
Software Revenue	1,301.8	1,378.0	1,878.6	5.9	6.4
Hardware Revenue	2,334.9	2,314.3	2,853.0	-0.9	4.3
Service Revenue	850.5	918.5	1,163.0	8.0	4.8
Total Factory Revenue	4,487.3	4,610.8	5,894.6	2.8	5.0
Japan (U.S.$ Million)					
Software Revenue	1,270.4	1,371.2	2,010.2	7.9	8.0
Hardware Revenue	2,420.1	2,397.0	2,759.8	-1.0	2.9
Service Revenue	617.4	665.5	887.7	7.8	5.9
Total Factory Revenue	4,317.8	4,438.8	5,657.8	2.8	5.0
Yen/U.S.$ Exchange Rate	*126.34*	*110.85*	*101.56**	*-12.3*	*-1.7*
Japan (Yen Million)					
Software Revenue	160,506	152,001	204,155	-5.3	6.1
Hardware Revenue	305,752	265,706	280,289	-13.1	1.1
Service Revenue	78,000	73,768	90,158	-5.4	4.1
Total Factory Revenue	545,508	492,037	574,603	-9.8	3.2
North America (U.S.$ Million)					
Software Revenue	1,562.5	1,754.6	3,085.6	12.3	12.0
Hardware Revenue	2,672.1	2,824.5	4,477.9	5.7	9.7
Service Revenue	931.5	1,092.3	1,904.2	17.3	11.8
Total Factory Revenue	5,166.6	5,671.3	9,467.7	9.8	10.8
Worldwide (U.S.$ Million)					
Software Revenue	4,717.1	5,021.5	7,956.1	6.5	9.6
Hardware Revenue	8,424.4	8,308.7	11,367.1	-1.4	6.5
Service Revenue	2,776.3	2,989.5	4,496.3	7.7	8.5
Total Factory Revenue	15,928.3	16,325.7	23,819.0	2.5	7.8

*Assuming a stable currency, the 1998 exchange rate is the June 1994 exchange rate.
Source: Dataquest (September 1994)

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Table 2
Foreign Currency/U.S. Dollar

		Actual				Current	Current	Year-to-Year Change (%)				
		1990	1991	1992	1993	1994	1995-1998	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995
European Community	ECU	NA	0.8079	0.7686	0.8566	0.8561	0.8419		-5	11	0	-2
France	Franc	5.4277	5.6183	5.2571	5.6641	5.6343	5.5346	4	-6	8	-1	-2
Germany	Mark	1.6111	1.6523	1.5513	1.6543	1.6485	1.6163	3	-6	7	0	-2
Italy	Lira	1195.03	1235.03	1220.85	1575.05	1610.71	1584.79	3	-1	29	2	-2
Netherlands	Guilder	1.81	1.86	1.75	1.86	1.85	1.8126	3	-6	6	0	-2
Spain	Peseta	101.70	103.48	101.50	127.10	135.40	133.39	2	-2	25	7	-1
Sweden	Krona	5.9137	6.0314	5.7770	7.8003	7.7955	7.7340	2	-4	35	0	-1
United Kingdom	Pound	0.5599	0.5658	0.5652	0.6665	0.6604	0.6549	1	0	18	-1	-1
China	Renminbi	4.7912	5.3340	5.5076	5.7580	8.5534	8.6895	11	3	5	49	2
Hong Kong	Dollar	7.7900	7.7712	7.7399	7.7351	7.7271	7.7280	0	0	0	0	0
Japan	Yen	144.05	134.59	126.34	110.85	103.08	101.56	-7	-6	-12	-7	-1
Korea	Won	242.70	730.67	782.41	799.42	806.49	805.80	201	7	2	1	0
Singapore	Dollar	1.8129	1.7277	1.6284	1.6155	1.5481	1.5300	-5	-6	-1	-4	-1
Taiwan	Dollar	26.64	26.49	24.93	26.15	26.77	26.98	-1	-6	5	2	1

NA = Not applicable

Source: Dataquest (September 1994)

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A new forecasting process for each application is being used to improve revenue and unit shipment control by region and by platform. This new process may cause some mismatch in market share tables and forecast tables. Please use the forecast tables to understand the year-to-year changes. Use the market share tables to compare company-to-company performance.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is the underlying philosophy that the best data and analyses come from a well-balanced program. This program includes the following: balance between primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from the more than 25 separate high-technology industries Dataquest covers; and balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macro environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at gross national product (GNP) growth, interest rate fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1994.

Figure 1 shows the CAD/CAM/CAE and GIS forecasting model. The overall forecasting process uses a combination of techniques such as time series and technological modeling. Market estimates and forecasts are derived using the following research techniques:

- "Bottom-up" aggregation—This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting—For each application segment tracked by the CAD/CAM/CAE and GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis—Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market model and a satisfied available market figure to assess the levels of penetration accurately. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Dataquest analysts also factor in the acceptance or ability for users to consume new technology.

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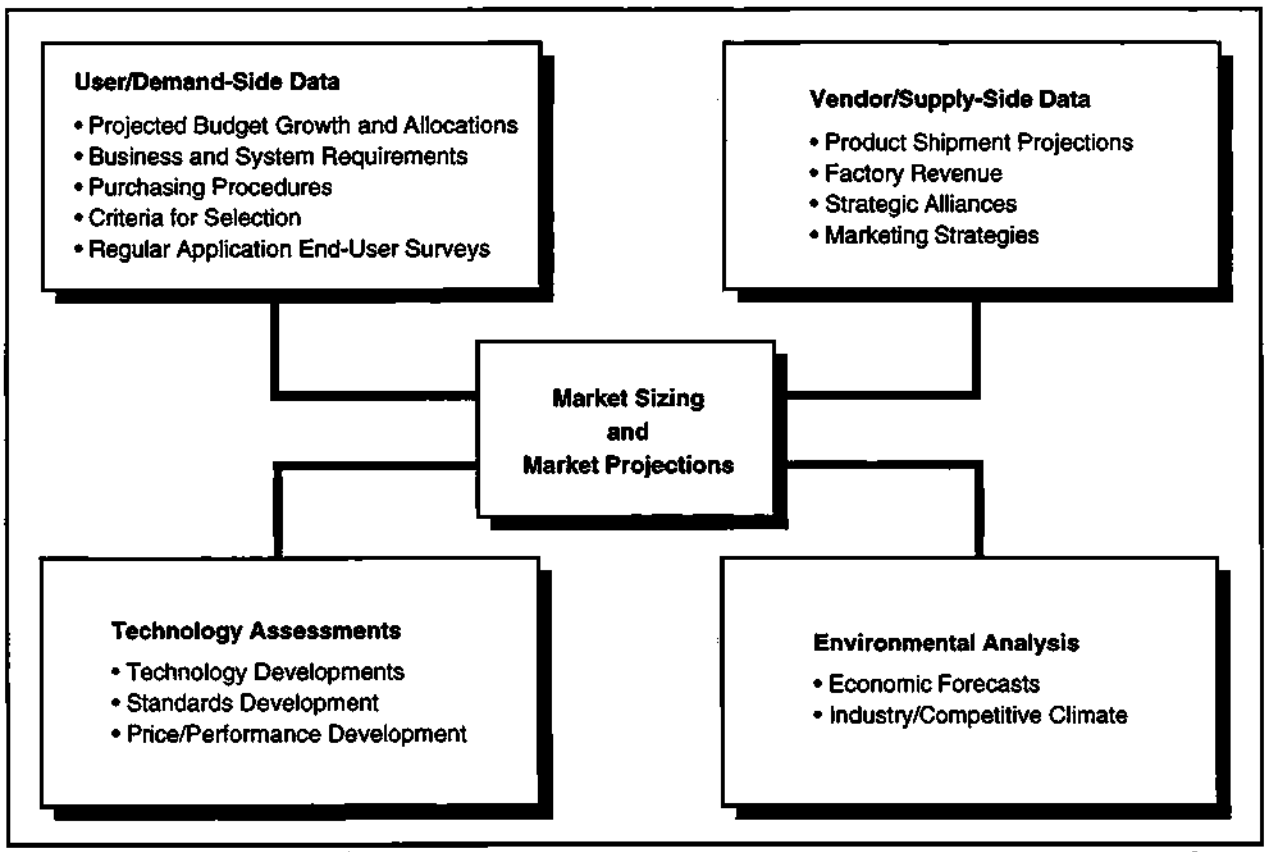
Figure 1
CAD/CAM/CAE and GIS Forecasting Model



Source: Dataquest (September 1994) G3000529

- Capacity-based analysis—This method involves identifying future shipment volume constraints. These constraints, or "ceilings," can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below the demand level.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and

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electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic computer-aided engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of ECAE applications are schematic capture and simulation.
- IC layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe (which includes Austria, Switzerland, and eastern Europe)

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong.

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Rest of World

Rest of World includes all other countries and regions, including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

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Line Items

Line item definitions are as follows:

- Average selling price (ASP) is defined as the average price of a product, inclusive of any discounts.
- CPU revenue is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
- CPU shipment is defined as the number of CPUs delivered.
- CPU installed base is defined as the total number of CPUs in active, day-to-day use.
- Unit shipment is defined as the number of products delivered (that is, seats).
- Seats are defined as the number of possible simultaneous users.
- Installed seats are defined as the total number of seats in active, day-to-day use.
- Hardware revenue is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
- Peripherals revenue is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
- Terminal revenue is defined as revenue derived from the sale of terminals used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform, as terminal revenue is contained within CPU revenue for technical workstations and PCs.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
- Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue that a company may receive from products sold to another company for resale (OEM revenue).

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Table 3
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Benelux
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	8,368	8,254	9,970	11,357	12,114	13,700	15,100	16,500	17,800	19,000	10	9
Unit Shipments or Seats	9,309	8,825	10,677	11,808	12,412	13,900	15,300	16,700	18,000	19,100	7	9
CPU Installed Base	21,496	28,157	35,204	42,201	48,460	54,100	60,300	67,400	74,500	80,700	23	11
Installed Seats	25,875	33,031	40,596	47,669	53,568	58,600	64,000	70,400	76,800	82,500	20	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	74.8	66.9	63.2	50.7	38.4	32.1	30.2	28.4	27.0	26.0	-15	-8
Hardware-Only ASP	10.9	11.8	9.4	10.5	9.9	9.1	8.9	8.9	8.9	9.0	-2	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	170	169	163	162	148	147	155	164	174	184	-3	5
CPU Revenue	132	134	133	140	132	134	142	152	163	173	0	5
Terminal Revenue	18	14	12	9	6	5	4	4	4	4	-24	-9
Peripheral Revenue (Turnkey)	20	21	18	13	9	9	9	8	8	8	-17	-4
Software Revenue	70	76	76	80	81	88	96	103	111	119	4	8
Bundled	43	43	37	34	26	26	27	27	27	27	-11	0
Unbundled	27	33	39	46	55	62	69	77	85	92	20	11
Service Revenue	56	61	53	57	55	56	59	64	68	73	-1	6
Total Factory Revenue	295	307	291	299	284	291	310	331	354	376	-1	6
Increase over Prior Year (%)	24	4	-5	2	-5	3	7	7	7	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 4
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Benelux
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	2,606	2,645	2,695	2,924	3,118	3,400	3,700	4,000	4,300	4,600	5	8
Unit Shipments or Seats	2,606	2,645	2,695	2,924	3,118	3,400	3,700	4,000	4,300	4,600	5	8
CPU Installed Base	6,428	8,746	10,771	12,664	14,307	15,900	17,300	18,800	20,400	21,700	22	9
Installed Seats	6,428	8,746	10,771	12,664	14,307	15,900	17,300	18,800	20,400	21,700	22	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	54.8	46.8	47.8	46.2	39.6	37.4	35.3	33.4	32.0	30.8	-8	-5
Hardware-Only ASP	17.8	20.3	20.9	24.5	24.7	23.9	23.3	22.7	22.2	21.6	9	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	77	74	75	78	77	80	82	86	89	94	-0	4
CPU Revenue	64	61	63	68	70	73	76	80	84	89	2	5
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	13	13	12	10	7	6	6	6	5	5	-15	-6
Software Revenue	46	47	47	52	52	56	60	64	68	73	3	7
Bundled	30	28	26	27	21	20	20	20	20	20	-9	-1
Unbundled	16	19	21	25	31	35	39	44	48	53	18	11
Service Revenue	35	36	30	40	39	41	43	46	49	51	3	6
Total Factory Revenue	158	157	152	170	168	177	186	195	206	218	2	5
Increase over Prior Year (%)	33	-1	-3	12	-1	5	5	5	5	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 5
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Benelux
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	353	356	209	150	126	100	100	100	100	100	-23	-5
Unit Shipments or Seats	1,294	926	916	602	423	300	300	300	300	200	-24	-14
CPU Installed Base	1,365	1,672	1,780	1,751	1,662	1,500	1,400	1,200	1,100	1,000	5	-10
Installed Seats	5,744	6,545	7,173	7,219	6,769	6,000	5,100	4,300	3,500	2,900	4	-16
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	457.7	481.6	398.9	430.9	304.9	270.3	246.5	224.2	204.1	187.7	-10	-9
Hardware-Only ASP	120.4	122.5	192.6	220.6	179.8	175.8	169.6	163.6	156.8	150.3	11	-4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	66	67	51	37	24	18	17	15	14	14	-23	-11
CPU Revenue	44	48	36	27	17	13	12	11	10	10	-21	-11
Terminal Revenue	18	14	12	9	6	5	4	4	4	4	-24	-9
Peripheral Revenue (Turnkey)	5	5	4	1	1	0	0	0	0	0	-43	-13
Software Revenue	14	16	10	4	3	3	2	2	2	2	-30	-13
Bundled	12	14	8	3	2	1	1	1	1	1	-34	-15
Unbundled	2	2	2	1	1	1	1	1	1	1	-10	-8
Service Revenue	19	22	16	9	6	5	4	4	4	4	-24	-11
Total Factory Revenue	99	106	78	51	34	26	23	21	20	19	-24	-11
Increase over Prior Year (%)	5	7	-27	-34	-34	-23	-10	-9	-5	-5		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 6
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Benelux
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	188	283	292	300	300	400	400	500	NA	11
Unit Shipments or Seats	NA	NA	188	283	292	300	300	400	400	500	NA	11
CPU Installed Base	NA	NA	188	471	746	1,000	1,200	1,400	1,600	1,800	NA	19
Installed Seats	NA	NA	188	471	746	1,000	1,200	1,400	1,600	1,800	NA	19
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	75.1	66.9	67.2	63.3	59.9	57.0	54.8	53.3	NA	-5
Hardware-Only ASP	NA	NA	54.6	72.6	71.5	70.9	70.2	69.5	68.9	68.0	NA	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	10	18	19	16	19	23	28	32	NA	11
CPU Revenue	NA	NA	9	17	18	16	19	23	27	32	NA	11
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	1	1	0	0	0	0	0	0	NA	-10
Software Revenue	NA	NA	2	3	4	4	5	5	6	7	NA	10
Bundled	NA	NA	2	2	2	1	2	2	2	2	NA	2
Unbundled	NA	NA	0	1	3	2	3	4	4	5	NA	14
Service Revenue	NA	NA	5	6	7	6	7	9	10	12	NA	11
Total Factory Revenue	NA	NA	17	27	30	26	31	37	44	50	NA	11
Increase over Prior Year (%)	NA	NA	NA	61	10	-13	19	20	18	14		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 7
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Benelux
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	5,409	5,254	6,878	7,999	8,579	9,900	11,000	12,100	13,000	13,700	12	10
Unit Shipments or Seats	5,409	5,254	6,878	7,999	8,579	9,900	11,000	12,100	13,000	13,700	12	10
CPU Installed Base	13,703	17,740	22,465	27,314	31,746	35,800	40,400	45,900	51,300	56,100	23	12
Installed Seats	13,703	17,740	22,465	27,314	31,746	35,800	40,400	45,900	51,300	56,100	23	12
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	21.9	21.1	19.0	15.6	11.5	11.0	10.9	10.7	10.6	10.4	-15	-2
Hardware-Only ASP	4.5	5.0	3.6	3.4	3.0	3.1	3.1	3.1	3.1	3.1	-10	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	26	28	26	29	28	33	37	40	43	45	2	10
CPU Revenue	24	25	25	27	26	31	35	38	41	43	2	10
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	2	3	2	2	1	2	2	2	2	2	-10	8
Software Revenue	10	13	17	20	22	26	29	32	35	38	22	12
Bundled	1	1	1	1	2	3	3	3	3	3	15	15
Unbundled	9	12	16	19	20	23	26	29	32	34	22	11
Service Revenue	2	3	2	2	3	4	4	5	6	7	2	20
Total Factory Revenue	38	44	45	51	52	63	70	78	84	89	8	11
Increase over Prior Year (%)	51	13	3	13	3	20	12	10	8	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 8
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: Benelux
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	3,308	3,002	3,803	3,834	4,181	4,200	4,400	4,700	4,900	5,000	6	4
Unit Shipments or Seats	4,032	3,383	4,334	4,186	4,411	4,400	4,600	4,800	5,000	5,200	2	3
CPU Installed Base	9,516	11,807	14,296	16,226	17,954	19,000	20,100	21,400	22,600	23,500	17	6
Installed Seats	12,949	15,550	18,411	20,373	21,816	22,400	22,900	23,800	24,500	25,000	14	3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	86.6	84.9	70.8	58.5	43.9	39.7	37.2	35.1	33.5	32.2	-16	-6
Hardware-Only ASP	13.7	14.7	11.7	14.8	13.3	12.7	12.9	13.4	13.9	14.4	-1	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	97	88	86	77	70	66	67	70	74	77	-8	2
CPU Revenue	73	68	68	63	60	57	59	62	66	69	-5	3
Terminal Revenue	13	10	8	6	4	4	4	3	3	3	-25	-5
Peripheral Revenue (Turnkey)	11	11	10	8	5	5	5	4	4	4	-17	-6
Software Revenue	36	36	37	31	31	32	34	36	38	40	-3	5
Bundled	25	25	23	17	14	14	14	13	13	13	-14	-2
Unbundled	11	11	14	14	17	19	21	23	25	27	13	9
Service Revenue	33	30	29	25	25	24	25	26	28	30	-7	3
Total Factory Revenue	167	155	151	134	126	122	127	133	140	146	-7	3
Increase over Prior Year (%)	23	-7	-2	-12	-6	-3	4	5	5	4		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 9
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: Benelux
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,814	2,317	2,735	3,281	3,554	4,700	5,400	5,900	6,400	6,600	18	13
Unit Shipments or Seats	1,908	2,398	2,812	3,322	3,579	4,700	5,400	5,900	6,400	6,600	17	13
CPU Installed Base	4,490	6,487	8,618	10,935	13,100	15,700	18,700	21,900	25,000	27,600	31	16
Installed Seats	4,983	7,053	9,241	11,559	13,680	16,200	19,100	22,200	25,200	27,800	29	15
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	58.7	48.1	46.3	39.1	30.1	23.0	21.5	20.3	19.4	18.9	-15	-9
Hardware-Only ASP	8.0	7.0	5.5	5.1	5.4	4.6	4.5	4.4	4.3	4.3	-9	-4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	24	27	26	25	26	27	30	31	32	33	2	5
CPU Revenue	19	22	22	22	23	25	27	29	30	31	5	6
Terminal Revenue	2	2	1	1	0	0	0	0	0	0	-26	-22
Peripheral Revenue (Turnkey)	3	3	3	2	2	2	2	2	2	2	-14	2
Software Revenue	10	12	14	15	17	19	21	23	25	26	15	9
Bundled	5	5	6	7	6	7	7	7	8	8	8	4
Unbundled	5	6	8	9	10	12	14	16	17	18	21	11
Service Revenue	7	9	8	8	8	8	9	9	9	10	4	3
Total Factory Revenue	41	48	48	48	51	55	59	63	66	69	6	6
Increase over Prior Year (%)	5	17	1	0	5	7	9	6	5	4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
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Table 10
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: Benelux
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	793	916	913	1,703	2,090	2,700	3,100	3,500	4,100	4,700	27	18
Unit Shipments or Seats	850	993	966	1,754	2,132	2,700	3,100	3,500	4,100	4,700	26	17
CPU Installed Base	1,306	2,174	2,964	4,404	6,062	8,000	10,100	12,500	15,000	17,400	47	23
Installed Seats	1,569	2,509	3,341	4,809	6,471	8,400	10,400	12,700	15,200	17,600	43	22
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	78.4	56.0	75.9	53.9	41.0	35.8	33.1	31.0	29.4	28.5	-15	-7
Hardware-Only ASP	9.5	10.9	9.3	11.8	11.6	9.8	9.3	8.8	8.3	7.9	5	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	16	21	20	30	29	31	33	35	38	41	17	7
CPU Revenue	13	17	15	26	27	29	31	33	36	39	21	8
Terminal Revenue	1	1	1	1	1	0	0	0	0	0	-11	-32
Peripheral Revenue (Turnkey)	2	3	4	3	2	2	2	2	2	2	-5	-2
Software Revenue	6	9	9	16	19	22	24	27	30	33	32	11
Bundled	4	6	5	7	5	5	5	5	5	5	5	3
Unbundled	3	3	4	8	15	17	19	22	25	28	54	14
Service Revenue	5	8	7	12	14	15	16	18	20	22	28	10
Total Factory Revenue	27	38	36	58	62	67	73	80	88	96	23	9
Increase over Prior Year (%)	37	38	-4	59	8	7	9	10	9	10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 11
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Benelux
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	2,453	2,019	2,519	2,539	2,289	2,100	2,200	2,400	2,500	2,600	-2	3
Unit Shipments or Seats	2,518	2,051	2,565	2,547	2,291	2,100	2,200	2,400	2,500	2,600	-2	3
CPU Installed Base	6,184	7,690	9,325	10,636	11,344	11,400	11,400	11,600	11,900	12,200	16	1
Installed Seats	6,374	7,919	9,604	10,928	11,601	11,600	11,600	11,700	11,900	12,200	16	1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	51.7	47.9	40.7	36.1	26.0	16.8	16.6	16.3	16.4	15.9	-16	-9
Hardware-Only ASP	10.5	14.1	10.7	11.0	9.6	11.4	11.5	11.8	12.4	12.8	-2	6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	32	33	30	30	23	24	25	28	31	33	-9	8
CPU Revenue	28	28	27	29	22	23	25	27	30	33	-6	9
Terminal Revenue	2	2	2	1	1	0	0	0	0	0	-25	-29
Peripheral Revenue (Turnkey)	3	3	1	1	0	0	0	0	0	0	-41	-12
Software Revenue	17	19	15	17	14	15	16	17	18	20	-6	8
Bundled	9	7	3	3	1	1	1	1	1	1	-39	-15
Unbundled	8	12	13	15	12	14	15	16	18	19	10	9
Service Revenue	11	14	10	11	8	9	9	10	11	12	-8	9
Total Factory Revenue	61	66	55	59	44	47	51	55	60	65	-8	8
Increase over Prior Year (%)	36	9	-16	6	-25	7	7	8	9	8		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
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Table 12
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Benelux
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,627	1,258	1,416	1,125	1,167	1,200	1,300	1,400	1,500	1,600	-8	7
Unit Shipments or Seats	1,650	1,269	1,424	1,119	1,158	1,200	1,300	1,400	1,500	1,600	-8	7
CPU Installed Base	3,001	4,073	5,133	5,696	6,011	6,000	6,000	6,200	6,600	7,000	19	3
Installed Seats	3,105	4,186	5,251	5,800	6,089	6,100	6,000	6,300	6,600	7,000	18	3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	48.4	43.0	32.2	33.1	21.2	12.6	12.8	13.1	13.1	13.1	-19	-9
Hardware-Only ASP	8.1	11.1	10.2	13.2	10.6	12.8	12.8	12.9	13.2	13.4	7	5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	17	17	16	16	13	14	16	17	19	21	-8	11
CPU Revenue	14	14	15	15	12	14	15	17	19	21	-4	12
Terminal Revenue	1	1	0	0	0	0	0	0	0	0	-28	-10
Peripheral Revenue (Turnkey)	2	2	1	0	0	0	0	0	0	0	-40	-11
Software Revenue	9	11	9	10	8	9	10	11	11	13	-3	9
Bundled	5	4	1	1	1	1	1	0	0	0	-37	-14
Unbundled	4	7	8	8	7	8	9	10	11	12	15	11
Service Revenue	5	7	5	6	5	5	6	6	7	7	-3	10
Total Factory Revenue	32	34	29	32	26	29	31	34	37	42	-6	10
Increase over Prior Year (%)	70	7	-14	7	-19	12	9	9	9	12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 13
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Benelux
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	159	163	116	121	105	100	100	100	100	100	-10	-1
Unit Shipments or Seats	154	158	114	120	101	100	100	100	100	100	-10	-0
CPU Installed Base	679	782	807	792	766	700	700	700	700	700	3	-2
Installed Seats	631	740	774	782	750	700	700	700	700	700	4	-1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	53.0	54.9	43.9	37.0	46.6	46.9	46.2	43.2	45.5	39.7	-3	-3
Hardware-Only ASP	18.2	23.1	28.0	41.1	33.9	34.3	37.0	39.8	42.8	45.2	17	6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	4	3	5	4	4	4	5	6	6	5	12
CPU Revenue	3	4	3	5	4	4	4	5	6	6	6	12
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-16	-100
Peripheral Revenue (Turnkey)	0	0	0	NA	0	0	0	0	0	0	-100	NA
Software Revenue	2	3	2	2	2	2	2	2	2	2	-0	8
Bundled	0	1	0	0	0	0	0	0	0	0	-38	-13
Unbundled	1	2	2	2	2	2	2	2	2	2	6	8
Service Revenue	1	2	2	2	1	1	2	2	2	2	6	11
Total Factory Revenue	6	9	7	9	7	7	8	9	10	11	4	11
Increase over Prior Year (%)	-24	52	-24	38	-27	4	10	13	19	8		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 14
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Benelux
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	668	597	987	1,293	1,017	800	900	900	900	900	11	-2
Unit Shipments or Seats	714	624	1,028	1,308	1,032	800	900	900	900	900	10	-3
CPU Installed Base	2,504	2,835	3,386	4,148	4,567	4,700	4,700	4,700	4,600	4,400	16	-1
Installed Seats	2,638	2,993	3,579	4,346	4,761	4,800	4,800	4,800	4,600	4,500	16	-1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	57.4	54.7	55.9	41.0	41.9	51.2	49.4	47.9	48.8	49.0	-8	3
Hardware-Only ASP	14.7	17.9	9.6	6.5	5.9	6.5	6.4	6.4	6.5	6.5	-20	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	12	12	11	10	6	6	6	6	6	6	-14	-2
CPU Revenue	11	10	10	9	6	6	6	6	6	6	-13	-1
Terminal Revenue	1	1	1	0	0	0	0	0	0	0	-23	-100
Peripheral Revenue (Turnkey)	0	1	1	0	0	0	0	0	0	0	-40	-24
Software Revenue	6	6	5	5	4	4	4	4	5	5	-13	5
Bundled	4	3	1	1	0	0	0	0	0	0	-41	-17
Unbundled	3	3	4	4	3	4	4	4	4	4	3	6
Service Revenue	4	5	3	3	2	2	2	2	2	2	-20	3
Total Factory Revenue	23	23	19	18	12	12	12	12	13	13	-15	1
Increase over Prior Year (%)	25	0	-16	-6	-34	-2	2	3	2	-0		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Software

CAD/CAM/CAE and GIS United Kingdom Market Share Update

Market Statistics

1994

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Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9411
Publication Date: July 29, 1994

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Note: All tables show estimated data.

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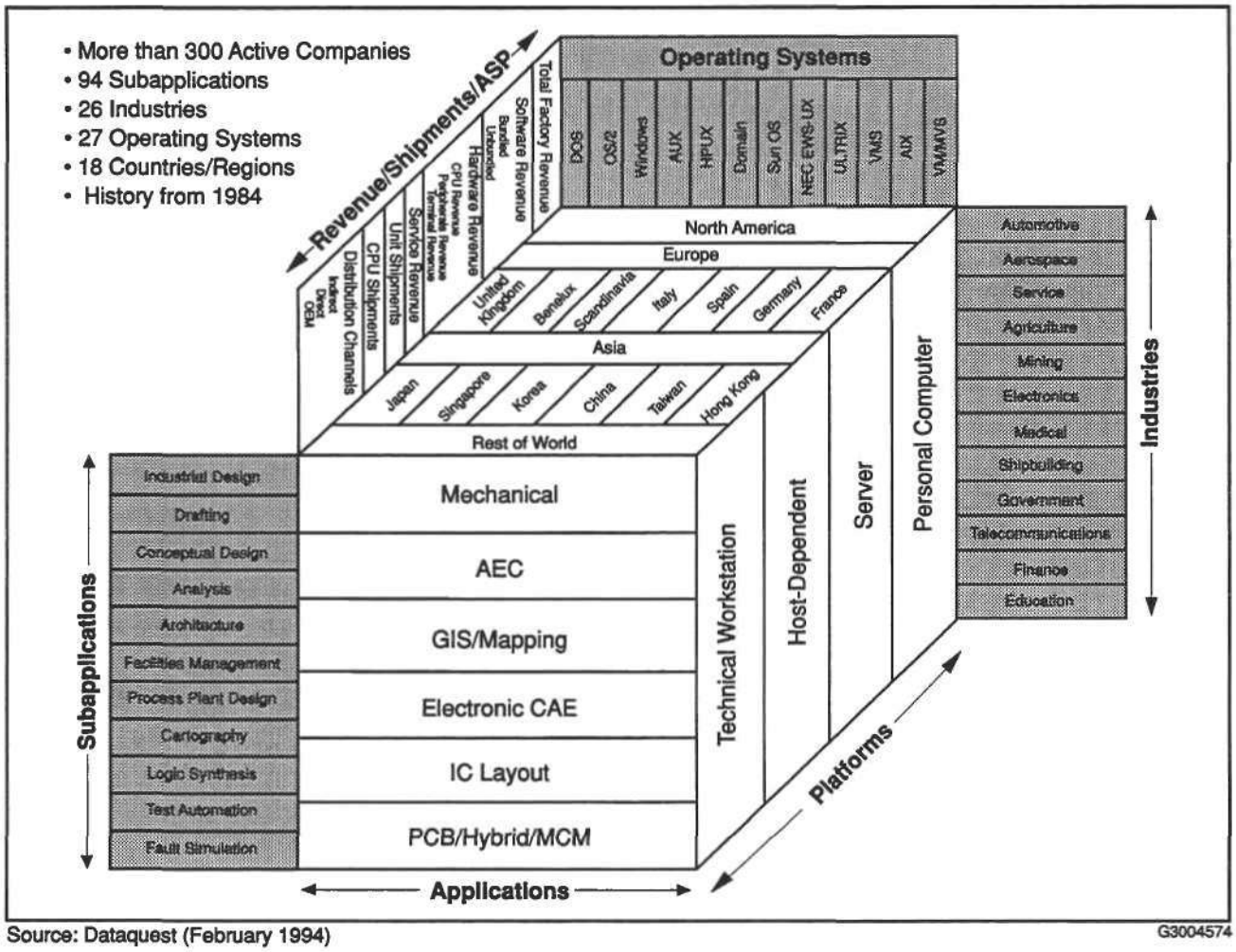
CAD/CAM/CAE and GIS United Kingdom Market Share Update

Introduction

CAD/CAM/CAE/GIS systems have dramatically changed the methods by which designers and production managers originate and implement products. CAD and CAE systems allow designers to create, draft, analyze, test, and manipulate products on a screen in two and three dimensions. As CAD/CAM/CAE/GIS systems continue to decrease in cost, they become more available and cost justifiable to new users.

In order to provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure 1.

Figure 1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (February 1994)

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Table 1
CAD/CAM/CAE/GIS 1992-1993 Market Summary

	Software Revenue 1992 ($M)	Software Revenue 1993 ($M)	Growth Rate (%)	Total Revenue 1992 ($M)	Total Revenue 1993 ($M)	Growth Rate (%)	Hardware Unit Shipments 1992	Hardware Unit Shipments 1993	Growth Rate (%)
Application									
Mechanical	2,170.4	2,294.7	5.7	7,988.2	7,862.7	-1.6	302,347	303,364	0.3
AEC	746.9	794.1	6.3	2,356.5	2,444.0	3.7	178,629	198,075	10.9
GIS/Mapping	580.1	662.2	14.2	2,005.6	2,179.1	8.7	86,513	102,624	18.6
Electronic CAE	741.5	797.1	7.5	2,086.4	2,271.7	8.9	94,176	99,129	5.3
IC Layout	212.7	203.0	-4.6	628.4	676.4	7.6	9,771	13,049	33.5
PCB/Hybrid/MCM	265.9	271.2	2.0	870.9	900.2	3.4	35,110	38,030	8.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
Region									
North America	1,562.5	1,754.6	12.3	5,253.5	5,690.7	8.3	286,939	325,318	13.4
Europe	1,693.8	1,608.9	-5.0	5,755.5	5,432.7	-5.6	231,062	240,603	4.1
Asia	1,352.7	1,534.4	13.4	4,601.2	4,830.6	5.0	169,839	163,620	-3.7
Rest of World	108.5	124.3	14.6	325.9	380.2	16.7	18,706	24,730	32.2
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
In Local Currencies									
Europe (ECU)	1,301.8	1,378.2	5.9	4,423.7	4,653.7	5.2			
Asia (yen)	170,895	170,093	-0.5	581,318	535,468	-7.9			
Platform									
Technical Workstation	3,060.1	3,312.8	8.3	9,640.0	10,458.3	8.5	173,705	194,848	12.2
Host-Dependent	360.2	306.1	-15.0	2,436.6	1,754.7	-28.0	34,524	28,573	-17.2
Server	140.0	176.2	25.9	906.3	1,056.8	16.6	11,566	13,381	15.7
Personal Computer	1,157.1	1,227.1	6.1	2,953.2	3,064.4	3.8	486,751	517,469	6.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8

Source: Dataquest (July 1994)

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A companion article analyzing major shifts in the 1993 market was published in our *Dataquest Perspective*, dated June 27, 1994.

Table 1 summarizes the performance in various segments of the CAD/CAM/CAE/GIS markets in 1993 versus 1992. With the devaluation of the dollar against the yen (¥126.34/$ in 1992 versus ¥110.85/$ in 1993) and the appreciation of the dollar against the ECU (ECU 0.7686/$ in 1992 versus ECU 0.8566/$ in 1993), actual growth is not as it appears when denominated in U.S. dollars. With 75 percent of the Asian market in Japan, denominating in yen gives a rough indication of real growth in the Asian market, which was a negative 7.9 percent.

About This Document

This document contains Dataquest's detailed market share information on the CAD/CAM/CAE/GIS industry. We no longer publish worldwide all-application market statistics for the entire CAD/CAM/CAE/GIS industry. This data is available by calling Suzanne Snygg at (408) 437-8241. The category "Other Companies" is the aggregation of small companies. More detailed data on these markets may be requested through our Client Inquiry service.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

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Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic Computer-Aided Engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of products). Schematic capture and simulation are examples of electronic CAE applications.
- IC Layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/Hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe. Market share data is available for each of these countries.

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong. Market share data is available for each of these countries.

Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed

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by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

Metrics

The following paragraphs define measurements.

- Total factory revenue is defined as the amount of money received by a manufacturer for its goods and services measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue). Total factory revenue is the sum of software revenue, hardware revenue, and service revenue.
- Unit shipment is defined as the number of seats delivered (number of possible simultaneous users of product delivered) excluding OEM shipments.

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- Hardware revenue is revenue derived from sales of CPUs (including operating systems), terminals (for host-dependent systems), and peripherals.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled application software.
- Service revenue is defined as all revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
  - Maintenance fees for hardware and software
  - Management and operations services—help desk, education and training, disaster recovery, vaulting, and configuration management.
  - Service bureau—project work, including construction of database, data conversion, product design, analysis, or manufacturing.
  - Application development—design and development of customized software applications or the modification, enhancement, or customization of existing software applications, adding new functionality.
  - Consulting revenue—assessment of CAD/CAM/CAE/GIS business and information technology needs and the formulation of a plan based on needs identification.
  - Implementation and integration services—planning, implementation, migration, and integration of software products (software network support and integration, account integration management, data center design, and construction).

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year and second quarter of the subsequent year, we survey all participants in each industry. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contacts at large companies. (Dataquest maintains a large contact database on all sources of information.) The following are examples of the job titles of people contacted for information:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning

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- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE/GIS marketing programs
- Market research analyst

The Audit Process

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks
- Articles in both the general and trade press
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice; Dataquest also checks with multiple sources at one company to cross-check data on that company.

Dataquest analysts have many years of experience in how to apply the above tools to get the most accurate information possible on a particular company (such as what to use when and what industry averages are). We believe that the estimates presented here are the most accurate and meaningful generally available today. It is the CAD/CAM/CAE/GIS group's policy to continually update our market information for any year, based on any new data received, in order to arrive at the most accurate market representation possible.

Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

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Publishing Schedule

We publish both market share and forecasting twice each year, allowing for timely distribution of data and thorough analysis and forecasting. Our annual delivery schedule is as follows:

- Market share data is available January 31. All tables will be published and distributed to clients by March 31.
- Forecasting from the market share tables provides a five-year forecast period, available after March 31. The books will be shipped by May 31.
- Final updated market share tables, based on additional data collection and analysis, will be completed by May 31. At this point, the market share database is frozen and will not be changed until the end of the year. For the next six months, supplementary market data will be based on this final market data. Books will be shipped by July 31.
- We provide complete final forecast tables by July 31. These tables take into consideration changes in the market share during the previous six months. Books will be shipped by September 30.

Database Changes

Tables 2 through 5 show changes made to the database since last year's market share update. PC clone manufacturers are no longer tracked individually. We continue to show PC sales by IBM, Hewlett-Packard, and Digital, which also sell other platforms. The 1993 sales of GeoVision Systems to SHL Systemhouse, Computervision-GIS to Unisys, Racal-Redac to Zuken, Chronologic to Viewlogic, ASG to Softdesk, CDC's mechanical software product to ICEM Technologies, PDA to MacNeal-Schwendler, and Logic Modeling Corporation to Synopsys; the merger of Sysdeco and SysScan; and the change of GDS to Convergent Group will be recognized in market reporting for 1994.

Table 2
Companies Renamed

Company Name	Renamed to:
Alper Systems	Sysdeco Ltd.
Areon	Kreon
CADAM	Altium
Catalpa	Catalpa groupe Missler
Geotrace Technologies	Cadlynx
Logic Control	Logic Systems Designers
RIB/RZB	RIB Bausoftware
Sener Sistemas Marinos	Sener Inginiera y Sistemas
STI Strassle	Strassle Informationssysteme
Test Systems Strategies	Summitt

Source: Dataquest (July 1994)

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Table 3
Companies (or CAD Portions Thereof) Sold/Merged

Company Name	Acquired by, Merged with, Technology Sold to:
ANACAD & Electrical Eng. Software	ANACAD-EES
Aries Technology	MacNeal-Schwendler
CAD Language Systems	Compass Design Automation
CAD/CAM Group	Data I/O
Comdisco	Cadence
DAT Standard info ssystemes	ISD Software
EEsof	Hewlett-Packard
Expertest	Sunrise Test
Fides Industrielle Automation	Strassle
HP Cade	Hewlett-Packard
Inca	Zycad
Infocel	Understanding Systems
PiE Design	Quickturn Design Systems
Quad Design Technology	Viewlogic
Wisdom Systems	ICAD

Source: Dataquest (July 1994)

Table 4
Companies Deleted

Company Removed from Database:
European
Asicom
Club Informatico SA
DATAID Technologies
DECISA
Micrograph
Olivetti*
Research Machines*
North American
Bechtel
CADLYNX
Compaq*
Dell Computer*
Engineering Systems Corporation
GeoQuest
Mega CADD
NCR Microelectronics
Object Design
Objectivity
Ontos
Quicklogic
The CAD Group
Ultimap

*We no longer follow individual PC clone makers.
Source: Dataquest (July 1994)

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Table 5
Companies Added

Company Added to Database:
European
APIC Systemes
ISD Software
SPEED
Ultimate Technology
North American
AT&T
Aptix
ARC SYS
EAGLE Point
Earth Resource Mapping
Graftek
Graphic Data Systems (GDS)
Model Technology
Systems Science Inc.
Tactics Int'l Ltd.
VLSI Libraries
Asian
Adam Net
Kozo
Okura
Tachnodia
TECHSPERT
Toshiba Engineering
Yokogawa Digital Computer

Source: Dataquest (July 1994)

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Table 6
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	90.4	64.4	13.2	4,791	10.9%	15.6%	5.4%	13.9%
Digital	86.8	68.4	.0	3,530	10.4%	16.6%	.0%	10.2%
Computervision	69.2	15.6	21.3	955	8.3%	3.8%	8.7%	2.8%
Intergraph	59.7	22.6	20.1	959	7.2%	5.5%	8.3%	2.8%
Sun Microsystems	57.5	45.9	.0	1,965	6.9%	11.1%	.0%	5.7%
Hewlett-Packard	53.7	38.9	4.9	2,094	6.5%	9.4%	2.0%	6.1%
ICL	30.4	17.8	10.5	873	3.7%	4.3%	4.3%	2.5%
Silicon Graphics	23.9	20.9	.0	637	2.9%	5.1%	.0%	1.8%
Sysdeco Ltd.	23.2	11.6	5.8	203	2.8%	2.8%	2.4%	.6%
Autodesk	20.0	.0	20.0	0	2.4%	.0%	8.2%	.0%
Data Technology/DATECH*	19.3	4.4	13.0	836	2.3%	1.1%	5.3%	2.4%
Mentor Graphics	17.4	2.5	7.6	83	2.1%	.6%	3.1%	.2%
Radan Computational	16.9	5.8	8.5	339	2.0%	1.4%	3.5%	1.0%
Engineering Computer Services*	15.7	6.2	5.5	427	1.9%	1.5%	2.2%	1.2%
EDS Unigraphics	13.7	4.1	6.5	207	1.6%	1.0%	2.7%	.6%
Cadence	11.7	.0	8.4	0	1.4%	.0%	3.4%	.0%
Parametric Technology	9.9	.0	8.1	0	1.2%	.0%	3.3%	.0%
Smallworld Systems	9.3	.5	5.5	17	1.1%	.1%	2.3%	.0%
SDRC	8.7	.0	6.0	0	1.0%	.0%	2.4%	.0%
PAFEC	8.2	2.6	4.5	107	1.0%	.6%	1.9%	.3%
Laser-Scan	7.3	2.1	3.2	45	.9%	.5%	1.3%	.1%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Delcam International	6.9	2.4	3.0	89	.8%	.6%	1.2%	.3%
Racal-Redac	6.3	.8	2.9	32	.8%	.2%	1.2%	.1%
ESRI	5.6	.0	4.5	0	.7%	.0%	1.8%	.0%
GDS	5.5	2.5	2.4	88	.7%	.6%	1.0%	.3%
Apple Computer	5.4	5.4	.0	1,142	.7%	1.3%	.0%	3.3%
Applicon	5.0	1.7	2.0	55	.6%	.4%	.8%	.2%
Moss Systems	4.6	.6	2.0	49	.6%	.1%	.8%	.1%
Synopsys	4.3	.0	3.0	0	.5%	.0%	1.2%	.0%
CAD Centre	4.2	.4	2.7	22	.5%	.1%	1.1%	.1%
Computer Services Consultants	4.0	.0	4.0	0	.5%	.0%	1.7%	.0%
Matra Datavision	3.9	1.3	2.2	71	.5%	.3%	.9%	.2%
PDA Engineering	3.8	.0	3.6	0	.5%	.0%	1.5%	.0%
RoboCAD Solutions	3.8	.0	3.0	0	.5%	.0%	1.2%	.0%
Gable CAD Systems	3.8	2.7	.6	43	.5%	.6%	.2%	.1%
MacNeal-Schwendler	3.7	.0	3.5	0	.4%	.0%	1.4%	.0%
Cimlinc	3.6	.2	1.8	8	.4%	.0%	.7%	.0%
Ground Modelling Systems	3.4	1.5	1.5	271	.4%	.4%	.6%	.8%
FEA	3.1	.7	.8	188	.4%	.2%	.3%	.5%
Whessoe Computing Systems	2.9	.0	2.9	0	.3%	.0%	1.2%	.0%
Harris EDA	2.6	.2	1.5	14	.3%	.0%	.6%	.0%
Siemens Nixdorf Info systeme	2.5	.9	1.0	41	.3%	.2%	.4%	.1%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Dassault*	2.4	.0	2.1	0	.3%	.0%	.8%	.0%
Viewlogic Systems	2.4	.0	1.9	0	.3%	.0%	.8%	.0%
Elstree Computing	2.1	.9	1.1	62	.3%	.2%	.5%	.2%
Sysscan	2.0	.8	.6	20	.2%	.2%	.2%	.1%
Altium*	1.9	.0	1.8	0	.2%	.0%	.8%	.0%
Control Data Systems	1.9	.9	.4	24	.2%	.2%	.2%	.1%
Anilam Electronics	1.7	.3	1.2	0	.2%	.1%	.5%	.0%
FEGS	1.7	.0	.7	0	.2%	.0%	.3%	.0%
Isicad CAD/CAM Systeme	1.7	.4	1.0	20	.2%	.1%	.4%	.1%
Unisys	1.7	.4	.7	16	.2%	.1%	.3%	.0%
Superdraft	1.6	.7	.7	114	.2%	.2%	.3%	.3%
Genasys II	1.6	.2	1.1	6	.2%	.0%	.4%	.0%
CAD-Capture	1.4	.3	.3	11	.2%	.1%	.1%	.0%
Swanson Analysis	1.4	.0	1.3	0	.2%	.0%	.5%	.0%
Pathtrace Engineering Systems	1.4	.3	.8	36	.2%	.1%	.3%	.1%
CAMTEK	1.3	.3	.9	117	.2%	.1%	.4%	.3%
Lamp Software	1.3	.3	1.0	92	.2%	.1%	.4%	.3%
Contract Data Research	1.2	.0	.3	0	.1%	.0%	.1%	.0%
MapInfo	1.1	.0	.9	0	.1%	.0%	.4%	.0%
Star Informatic	1.1	.2	.7	15	.1%	.1%	.3%	.0%
Investronica SA	.9	.6	.3	32	.1%	.1%	.1%	.1%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
MCS	.9	.0	.8	5	.1%	.0%	.3%	.0%
Gerber Systems	.9	.4	.4	14	.1%	.1%	.2%	.0%
Zycad	.8	.5	.1	11	.1%	.1%	.0%	.0%
Sagantec	.8	.0	.8	0	.1%	.0%	.3%	.0%
COMPASS Design Automation	.7	.0	.6	0	.1%	.0%	.2%	.0%
Exapt	.6	.3	.2	12	.1%	.1%	.1%	.0%
BETRONEX	.6	.0	.6	5	.1%	.0%	.2%	.0%
APIC Systemes	.6	.0	.4	0	.1%	.0%	.2%	.0%
Computational Mechanics	.5	.0	.5	0	.1%	.0%	.2%	.0%
Other Companies	45.0	48.8	.0	13,601	5.4%	11.8%	.0%	39.4%
All Companies	831.4	412.6	243.6	34,497	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	648.1	341.0	165.8	26,141	77.9%	82.6%	68.1%	75.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	183.4	71.6	77.8	8,355	22.1%	17.4%	31.9%	24.2%
All Hardware Companies	305.5	263.4	.0	27,918	36.7%	63.8%	.0%	80.9%
All Turnkey & SW Companies	526.0	149.2	243.6	6,579	63.3%	36.2%	100.0%	19.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 7
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Computervision	67.8	15.5	20.2	935	12.2%	6.3%	11.7%	9.5%
IBM	53.9	39.2	6.8	1,125	9.7%	16.0%	3.9%	11.4%
Hewlett-Packard	50.7	36.4	4.8	1,411	9.1%	14.9%	2.8%	14.3%
Intergraph	49.3	19.0	15.9	633	8.8%	7.7%	9.3%	6.4%
Sun Microsystems	44.0	34.8	.0	1,717	7.9%	14.2%	.0%	17.4%
ICL	30.4	17.8	10.5	873	5.5%	7.3%	6.1%	8.9%
Sysdeco Ltd.	23.2	11.6	5.8	203	4.2%	4.7%	3.4%	2.1%
Digital	22.0	16.9	.0	861	3.9%	6.9%	.0%	8.7%
Silicon Graphics	20.3	17.9	.0	599	3.6%	7.3%	.0%	6.1%
Mentor Graphics	17.4	2.5	7.6	83	3.1%	1.0%	4.4%	.8%
Radan Computational	16.7	5.7	8.4	323	3.0%	2.3%	4.9%	3.3%
Cadence	11.0	.0	7.8	0	2.0%	.0%	4.6%	.0%
EDS Unigraphics	10.9	3.2	5.2	178	2.0%	1.3%	3.0%	1.8%
Parametric Technology	9.4	.0	7.7	0	1.7%	.0%	4.5%	.0%
Smallworld Systems	9.3	.5	5.5	17	1.7%	.2%	3.2%	.2%
SDRC	8.6	.0	5.9	0	1.6%	.0%	3.4%	.0%
Engineering Computer Services*	7.5	2.9	2.5	100	1.3%	1.2%	1.5%	1.0%
PAFEC	7.4	2.6	3.7	107	1.3%	1.1%	2.2%	1.1%
Laser-Scan	6.9	1.9	3.1	42	1.2%	.8%	1.8%	.4%
Delcam International	6.6	2.3	2.9	81	1.2%	.9%	1.7%	.8%
Racal-Redac	5.6	.8	2.5	32	1.0%	.3%	1.4%	.3%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
GDS	5.5	2.5	2.4	88	1.0%	1.0%	1.4%	.9%
Applicon	5.0	1.7	2.0	55	.9%	.7%	1.1%	.6%
Moss Systems	4.6	.6	2.0	49	.8%	.2%	1.1%	.5%
Synopsys	4.3	.0	3.0	0	.8%	.0%	1.7%	.0%
CAD Centre	4.2	.4	2.7	22	.8%	.2%	1.6%	.2%
Matra Datavision	3.8	1.3	2.2	63	.7%	.5%	1.3%	.6%
Gable CAD Systems	3.8	2.7	.6	43	.7%	1.1%	.3%	.4%
PDA Engineering	3.5	.0	3.2	0	.6%	.0%	1.9%	.0%
Cimlinc	3.4	.1	1.7	8	.6%	.1%	1.0%	.1%
Data Technology/DATECH*	2.5	.0	2.3	0	.4%	.0%	1.3%	.0%
Siemens Nixdorf Info systeme	2.4	.8	.9	39	.4%	.3%	.5%	.4%
Harris EDA	2.3	.2	1.4	10	.4%	.1%	.8%	.1%
ESRI	2.2	.0	1.7	0	.4%	.0%	1.0%	.0%
FEGS	1.7	.0	.7	0	.3%	.0%	.4%	.0%
Viewlogic Systems	1.6	.0	1.1	0	.3%	.0%	.6%	.0%
Genasys II	1.4	.1	1.0	3	.3%	.1%	.6%	.0%
Dassault*	1.3	.0	1.1	0	.2%	.0%	.6%	.0%
FEA	1.2	.3	.3	19	.2%	.1%	.2%	.2%
Unisys	1.2	.3	.5	11	.2%	.1%	.3%	.1%
Control Data Systems	1.2	.5	.4	16	.2%	.2%	.2%	.2%
Isicad CAD/CAM Systeme	1.2	.4	.5	20	.2%	.2%	.3%	.2%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
MacNeal-Schwendler	1.1	.0	.9	0	.2%	.0%	.5%	.0%
Sysscan	1.0	.4	.4	13	.2%	.1%	.2%	.1%
Star Informatic	1.0	.2	.7	14	.2%	.1%	.4%	.1%
Autodesk	1.0	.0	1.0	0	.2%	.0%	.6%	.0%
Gerber Systems	.9	.4	.4	14	.2%	.2%	.2%	.1%
Swanson Analysis	.9	.0	.8	0	.2%	.0%	.5%	.0%
Sagantec	.8	.0	.8	0	.1%	.0%	.4%	.0%
COMPASS Design Automation	.7	.0	.6	0	.1%	.0%	.3%	.0%
APIC Systemes	.6	.0	.4	0	.1%	.0%	.2%	.0%
Zycad	.6	.3	.1	8	.1%	.1%	.0%	.1%
Other Companies	7.4	.0	5.3	0	1.3%	.0%	3.1%	.0%
All Companies	556.8	244.7	171.9	9,850	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	422.5	194.2	116.2	7,850	75.9%	79.4%	67.6%	79.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	134.3	50.4	55.7	2,000	24.1%	20.6%	32.4%	20.3%
All Hardware Companies	145.1	120.8	.0	5,039	26.1%	49.4%	.0%	51.2%
All Turnkey & SW Companies	411.7	123.9	171.9	4,811	73.9%	50.6%	100.0%	48.8%

*Contains reseller or OEM revenue; All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 8
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	27.3	21.1	.0	0	37.8%	40.8%	.0%	.0%
IBM	18.5	10.6	3.7	317	25.5%	20.5%	44.5%	29.8%
MacNeal-Schwendler	2.6	.0	2.6	0	3.5%	.0%	30.3%	.0%
Dassault*	.8	.0	.7	0	1.1%	.0%	8.3%	.0%
Control Data Systems	.6	.4	.1	7	.9%	.7%	.7%	.7%
Other Companies	20.1	19.2	.0	716	27.8%	37.0%	.0%	67.3%
All Companies	72.2	51.8	8.4	1,063	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	70.6	51.3	7.5	1,052	97.7%	99.0%	89.4%	98.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.7	.5	.9	11	2.3%	1.0%	10.6%	1.1%
All Hardware Companies	47.8	40.5	.0	719	66.1%	78.1%	.0%	67.7%
All Turnkey & SW Companies	24.5	11.3	8.4	344	33.9%	21.9%	100.0%	32.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 9
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	29.7	22.9	.0	289	44.0%	51.0%	.0%	38.1%
Sun Microsystems	13.5	11.2	.0	248	19.9%	24.8%	.0%	32.7%
Intergraph	5.0	2.0	1.5	60	7.5%	4.5%	20.2%	7.9%
IBM	4.3	2.6	.9	52	6.4%	5.9%	11.3%	6.8%
Silicon Graphics	3.6	3.0	.0	38	5.3%	6.7%	.0%	5.0%
EDS Unigraphics	2.7	.8	1.3	29	4.0%	1.9%	16.9%	3.9%
ESRI	2.2	.0	1.7	0	3.3%	.0%	22.4%	.0%
Sysscan	.9	.4	.2	7	1.4%	1.0%	2.5%	1.0%
Cadence	.8	.0	.6	0	1.1%	.0%	7.3%	.0%
Hewlett-Packard	.6	.5	.0	9	.8%	1.0%	.0%	1.1%
Other Companies	2.7	1.0	.9	16	4.0%	2.3%	11.3%	2.1%
All Companies	67.6	44.9	7.5	758	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	66.6	44.5	7.3	750	98.6%	99.0%	97.2%	99.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.0	.4	.2	8	1.4%	1.0%	2.8%	1.0%
All Hardware Companies	48.3	38.5	.0	604	71.5%	85.7%	.0%	79.8%
All Turnkey & SW Companies	19.2	6.4	7.5	153	28.5%	14.3%	100.0%	20.2%

Source: Dataquest (July 1994)

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Table 10
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Autodesk	19.0	.0	19.0	0	14.1%	.0%	34.1%	.0%
Data Technology/DATECH*	16.9	4.4	10.7	836	12.5%	6.2%	19.3%	3.7%
IBM	13.8	11.9	1.8	3,297	10.2%	16.7%	3.3%	14.4%
Engineering Computer Services*	8.3	3.4	3.0	327	6.1%	4.7%	5.3%	1.4%
Digital	7.8	7.5	.0	2,381	5.8%	10.5%	.0%	10.4%
Apple Computer	5.4	5.4	.0	1,142	4.0%	7.6%	.0%	5.0%
Intergraph	5.4	1.6	2.7	266	4.0%	2.3%	4.9%	1.2%
Computer Services Consultants	4.0	.0	4.0	0	3.0%	.0%	7.2%	.0%
RoboCAD Solutions	3.8	.0	3.0	0	2.8%	.0%	5.4%	.0%
Ground Modelling Systems	3.4	1.5	1.5	271	2.5%	2.1%	2.7%	1.2%
Hewlett-Packard	2.5	2.1	.1	675	1.8%	2.9%	.3%	3.0%
Whessoe Computing Systems	2.2	.0	2.2	0	1.6%	.0%	4.0%	.0%
Elstree Computing	2.1	.9	1.1	62	1.6%	1.2%	2.0%	.3%
Altium*	1.9	.0	1.8	0	1.4%	.0%	3.3%	.0%
Anilam Electronics	1.7	.3	1.2	0	1.3%	.5%	2.2%	.0%
FEA	1.7	.4	.4	169	1.3%	.6%	.8%	.7%
Superdraft	1.6	.7	.7	114	1.2%	1.0%	1.3%	.5%
Pathtrace Engineering Systems	1.4	.3	.8	36	1.0%	.4%	1.3%	.2%
CAMTEK	1.3	.3	.8	115	.9%	.4%	1.5%	.5%
CAD-Capture	1.2	.2	.2	10	.9%	.3%	.4%	.0%
Contract Data Research	1.2	.0	.3	0	.9%	.0%	.6%	.0%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ESRI	1.1	.0	1.1	0	.8%	.0%	1.9%	.0%
Computervision	1.1	.0	1.1	17	.8%	.0%	1.9%	.1%
MapInfo	1.1	.0	.9	0	.8%	.0%	1.6%	.0%
Investronica SA	.9	.6	.3	32	.7%	.8%	.4%	.1%
Lamp Software	.9	.2	.7	60	.7%	.3%	1.3%	.3%
Viewlogic Systems	.8	.0	.8	0	.6%	.0%	1.5%	.0%
PAFEC	.8	.0	.8	0	.6%	.0%	1.4%	.0%
Racal-Redac	.8	.0	.4	0	.6%	.0%	.8%	.0%
BETRONEX	.6	.0	.6	5	.4%	.0%	1.0%	.0%
Isicad CAD/CAM Systeme	.5	.0	.5	0	.4%	.0%	1.0%	.0%
Other Companies	14.8	29.2	.0	12,918	11.0%	41.0%	.0%	56.6%
All Companies	134.9	71.3	55.8	22,826	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	88.4	51.0	34.8	16,489	65.6%	71.6%	62.3%	72.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	46.4	20.3	21.0	6,337	34.4%	28.4%	37.7%	27.8%
All Hardware Companies	64.3	63.7	.0	21,555	47.7%	89.4%	.0%	94.4%
All Turnkey & SW Companies	70.5	7.5	55.8	1,271	52.3%	10.6%	100.0%	5.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 11
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Computervision	61.6	13.9	19.0	846	15.0%	6.7%	16.7%	5.8%
IBM	54.8	33.9	11.1	1,832	13.3%	16.4%	9.7%	12.4%
Digital	50.0	39.7	.0	1,785	12.2%	19.2%	.0%	12.1%
Hewlett-Packard	33.7	22.9	3.9	1,144	8.2%	11.1%	3.5%	7.8%
Sun Microsystems	21.9	17.6	.0	720	5.3%	8.5%	.0%	4.9%
Silicon Graphics	21.1	18.4	.0	558	5.1%	8.9%	.0%	3.8%
Engineering Computer Services*	15.7	6.2	5.5	427	3.8%	3.0%	4.8%	2.9%
Radan Computational	15.1	5.1	7.6	303	3.7%	2.5%	6.6%	2.1%
EDS Unigraphics	13.7	4.1	6.5	207	3.3%	2.0%	5.7%	1.4%
Data Technology/DATECH*	11.9	2.9	7.9	554	2.9%	1.4%	6.9%	3.8%
Intergraph	11.1	4.0	3.5	155	2.7%	1.9%	3.1%	1.1%
Parametric Technology	9.9	.0	8.1	0	2.4%	.0%	7.1%	.0%
SDRC	8.7	.0	6.0	0	2.1%	.0%	5.2%	.0%
Autodesk	8.0	.0	8.0	0	1.9%	.0%	7.0%	.0%
ICL	7.6	4.4	2.6	218	1.9%	2.1%	2.3%	1.5%
Delcam International	6.9	2.4	3.0	89	1.7%	1.2%	2.6%	.6%
PAFEC	6.1	1.9	3.4	76	1.5%	.9%	3.0%	.5%
Applicon	5.0	1.7	2.0	55	1.2%	.8%	1.7%	.4%
PDA Engineering	3.8	.0	3.6	0	.9%	.0%	3.2%	.0%
Matra Datavision	3.6	1.2	2.0	66	.9%	.6%	1.8%	.5%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cimlinc	3.6	.2	1.8	8	.9%	.1%	1.6%	.1%
MacNeal-Schwendler	3.5	.0	3.3	0	.8%	.0%	2.9%	.0%
FEA	3.1	.7	.8	188	.8%	.3%	.7%	1.3%
Whessoe Computing Systems	2.9	.0	2.9	0	.7%	.0%	2.5%	.0%
Dassault*	2.2	.0	1.9	0	.5%	.0%	1.6%	.0%
Apple Computer	2.0	2.0	.0	415	.5%	1.0%	.0%	2.8%
Control Data Systems	1.9	.9	.4	24	.5%	.4%	.4%	.2%
Anilam Electronics	1.7	.3	1.2	0	.4%	.2%	1.1%	.0%
RoboCAD Solutions	1.7	.0	1.4	0	.4%	.0%	1.2%	.0%
FEGS	1.7	.0	.7	0	.4%	.0%	.6%	.0%
Superdraft	1.6	.7	.7	114	.4%	.3%	.6%	.8%
Swanson Analysis	1.4	.0	1.3	0	.3%	.0%	1.1%	.0%
Pathtrace Engineering Systems	1.4	.3	.8	36	.3%	.1%	.7%	.2%
CAMTEK	1.3	.3	.9	117	.3%	.1%	.8%	.8%
Altium*	1.3	.0	1.2	0	.3%	.0%	1.1%	.0%
Investronica SA	.9	.6	.3	32	.2%	.3%	.2%	.2%
MCS	.9	.0	.8	5	.2%	.0%	.7%	.0%
Gerber Systems	.9	.4	.4	14	.2%	.2%	.3%	.1%
CAD-Capture	.7	.1	.1	6	.2%	.1%	.1%	.0%
Exapt	.6	.3	.2	12	.2%	.1%	.2%	.1%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Computational Mechanics	.5	.0	.5	0	.1%	.0%	.5%	.0%
Other Companies	2.8	19.3	.0	4,643	.7%	9.4%	.0%	31.5%
All Companies	411.2	207.0	114.0	14,716	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	344.4	180.7	83.9	10,680	83.8%	87.3%	73.6%	72.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	66.8	26.2	30.2	4,037	16.2%	12.7%	26.4%	27.4%
All Hardware Companies	150.6	129.7	.0	11,156	36.6%	62.7%	.0%	75.8%
All Turnkey & SW Companies	260.6	77.2	114.0	3,560	63.4%	37.3%	100.0%	24.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 12
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	23.2	8.8	7.3	432	20.3%	15.3%	19.2%	4.7%
IBM	15.6	13.2	1.0	1,623	13.7%	23.1%	2.7%	17.7%
Autodesk	8.6	.0	8.6	0	7.6%	.0%	22.5%	.0%
Data Technology/DATECH*	6.4	1.3	4.5	237	5.6%	2.2%	11.9%	2.6%
Computervision	5.7	1.3	1.7	83	5.0%	2.3%	4.4%	.9%
Moss Systems	4.6	.6	2.0	49	4.0%	1.0%	5.1%	.5%
Digital	4.5	3.8	.0	658	3.9%	6.7%	.0%	7.2%
CAD Centre	4.1	.4	2.6	22	3.6%	.7%	6.9%	.2%
Computer Services Consultants	4.0	.0	4.0	0	3.5%	.0%	10.6%	.0%
Gable CAD Systems	3.8	2.7	.6	43	3.3%	4.7%	1.5%	.5%
Hewlett-Packard	3.7	3.2	.0	220	3.3%	5.5%	.0%	2.4%
Apple Computer	3.0	3.0	.0	630	2.6%	5.2%	.0%	6.9%
GDS	3.0	1.4	1.3	48	2.6%	2.4%	3.4%	.5%
Elstree Computing	2.1	.9	1.1	62	1.8%	1.5%	2.9%	.7%
RoboCAD Solutions	1.8	.0	1.4	0	1.6%	.0%	3.8%	.0%
Radan Computational	1.8	.6	.9	36	1.6%	1.1%	2.4%	.4%
Ground Modelling Systems	1.8	.9	.7	165	1.6%	1.6%	1.9%	1.8%
Isicad CAD/CAM Systeme	1.7	.4	1.0	20	1.5%	.7%	2.6%	.2%
Lamp Software	1.2	.3	.9	81	1.0%	.5%	2.3%	.9%
Sun Microsystems	.7	.6	.0	27	.6%	1.0%	.0%	.3%

(Continued)

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Table 12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Silicon Graphics	.7	.6	.0	19	.6%	1.0%	.0%	.2%
Other Companies	9.8	13.0	.0	4,678	8.6%	22.7%	.0%	51.0%
All Companies	114.0	57.2	38.2	9,179	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	82.5	46.0	22.8	7,059	72.3%	80.5%	59.7%	76.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	31.6	11.2	15.4	2,120	27.7%	19.5%	40.3%	23.1%
All Hardware Companies	38.4	36.4	.0	8,027	33.7%	63.6%	.0%	87.5%
All Turnkey & SW Companies	75.6	20.8	38.2	1,152	66.3%	36.4%	100.0%	12.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

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Table 13
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sysdeco Ltd.	23.2	11.6	5.8	203	14.3%	15.0%	11.6%	4.1%
Intergraph	23.2	9.8	7.3	370	14.3%	12.6%	14.5%	7.4%
ICL	22.2	13.0	7.7	638	13.7%	16.7%	15.3%	12.7%
Digital	12.6	9.4	.0	547	7.8%	12.1%	.0%	10.9%
Sun Microsystems	9.9	8.1	.0	257	6.1%	10.4%	.0%	5.1%
Smallworld Systems	9.3	.5	5.5	17	5.7%	.6%	11.0%	.3%
Laser-Scan	7.3	2.1	3.2	45	4.5%	2.7%	6.4%	.9%
IBM	6.3	5.6	.2	370	3.9%	7.2%	.3%	7.4%
ESRI	5.6	.0	4.5	0	3.4%	.0%	9.0%	.0%
Hewlett-Packard	4.5	3.8	.0	212	2.8%	5.0%	.0%	4.2%
Siemens Nixdorf Info systeme	2.5	.9	1.0	41	1.6%	1.1%	1.9%	.8%
GDS	2.5	1.2	1.1	40	1.5%	1.5%	2.2%	.8%
Autodesk	2.2	.0	2.2	0	1.4%	.0%	4.4%	.0%
Sysscan	2.0	.8	.6	20	1.2%	1.0%	1.1%	.4%
PAFEC	1.7	.6	.8	24	1.0%	.8%	1.7%	.5%
Unisys	1.7	.4	.7	16	1.0%	.5%	1.4%	.3%
Ground Modelling Systems	1.6	.6	.8	105	1.0%	.7%	1.6%	2.1%
Genasys II	1.6	.2	1.1	6	1.0%	.2%	2.2%	.1%
Contract Data Research	1.2	.0	.3	0	.7%	.0%	.7%	.0%
MapInfo	1.1	.0	.9	0	.7%	.0%	1.9%	.0%
Star Informatic	.8	.2	.5	11	.5%	.2%	1.0%	.2%

(Continued)

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Table 13 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
APIC Systemes	.6	.0	.4	0	.4%	.0%	.8%	.0%
Other Companies	16.6	8.4	4.8	2,031	10.2%	10.9%	9.5%	40.6%
All Companies	162.0	77.6	50.1	5,005	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	88.1	46.3	23.2	3,517	54.4%	59.7%	46.2%	70.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	74.0	31.2	27.0	1,489	45.6%	40.3%	53.8%	29.7%
All Hardware Companies	39.3	33.0	.0	3,404	24.3%	42.6%	.0%	68.0%
All Turnkey & SW Companies	122.7	44.5	50.1	1,601	75.7%	57.4%	100.0%	32.0%

Source: Dataquest (July 1994)

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Table 14
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	24.9	19.7	.0	962	17.3%	27.8%	.0%	17.2%
Digital	19.8	15.5	.0	540	13.7%	21.9%	.0%	9.6%
Mentor Graphics	17.4	2.5	7.6	83	12.1%	3.5%	18.5%	1.5%
IBM	13.7	11.7	.9	967	9.5%	16.5%	2.1%	17.3%
Hewlett-Packard	11.8	9.0	1.0	518	8.2%	12.7%	2.3%	9.3%
Cadence	11.7	.0	8.4	0	8.1%	.0%	20.3%	.0%
Racal-Redac	6.3	.8	2.9	32	4.4%	1.1%	7.0%	.6%
Synopsys	4.3	.0	3.0	0	3.0%	.0%	7.2%	.0%
Harris EDA	2.6	.2	1.5	14	1.8%	.3%	3.7%	.3%
Viewlogic Systems	2.4	.0	1.9	0	1.6%	.0%	4.6%	.0%
Intergraph	2.3	.0	2.0	1	1.6%	.0%	4.9%	.0%
Silicon Graphics	1.8	1.6	.0	51	1.3%	2.2%	.0%	.9%
Computervision	1.4	.3	.4	21	1.0%	.5%	1.0%	.4%
Autodesk	1.2	.0	1.2	0	.8%	.0%	2.9%	.0%
Data Technology/DATECH*	1.0	.3	.6	46	.7%	.4%	1.5%	.8%
Zycad	.8	.5	.1	11	.6%	.7%	.2%	.2%
Sagantec	.8	.0	.8	0	.6%	.0%	1.8%	.0%
COMPASS Design Automation	.7	.0	.6	0	.5%	.0%	1.4%	.0%
BETRONEX	.6	.0	.6	5	.4%	.0%	1.4%	.1%
ICL	.6	.3	.2	16	.4%	.5%	.5%	.3%

(Continued)

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Table 14 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Altium*	.5	.0	.5	0	.4%	.0%	1.2%	.0%
Other Companies	15.8	8.1	5.8	2,249	11.0%	11.4%	14.1%	40.2%
All Companies	144.2	70.9	41.2	5,596	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	133.2	68.0	36.0	4,886	92.3%	95.8%	87.2%	87.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	11.1	3.0	5.3	710	7.7%	4.2%	12.8%	12.7%
All Hardware Companies	77.1	64.3	.0	5,330	53.5%	90.7%	.0%	95.2%
All Turnkey & SW Companies	67.1	6.6	41.2	266	46.5%	9.3%	100.0%	4.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

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Table 15
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	15.1	11.9	.0	618	17.4%	28.0%	.0%	17.1%
Digital	11.9	9.4	.0	371	13.7%	22.1%	.0%	10.3%
Mentor Graphics	9.2	1.3	4.1	44	10.6%	3.1%	15.8%	1.2%
Hewlett-Packard	7.5	5.4	1.0	331	8.6%	12.7%	3.7%	9.2%
Cadence	7.0	.0	5.0	0	8.0%	.0%	19.4%	.0%
IBM	7.0	6.5	.0	644	8.0%	15.4%	.0%	17.8%
Synopsys	4.3	.0	3.0	0	4.9%	.0%	11.5%	.0%
Racal-Redac	2.4	.3	1.0	14	2.7%	.8%	4.1%	.4%
Viewlogic Systems	2.4	.0	1.9	0	2.7%	.0%	7.4%	.0%
Silicon Graphics	1.7	1.5	.0	48	2.0%	3.5%	.0%	1.3%
Intergraph	1.3	.0	1.1	1	1.4%	.0%	4.4%	.0%
Autodesk	1.0	.0	1.0	0	1.1%	.0%	3.9%	.0%
Zycad	.8	.5	.1	11	1.0%	1.1%	.4%	.3%
Harris EDA	.6	.1	.4	4	.7%	.1%	1.4%	.1%
Data Technology/DATECH*	.6	.2	.3	39	.7%	.5%	1.2%	1.1%
Other Companies	12.4	4.9	5.8	1,409	14.2%	11.5%	22.5%	39.0%
All Companies	87.0	42.5	25.7	3,611	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	82.3	40.4	24.2	2,942	94.6%	95.0%	94.3%	81.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	4.7	2.1	1.5	669	5.4%	5.0%	5.7%	18.5%
All Hardware Companies	47.2	39.2	.0	3,476	54.3%	92.2%	.0%	96.3%
All Turnkey & SW Companies	39.7	3.3	25.7	135	45.7%	7.8%	100.0%	3.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

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Table 16
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	7.8	6.2	.0	258	30.6%	44.2%	.0%	53.6%
Digital	4.2	3.3	.0	61	16.5%	23.4%	.0%	12.7%
Cadence	4.2	.0	3.0	0	16.4%	.0%	51.8%	.0%
Mentor Graphics	3.2	.5	1.4	15	12.5%	3.2%	24.1%	3.1%
IBM	3.0	2.8	.0	85	11.8%	19.8%	.0%	17.6%
Hewlett-Packard	1.3	1.1	.0	49	5.0%	7.8%	.0%	10.2%
Sagantec	.8	.0	.8	0	3.2%	.0%	13.3%	.0%
Other Companies	.5	.2	.3	12	2.1%	1.3%	4.4%	2.4%
All Companies	25.4	13.9	5.7	481	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	24.5	13.9	5.0	481	96.8%	100.0%	86.7%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.8	.0	.8	0	3.2%	.0%	13.3%	.0%
All Hardware Companies	16.4	13.5	.0	465	64.8%	96.7%	.0%	96.8%
All Turnkey & SW Companies	8.9	.5	5.7	15	35.2%	3.3%	100.0%	3.2%

Source: Dataquest (July 1994)

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Table 17
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: United Kingdom
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Mentor Graphics	5.1	.7	2.2	24	15.8%	5.0%	22.5%	1.6%
Racal-Redac	4.0	.5	1.9	19	12.4%	3.2%	18.9%	1.2%
IBM	3.7	2.4	.9	239	11.7%	16.7%	8.7%	15.9%
Digital	3.7	2.9	.0	108	11.5%	19.8%	.0%	7.2%
Hewlett-Packard	3.0	2.5	.0	138	9.3%	17.5%	.0%	9.2%
Sun Microsystems	2.1	1.7	.0	86	6.6%	11.4%	.0%	5.7%
Harris EDA	1.9	.2	1.2	10	6.1%	1.0%	11.7%	.6%
Computervision	1.0	.2	.3	15	3.2%	1.6%	3.1%	1.0%
Intergraph	.9	.0	.8	0	2.7%	.1%	7.7%	.0%
Cadence	.6	.0	.4	0	1.9%	.0%	4.5%	.0%
BETRONEX	.6	.0	.6	5	1.9%	.2%	5.9%	.3%
ICL	.6	.3	.2	16	1.8%	2.3%	1.9%	1.1%
Altium*	.5	.0	.5	0	1.6%	.0%	5.1%	.0%
Other Companies	2.9	3.0	.0	829	9.1%	20.5%	.0%	55.1%
All Companies	31.9	14.5	9.8	1,504	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	26.3	13.7	6.8	1,464	82.5%	94.3%	69.0%	97.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	5.6	.8	3.1	41	17.5%	5.7%	31.0%	2.7%
All Hardware Companies	13.5	11.7	.0	1,389	42.3%	80.3%	.0%	92.3%
All Turnkey & SW Companies	18.4	2.9	9.8	115	57.7%	19.7%	100.0%	7.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Software

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Note: All tables show estimated data.

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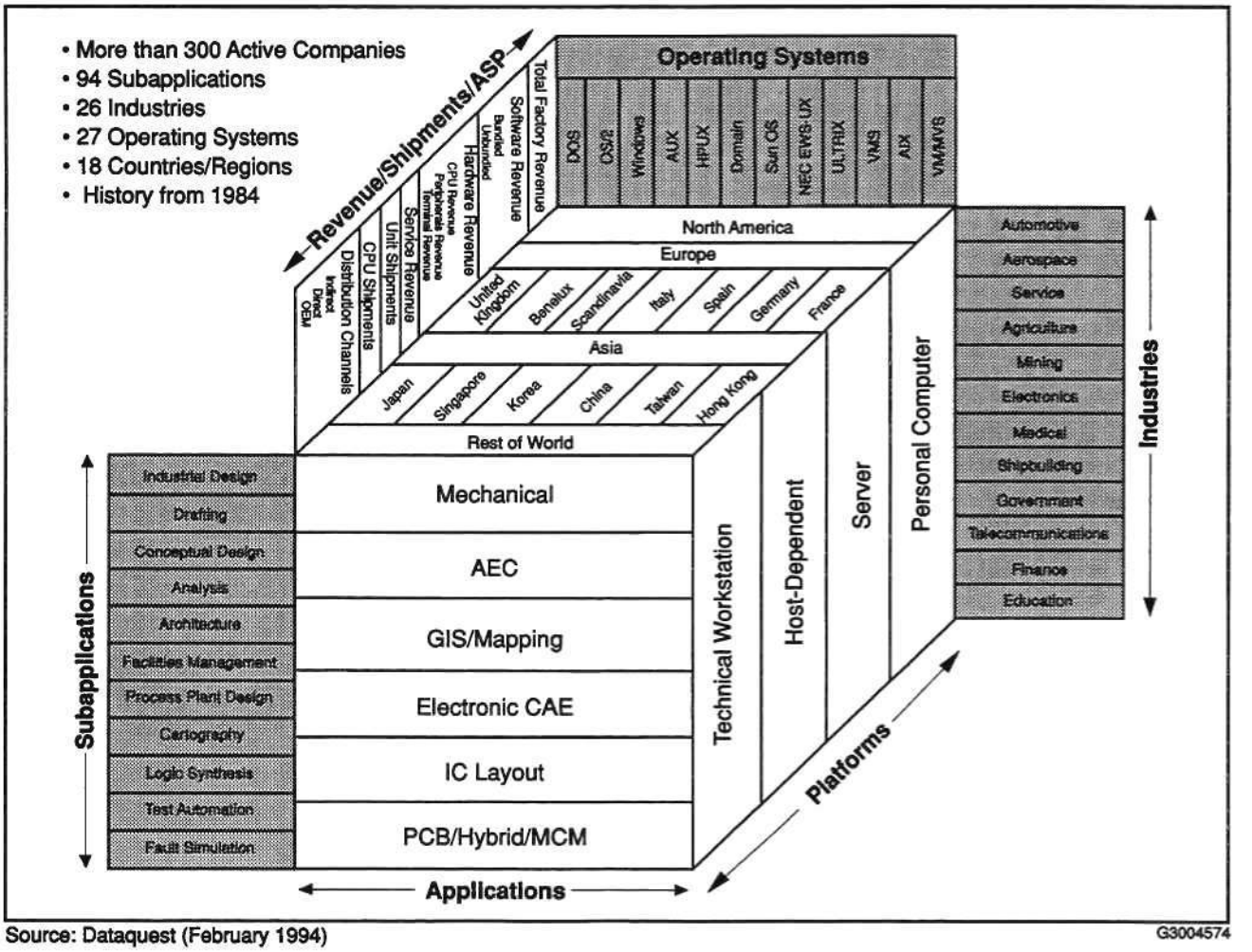
CAD/CAM/CAE and GIS Spain Market Share Update

Introduction

CAD/CAM/CAE/GIS systems have dramatically changed the methods by which designers and production managers originate and implement products. CAD and CAE systems allow designers to create, draft, analyze, test, and manipulate products on a screen in two and three dimensions. As CAD/CAM/CAE/GIS systems continue to decrease in cost, they become more available and cost justifiable to new users.

In order to provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure 1.

Figure 1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (February 1994)

G3004574

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Table 1
CAD/CAM/CAE/GIS 1992-1993 Market Summary

	Software Revenue 1992 ($M)	Software Revenue 1993 ($M)	Growth Rate (%)	Total Revenue 1992 ($M)	Total Revenue 1993 ($M)	Growth Rate (%)	Hardware Unit Shipments 1992	Hardware Unit Shipments 1993	Growth Rate (%)
Application									
Mechanical	2,170.4	2,294.7	5.7	7,988.2	7,862.7	-1.6	302,347	303,364	0.3
AEC	746.9	794.1	6.3	2,356.5	2,444.0	3.7	178,629	198,075	10.9
GIS/Mapping	580.1	662.2	14.2	2,005.6	2,179.1	8.7	86,513	102,624	18.6
Electronic CAE	741.5	797.1	7.5	2,086.4	2,271.7	8.9	94,176	99,129	5.3
IC Layout	212.7	203.0	-4.6	628.4	676.4	7.6	9,771	13,049	33.5
PCB/Hybrid/MCM	265.9	271.2	2.0	870.9	900.2	3.4	35,110	38,030	8.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
Region									
North America	1,562.5	1,754.6	12.3	5,253.5	5,690.7	8.3	286,939	325,318	13.4
Europe	1,693.8	1,608.9	-5.0	5,755.5	5,432.7	-5.6	231,062	240,603	4.1
Asia	1,352.7	1,534.4	13.4	4,601.2	4,830.6	5.0	169,839	163,620	-3.7
Rest of World	108.5	124.3	14.6	325.9	380.2	16.7	18,706	24,730	32.2
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
In Local Currencies									
Europe (ECU)	1,301.8	1,378.2	5.9	4,423.7	4,653.7	5.2			
Asia (yen)	170,895	170,093	-0.5	581,318	535,468	-7.9			
Platform									
Technical Workstation	3,060.1	3,312.8	8.3	9,640.0	10,458.3	8.5	173,705	194,848	12.2
Host-Dependent	360.2	306.1	-15.0	2,436.6	1,754.7	-28.0	34,524	28,573	-17.2
Server	140.0	176.2	25.9	906.3	1,056.8	16.6	11,566	13,381	15.7
Personal Computer	1,157.1	1,227.1	6.1	2,953.2	3,064.4	3.8	486,751	517,469	6.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8

Source: Dataquest (July 1994)

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A companion article analyzing major shifts in the 1993 market was published in our *Dataquest Perspective,* dated June 27, 1994.

Table 1 summarizes the performance in various segments of the CAD/CAM/CAE/GIS markets in 1993 versus 1992. With the devaluation of the dollar against the yen (¥126.34/$ in 1992 versus ¥110.85/$ in 1993) and the appreciation of the dollar against the ECU (ECU 0.7686/$ in 1992 versus ECU 0.8566/$ in 1993), actual growth is not as it appears when denominated in U.S. dollars. With 75 percent of the Asian market in Japan, denominating in yen gives a rough indication of real growth in the Asian market, which was a negative 7.9 percent.

About This Document

This document contains Dataquest's detailed market share information on the CAD/CAM/CAE/GIS industry. We no longer publish worldwide all-application market statistics for the entire CAD/CAM/CAE/GIS industry. This data is available by calling Suzanne Snygg at (408) 437-8241. The category "Other Companies" is the aggregation of small companies. More detailed data on these markets may be requested through our Client Inquiry service.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

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Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic Computer-Aided Engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of products). Schematic capture and simulation are examples of electronic CAE applications.
- IC Layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/Hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe. Market share data is available for each of these countries.

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong. Market share data is available for each of these countries.

Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed

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by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

Metrics

The following paragraphs define measurements.

- Total factory revenue is defined as the amount of money received by a manufacturer for its goods and services measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue). Total factory revenue is the sum of software revenue, hardware revenue, and service revenue.
- Unit shipment is defined as the number of seats delivered (number of possible simultaneous users of product delivered) excluding OEM shipments.

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- Hardware revenue is revenue derived from sales of CPUs (including operating systems), terminals (for host-dependent systems), and peripherals.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled application software.
- Service revenue is defined as all revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
  - Maintenance fees for hardware and software
  - Management and operations services—help desk, education and training, disaster recovery, vaulting, and configuration management.
  - Service bureau—project work, including construction of database, data conversion, product design, analysis, or manufacturing.
  - Application development—design and development of customized software applications or the modification, enhancement, or customization of existing software applications, adding new functionality.
  - Consulting revenue—assessment of CAD/CAM/CAE/GIS business and information technology needs and the formulation of a plan based on needs identification.
  - Implementation and integration services—planning, implementation, migration, and integration of software products (software network support and integration, account integration management, data center design, and construction).

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year and second quarter of the subsequent year, we survey all participants in each industry. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contacts at large companies. (Dataquest maintains a large contact database on all sources of information.) The following are examples of the job titles of people contacted for information:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning

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- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE/GIS marketing programs
- Market research analyst

The Audit Process

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks
- Articles in both the general and trade press
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice; Dataquest also checks with multiple sources at one company to cross-check data on that company.

Dataquest analysts have many years of experience in how to apply the above tools to get the most accurate information possible on a particular company (such as what to use when and what industry averages are). We believe that the estimates presented here are the most accurate and meaningful generally available today. It is the CAD/CAM/CAE/GIS group's policy to continually update our market information for any year, based on any new data received, in order to arrive at the most accurate market representation possible.

Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

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Publishing Schedule

We publish both market share and forecasting twice each year, allowing for timely distribution of data and thorough analysis and forecasting. Our annual delivery schedule is as follows:

- Market share data is available January 31. All tables will be published and distributed to clients by March 31.
- Forecasting from the market share tables provides a five-year forecast period, available after March 31. The books will be shipped by May 31.
- Final updated market share tables, based on additional data collection and analysis, will be completed by May 31. At this point, the market share database is frozen and will not be changed until the end of the year. For the next six months, supplementary market data will be based on this final market data. Books will be shipped by July 31.
- We provide complete final forecast tables by July 31. These tables take into consideration changes in the market share during the previous six months. Books will be shipped by September 30.

Database Changes

Tables 2 through 5 show changes made to the database since last year's market share update. PC clone manufacturers are no longer tracked individually. We continue to show PC sales by IBM, Hewlett-Packard, and Digital, which also sell other platforms. The 1993 sales of GeoVision Systems to SHL Systemhouse, Computervision-GIS to Unisys, Racal-Redac to Zuken, Chronologic to Viewlogic, ASG to Softdesk, CDC's mechanical software product to ICEM Technologies, PDA to MacNeal-Schwendler, and Logic Modeling Corporation to Synopsys; the merger of Sysdeco and SysScan; and the change of GDS to Convergent Group will be recognized in market reporting for 1994.

Table 2
Companies Renamed

Company Name	Renamed to:
Alper Systems	Sysdeco Ltd.
Areon	Kreon
CADAM	Altium
Catalpa	Catalpa groupe Missler
Geotrace Technologies	Cadlynx
Logic Control	Logic Systems Designers
RIB/RZB	RIB Bausoftware
Sener Sistemas Marinos	Sener Inginiera y Sistemas
STI Strassle	Strassle Informationssysteme
Test Systems Strategies	Summitt

Source: Dataquest (July 1994)

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Table 3
Companies (or CAD Portions Thereof) Sold/Merged

Company Name	Acquired by, Merged with, Technology Sold to:
ANACAD & Electrical Eng. Software	ANACAD-EES
Aries Technology	MacNeal-Schwendler
CAD Language Systems	Compass Design Automation
CAD/CAM Group	Data I/O
Comdisco	Cadence
DAT Standard info ssystemes	ISD Software
EEsof	Hewlett-Packard
Expertest	Sunrise Test
Fides Industrielle Automation	Strassle
HP Cade	Hewlett-Packard
Inca	Zycad
Infocel	Understanding Systems
PiE Design	Quickturn Design Systems
Quad Design Technology	Viewlogic
Wisdom Systems	ICAD

Source: Dataquest (July 1994)

Table 4
Companies Deleted

Company Removed from Database:
European
Asicom
Club Informatico SA
DATAID Technologies
DECISA
Micrograph
Olivetti*
Research Machines*
North American
Bechtel
CADLYNX
Compaq*
Dell Computer*
Engineering Systems Corporation
GeoQuest
Mega CADD
NCR Microelectronics
Object Design
Objectivity
Ontos
Quicklogic
The CAD Group
Ultimap

*We no longer follow individual PC clone makers.
Source: Dataquest (July 1994)

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Table 5
Companies Added

Company Added to Database:
European
APIC Systemes
ISD Software
SPEED
Ultimate Technology
North American
AT&T
Aptix
ARC SYS
EAGLE Point
Earth Resource Mapping
Graftek
Graphic Data Systems (GDS)
Model Technology
Systems Science Inc.
Tactics Int'l Ltd.
VLSI Libraries
Asian
Adam Net
Kozo
Okura
Tachnodia
TECHSPERT
Toshiba Engineering
Yokogawa Digital Computer

Source: Dataquest (July 1994)

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Table 6
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	29.6	21.3	2.8	1,133	17.1%	24.0%	5.7%	13.5%
IBM	24.0	16.9	3.6	1,220	13.8%	19.0%	7.3%	14.5%
Intergraph	19.3	7.4	6.4	306	11.2%	8.4%	13.2%	3.6%
ABB Industria*	13.7	6.0	6.6	510	7.9%	6.8%	13.5%	6.1%
Computervision	12.8	2.9	3.9	175	7.4%	3.3%	8.0%	2.1%
Siemens Nixdorf Info systeme	7.6	2.6	2.9	123	4.4%	2.9%	5.9%	1.5%
Digital	7.1	5.5	.0	309	4.1%	6.2%	.0%	3.7%
Sun Microsystems	6.8	5.5	.0	216	3.9%	6.1%	.0%	2.6%
CIMTEK*	6.6	2.3	3.5	60	3.8%	2.6%	7.2%	.7%
Autodesk	4.7	.0	4.7	0	2.7%	.0%	9.7%	.0%
Softronics	4.2	.9	3.4	322	2.4%	1.0%	6.9%	3.8%
Investronica SA	3.8	2.4	1.0	129	2.2%	2.7%	2.1%	1.5%
FHECOR*	3.6	.0	3.6	0	2.1%	.0%	7.4%	.0%
Silicon Graphics	3.6	3.1	.0	95	2.1%	3.5%	.0%	1.1%
ESRI	3.0	.0	2.4	0	1.7%	.0%	4.9%	.0%
Control Data Systems	2.5	1.3	.5	36	1.5%	1.5%	1.0%	.4%
Tebis	2.1	.5	.3	14	1.2%	.6%	.7%	.2%
Logic System Designers*	1.7	.7	.7	42	1.0%	.7%	1.5%	.5%
Aplein*	1.7	1.6	.1	20	1.0%	1.8%	.2%	.2%
Genasys II	1.6	.2	1.1	6	.9%	.2%	2.2%	.1%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
SDRC	1.5	.0	1.1	0	.9%	.0%	2.2%	.0%
Soft*	1.5	.0	1.1	0	.9%	.0%	2.3%	.0%
Parametric Technology	1.5	.0	1.2	0	.8%	.0%	2.5%	.0%
Cadence	1.3	.0	.9	0	.8%	.0%	1.9%	.0%
DELTA CAD*	1.2	.3	1.0	20	.7%	.3%	2.0%	.2%
Unisys	1.2	.3	.5	12	.7%	.3%	1.0%	.1%
ARKTEC	1.1	.1	.9	44	.6%	.1%	1.8%	.5%
CAD TECH Iberica*	1.1	.6	.4	32	.6%	.7%	.8%	.4%
Kockums Computer Systems	1.0	.3	.2	45	.6%	.3%	.3%	.5%
Apple Computer	.9	.9	.0	195	.5%	1.0%	.0%	2.3%
Dassault*	.9	.0	.8	0	.5%	.0%	1.7%	.0%
MacNeal-Schwendler	.9	.0	.9	0	.5%	.0%	1.8%	.0%
DAPCO	.9	.0	.4	0	.5%	.0%	.7%	.0%
Delcam International	.8	.3	.3	10	.5%	.3%	.7%	.1%
Cimatron	.7	.3	.3	18	.4%	.4%	.7%	.2%
Mentor Graphics	.7	.1	.3	4	.4%	.1%	.7%	.0%
Ziegler Informatics	.7	.0	.7	0	.4%	.0%	1.5%	.0%
EDS Unigraphics	.7	.2	.3	11	.4%	.2%	.7%	.1%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IEZ	.6	.2	.3	14	.3%	.2%	.6%	.2%
Other Companies	.0	3.2	.0	3,182	.0%	3.6%	.0%	37.9%
All Companies	173.1	88.7	48.7	8,405	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	146.4	80.5	36.0	7,599	84.6%	90.8%	74.1%	90.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	26.7	8.2	12.6	806	15.4%	9.2%	25.9%	9.6%
All Hardware Companies	61.3	54.2	.0	6,629	35.4%	61.1%	.0%	78.9%
All Turnkey & SW Companies	111.8	34.5	48.7	1,775	64.6%	38.9%	100.0%	21.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 7
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	27.9	20.0	2.7	768	25.4%	37.6%	9.2%	36.6%
Intergraph	15.9	6.3	5.0	198	14.4%	11.8%	17.2%	9.5%
IBM	14.2	10.2	1.9	292	12.9%	19.3%	6.3%	13.9%
Computervision	12.6	2.9	3.8	174	11.5%	5.4%	12.8%	8.3%
Siemens Nixdorf Info systeme	7.2	2.4	2.8	117	6.5%	4.5%	9.5%	5.6%
CIMTEK*	6.1	2.1	3.2	54	5.5%	4.0%	10.8%	2.6%
Sun Microsystems	4.4	3.4	.0	171	4.0%	6.5%	.0%	8.1%
Silicon Graphics	3.1	2.7	.0	90	2.8%	5.1%	.0%	4.3%
Digital	1.9	1.4	.0	71	1.7%	2.7%	.0%	3.4%
Aplein*	1.7	1.6	.1	20	1.5%	3.0%	.3%	1.0%
Control Data Systems	1.5	.7	.4	25	1.4%	1.4%	1.4%	1.2%
SDRC	1.5	.0	1.0	0	1.4%	.0%	3.5%	.0%
Genasys II	1.4	.1	1.0	3	1.3%	.3%	3.3%	.1%
Parametric Technology	1.4	.0	1.2	0	1.3%	.0%	3.9%	.0%
Cadence	1.2	.0	.9	0	1.1%	.0%	3.0%	.0%
ESRI	1.2	.0	.9	0	1.1%	.0%	3.1%	.0%
Kockums Computer Systems	1.0	.3	.2	45	.9%	.5%	.6%	2.1%
DAPCO	.9	.0	.4	0	.8%	.0%	1.2%	.0%
Unisys	.9	.2	.4	8	.8%	.4%	1.2%	.4%
CAD TECH Iberica*	.8	.4	.3	17	.7%	.8%	.9%	.8%
Delcam International	.8	.3	.3	9	.7%	.5%	1.1%	.4%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Mentor Graphics	.7	.1	.3	4	.7%	.2%	1.1%	.2%
Cimatron	.6	.3	.3	13	.6%	.5%	1.0%	.6%
FHECOR*	.6	.0	.6	0	.5%	.0%	1.9%	.0%
IEZ	.6	.2	.3	14	.5%	.4%	1.0%	.7%
EDS Unigraphics	.6	.2	.3	9	.5%	.3%	.9%	.4%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	110.1	53.0	29.3	2,098	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	96.7	49.0	23.7	1,843	87.9%	92.5%	80.8%	87.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	13.4	4.0	5.6	255	12.1%	7.5%	19.2%	12.2%
All Hardware Companies	32.9	27.9	.0	1,111	29.9%	52.7%	.0%	53.0%
All Turnkey & SW Companies	77.2	25.1	29.3	987	70.1%	47.3%	100.0%	47.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 8
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	5.1	3.0	1.0	89	36.6%	30.7%	51.2%	32.0%
Digital	2.0	1.5	.0	0	14.1%	15.4%	.0%	.0%
Control Data Systems	.9	.5	.1	11	6.3%	5.4%	3.4%	3.9%
MacNeal-Schwendler	.6	.0	.6	0	4.5%	.0%	31.0%	.0%
Other Companies	4.4	4.4	.0	167	31.1%	45.9%	.0%	60.2%
All Companies	14.0	9.7	2.0	277	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	13.7	9.5	1.9	271	97.3%	98.3%	95.1%	97.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.4	.2	.1	6	2.7%	1.7%	4.9%	2.1%
All Hardware Companies	7.2	6.4	.0	176	51.0%	65.8%	.0%	63.7%
All Turnkey & SW Companies	6.9	3.3	2.0	101	49.0%	34.2%	100.0%	36.3%

Source: Dataquest (July 1994)

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Table 9
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	2.5	1.9	.0	23	21.7%	29.7%	.0%	19.1%
Sun Microsystems	2.4	2.0	.0	45	21.2%	31.9%	.0%	36.6%
Intergraph	1.6	.6	.5	19	14.2%	10.1%	21.0%	15.5%
IBM	1.2	.7	.2	15	10.5%	11.5%	10.5%	11.8%
ESRI	1.2	.0	.9	0	10.3%	.0%	39.3%	.0%
Silicon Graphics	.5	.5	.0	6	4.6%	7.1%	.0%	4.7%
Other Companies	.9	.2	.3	4	7.4%	2.8%	12.2%	3.2%
All Companies	11.5	6.3	2.3	122	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	11.5	6.3	2.3	121	99.6%	99.7%	99.1%	99.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.1	.0	.0	1	.4%	.3%	.9%	.9%
All Hardware Companies	6.0	4.9	.0	84	52.5%	76.5%	.0%	68.5%
All Turnkey & SW Companies	5.5	1.5	2.3	39	47.5%	23.5%	100.0%	31.5%

Source: Dataquest (July 1994)

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Table 10
1993 CAD/CAM/CAE/GIS Market Share Update

Application: **All Applications**
Platform: Personal Computer
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ABB Industria*	13.7	6.0	6.6	510	36.6%	30.7%	43.8%	8.6%
Autodesk	4.5	.0	4.5	0	12.0%	.0%	29.8%	.0%
Softronics	4.2	.9	3.4	322	11.2%	4.3%	22.3%	5.5%
Investronica SA	3.8	2.4	1.0	129	10.1%	12.0%	6.7%	2.2%
IBM	3.4	3.0	.4	824	9.1%	15.1%	2.9%	14.0%
FHECOR*	3.0	.0	3.0	0	8.1%	.0%	20.1%	.0%
Tebis	2.1	.5	.3	14	5.6%	2.7%	2.1%	.2%
Intergraph	1.8	.5	.9	89	4.8%	2.7%	6.0%	1.5%
Soft*	1.4	.0	1.0	0	3.7%	.0%	6.8%	.0%
Hewlett-Packard	1.3	1.1	.1	360	3.6%	5.7%	.5%	6.1%
DELTA CAD*	1.2	.3	1.0	20	3.3%	1.3%	6.4%	.3%
Logic System Designers*	1.2	.4	.6	37	3.3%	2.2%	3.7%	.6%
ARKTEC	1.0	.1	.8	41	2.6%	.4%	5.6%	.7%
Apple Computer	.9	.9	.0	195	2.5%	4.7%	.0%	3.3%
Ziegler Informatics	.7	.0	.7	0	1.9%	.0%	4.7%	.0%
Digital	.7	.7	.0	214	1.9%	3.4%	.0%	3.6%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ESRI	.6	.0	.6	0	1.6%	.0%	3.8%	.0%
Other Companies	.0	2.5	.0	3,090	.0%	12.8%	.0%	52.3%
All Companies	37.4	19.7	15.0	5,907	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	24.6	15.7	8.2	5,364	65.7%	79.6%	54.3%	90.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	12.9	4.0	6.9	544	34.3%	20.4%	45.7%	9.2%
All Hardware Companies	15.2	15.1	.0	5,258	40.7%	76.4%	.0%	89.0%
All Turnkey & SW Companies	22.2	4.6	15.0	650	59.3%	23.6%	100.0%	11.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 11
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	19.3	13.1	2.3	656	22.1%	28.5%	10.1%	18.1%
IBM	14.9	9.2	3.0	492	17.1%	19.9%	13.6%	13.6%
Computervision	11.4	2.6	3.5	155	13.1%	5.6%	15.6%	4.3%
CIMTEK*	6.6	2.3	3.5	60	7.5%	4.9%	15.6%	1.7%
ABB Industria*	5.1	2.2	2.4	189	5.8%	4.9%	10.9%	5.2%
Investronica SA	3.8	2.4	1.0	129	4.3%	5.1%	4.5%	3.6%
Intergraph	3.5	1.3	1.1	49	4.0%	2.8%	5.0%	1.4%
Silicon Graphics	3.2	2.8	.0	84	3.6%	6.0%	.0%	2.3%
Digital	2.7	2.1	.0	96	3.1%	4.6%	.0%	2.6%
Control Data Systems	2.5	1.3	.5	35	2.8%	2.8%	2.2%	1.0%
Tebis	2.1	.5	.3	14	2.4%	1.2%	1.4%	.4%
Autodesk	1.9	.0	1.9	0	2.2%	.0%	8.5%	.0%
Sun Microsystems	1.9	1.5	.0	61	2.1%	3.2%	.0%	1.7%
Logic System Designers*	1.7	.7	.7	42	2.0%	1.4%	3.2%	1.2%
Softronics	1.6	.3	1.3	123	1.8%	.7%	5.7%	3.4%
SDRC	1.5	.0	1.1	0	1.8%	.0%	4.7%	.0%
Parametric Technology	1.5	.0	1.2	0	1.7%	.0%	5.4%	.0%
CAD TECH Iberica*	1.1	.6	.4	32	1.3%	1.3%	1.8%	.9%
DELTA CAD*	.9	.2	.7	15	1.1%	.4%	3.2%	.4%
MacNeal-Schwendler	.9	.0	.8	0	1.0%	.0%	3.7%	.0%
Dassault*	.9	.0	.8	0	1.0%	.0%	3.4%	.0%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Delcam International	.8	.3	.3	10	.9%	.6%	1.5%	.3%
Cimatron	.7	.3	.3	18	.8%	.7%	1.5%	.5%
EDS Unigraphics	.7	.2	.3	11	.8%	.4%	1.5%	.3%
Aplein*	.6	.6	.0	8	.7%	1.3%	.2%	.2%
FHECOR*	.6	.0	.6	0	.7%	.0%	2.7%	.0%
Other Companies	.0	.7	.0	1,232	.0%	1.4%	.0%	34.0%
All Companies	87.2	46.0	22.3	3,627	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	76.0	41.7	17.6	3,293	87.1%	90.7%	79.2%	90.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	11.2	4.3	4.6	334	12.9%	9.3%	20.8%	9.2%
All Hardware Companies	27.4	24.3	.0	2,693	31.4%	52.9%	.0%	74.2%
All Turnkey & SW Companies	59.9	21.7	22.3	934	68.6%	47.1%	100.0%	25.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 12
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	5.2	2.0	1.7	97	20.3%	14.8%	19.8%	4.0%
ABB Industria*	5.1	2.2	2.4	189	19.8%	17.0%	29.1%	7.8%
IBM	4.1	3.3	.4	381	16.1%	25.1%	4.7%	15.7%
FHECOR*	3.0	.0	3.0	0	11.6%	.0%	35.7%	.0%
Autodesk	2.0	.0	2.0	0	7.9%	.0%	24.3%	.0%
Softronics	1.8	.4	1.4	135	6.9%	2.7%	16.8%	5.6%
Soft*	1.5	.0	1.1	0	5.9%	.0%	13.4%	.0%
Hewlett-Packard	1.1	1.0	.0	66	4.3%	7.2%	.0%	2.7%
ARKTEC	1.1	.1	.9	44	4.3%	.8%	10.8%	1.8%
Computervision	1.1	.2	.3	15	4.1%	1.8%	3.7%	.6%
Aplein*	1.0	1.0	.1	13	4.1%	7.5%	.6%	.5%
Kockums Computer Systems	1.0	.3	.2	45	3.8%	1.9%	2.0%	1.9%
Sun Microsystems	.8	.6	.0	28	2.9%	4.5%	.0%	1.2%
IEZ	.6	.2	.3	14	2.2%	1.4%	3.6%	.6%
Apple Computer	.6	.6	.0	115	2.1%	4.2%	.0%	4.8%
Other Companies	.0	.6	.0	1,180	.0%	4.9%	.0%	48.8%
All Companies	25.6	13.2	8.3	2,419	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	20.2	12.1	5.0	2,154	78.9%	92.0%	60.1%	89.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	5.4	1.1	3.3	265	21.1%	8.0%	39.9%	11.0%
All Hardware Companies	9.5	9.0	.0	2,011	37.0%	68.0%	.0%	83.1%
All Turnkey & SW Companies	16.1	4.2	8.3	408	63.0%	32.0%	100.0%	16.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 13
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	10.0	4.2	3.1	160	24.1%	22.5%	23.8%	10.9%
Siemens Nixdorf Info systeme	7.6	2.6	2.9	123	18.3%	13.7%	22.0%	8.5%
Digital	3.1	2.3	.0	132	7.3%	12.1%	.0%	9.1%
Hewlett-Packard	3.0	2.6	.0	142	7.3%	13.7%	.0%	9.7%
ESRI	3.0	.0	2.4	0	7.2%	.0%	18.2%	.0%
Sun Microsystems	2.8	2.3	.0	72	6.7%	12.0%	.0%	4.9%
IBM	2.0	1.8	.1	117	4.9%	9.6%	.5%	8.0%
ABB Industria*	1.9	.8	.9	71	4.6%	4.5%	7.0%	4.9%
Genasys II	1.6	.2	1.1	6	3.8%	.8%	8.3%	.4%
Unisys	1.2	.3	.5	12	2.9%	1.4%	3.7%	.8%
DAPCO	.7	.0	.3	0	1.7%	.0%	2.2%	.0%
Softronics	.5	.1	.4	41	1.3%	.6%	3.3%	2.8%
Autodesk	.5	.0	.5	0	1.3%	.0%	4.0%	.0%
Other Companies	2.8	1.6	.5	569	6.8%	8.3%	3.9%	39.0%
All Companies	41.5	18.7	13.1	1,459	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	32.1	16.0	9.0	1,280	77.4%	85.2%	68.8%	87.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	9.4	2.8	4.1	179	22.6%	14.8%	31.2%	12.2%
All Hardware Companies	12.6	10.7	.0	1,087	30.4%	57.0%	.0%	74.5%
All Turnkey & SW Companies	28.9	8.1	13.1	372	69.6%	43.0%	100.0%	25.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 14
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	6.1	4.7	.5	269	32.7%	43.5%	10.2%	29.9%
IBM	2.9	2.6	.1	230	15.6%	24.6%	1.6%	25.5%
ABB Industria*	1.6	.7	.8	61	8.8%	6.7%	16.1%	6.8%
Sun Microsystems	1.4	1.1	.0	54	7.5%	10.4%	.0%	6.0%
Cadence	1.3	.0	.9	0	7.0%	.0%	19.0%	.0%
Digital	1.0	.7	.0	26	5.1%	6.9%	.0%	2.9%
Mentor Graphics	.7	.1	.3	4	3.9%	1.0%	6.7%	.4%
Intergraph	.6	.0	.5	0	3.2%	.0%	10.8%	.0%
Other Companies	.6	.3	.1	201	3.0%	3.0%	1.8%	22.4%
All Companies	18.7	10.7	4.9	899	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	18.1	10.7	4.4	871	96.6%	99.4%	88.8%	96.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.6	.1	.6	28	3.4%	.6%	11.2%	3.1%
All Hardware Companies	11.9	10.2	.0	838	63.2%	95.1%	.0%	93.2%
All Turnkey & SW Companies	6.9	.5	4.9	61	36.8%	4.9%	100.0%	6.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 15
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	3.9	2.8	.5	172	32.3%	42.2%	13.9%	27.0%
IBM	1.6	1.5	.0	149	13.3%	23.1%	.0%	23.4%
ABB Industria*	1.2	.5	.6	46	10.1%	8.2%	16.4%	7.2%
Sun Microsystems	.9	.7	.0	35	7.0%	10.3%	.0%	5.5%
Cadence	.8	.0	.6	0	6.3%	.0%	15.3%	.0%
Digital	.6	.5	.0	18	4.8%	6.8%	.0%	2.8%
Other Companies	.6	.2	.3	169	5.2%	3.0%	7.8%	26.5%
All Companies	12.2	6.6	3.6	637	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	11.7	6.5	3.2	613	96.1%	99.1%	88.9%	96.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.5	.1	.4	24	3.9%	.9%	11.1%	3.8%
All Hardware Companies	7.3	6.3	.0	587	59.9%	95.0%	.0%	92.2%
All Turnkey & SW Companies	4.9	.3	3.6	50	40.1%	5.0%	100.0%	7.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 16
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Hewlett-Packard	.7	.6	.0	25	23.4%	32.9%	.0%	39.4%
IBM	.6	.6	.0	18	22.3%	34.1%	.0%	27.9%
Other Companies	.1	.0	.0	3	2.5%	2.4%	3.4%	4.4%
All Companies	2.8	1.7	.6	65	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2.8	1.7	.6	65	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	2.0	1.7	.0	64	70.2%	98.8%	.0%	99.0%
All Turnkey & SW Companies	.8	.0	.6	1	29.8%	1.2%	100.0%	1.0%

Source: Dataquest (July 1994)

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Table 17
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Spain
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	1.6	1.3	.0	72	41.1%	54.3%	.0%	36.2%
IBM	.7	.5	.1	62	18.0%	22.2%	11.1%	31.5%
Other Companies	.0	.1	.0	29	.0%	3.3%	.0%	14.9%
All Companies	3.8	2.4	.7	198	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.6	2.4	.6	194	95.5%	100.0%	79.2%	98.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.2	.0	.2	4	4.5%	.0%	20.8%	2.0%
All Hardware Companies	2.6	2.3	.0	187	68.7%	93.0%	.0%	94.7%
All Turnkey & SW Companies	1.2	.2	.7	10	31.3%	7.0%	100.0%	5.3%

Source: Dataquest (July 1994)

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For More Information...

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Software

CAD/CAM/CAE and GIS Scandinavia Market Share Update

Market Statistics

1994

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Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9409
Publication Date: July 27, 1994

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Note: All tables show estimated data.

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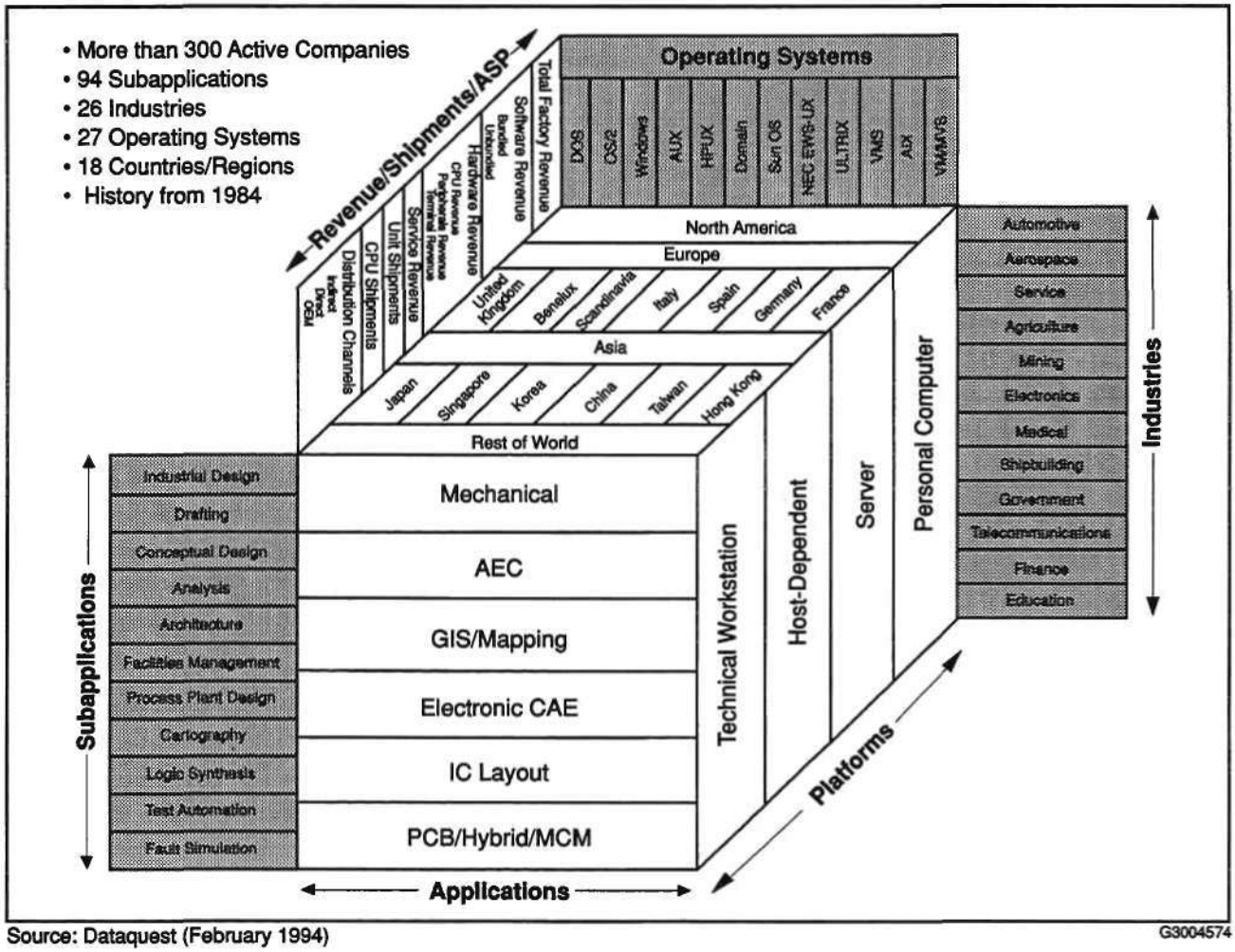
CAD/CAM/CAE and GIS Scandinavia Market Share Update

Introduction

CAD/CAM/CAE/GIS systems have dramatically changed the methods by which designers and production managers originate and implement products. CAD and CAE systems allow designers to create, draft, analyze, test, and manipulate products on a screen in two and three dimensions. As CAD/CAM/CAE/GIS systems continue to decrease in cost, they become more available and cost justifiable to new users.

In order to provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure 1.

Figure 1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (February 1994)

G3004574

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Table 1
CAD/CAM/CAE/GIS 1992-1993 Market Summary

	Software Revenue 1992 ($M)	Software Revenue 1993 ($M)	Growth Rate (%)	Total Revenue 1992 ($M)	Total Revenue 1993 ($M)	Growth Rate (%)	Hardware Unit Shipments 1992	Hardware Unit Shipments 1993	Growth Rate (%)
Application									
Mechanical	2,170.4	2,294.7	5.7	7,988.2	7,862.7	-1.6	302,347	303,364	0.3
AEC	746.9	794.1	6.3	2,356.5	2,444.0	3.7	178,629	198,075	10.9
GIS/Mapping	580.1	662.2	14.2	2,005.6	2,179.1	8.7	86,513	102,624	18.6
Electronic CAE	741.5	797.1	7.5	2,086.4	2,271.7	8.9	94,176	99,129	5.3
IC Layout	212.7	203.0	-4.6	628.4	676.4	7.6	9,771	13,049	33.5
PCB/Hybrid/MCM	265.9	271.2	2.0	870.9	900.2	3.4	35,110	38,030	8.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
Region									
North America	1,562.5	1,754.6	12.3	5,253.5	5,690.7	8.3	286,939	325,318	13.4
Europe	1,693.8	1,608.9	-5.0	5,755.5	5,432.7	-5.6	231,062	240,603	4.1
Asia	1,352.7	1,534.4	13.4	4,601.2	4,830.6	5.0	169,839	163,620	-3.7
Rest of World	108.5	124.3	14.6	325.9	380.2	16.7	18,706	24,730	32.2
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
In Local Currencies									
Europe (ECU)	1,301.8	1,378.2	5.9	4,423.7	4,653.7	5.2			
Asia (yen)	170,895	170,093	-0.5	581,318	535,468	-7.9			
Platform									
Technical Workstation	3,060.1	3,312.8	8.3	9,640.0	10,458.3	8.5	173,705	194,848	12.2
Host-Dependent	360.2	306.1	-15.0	2,436.6	1,754.7	-28.0	34,524	28,573	-17.2
Server	140.0	176.2	25.9	906.3	1,056.8	16.6	11,566	13,381	15.7
Personal Computer	1,157.1	1,227.1	6.1	2,953.2	3,064.4	3.8	486,751	517,469	6.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8

Source: Dataquest (July 1994)

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A companion article analyzing major shifts in the 1993 market was published in our *Dataquest Perspective*, dated June 27, 1994.

Table 1 summarizes the performance in various segments of the CAD/CAM/CAE/GIS markets in 1993 versus 1992. With the devaluation of the dollar against the yen (¥126.34/$ in 1992 versus ¥110.85/$ in 1993) and the appreciation of the dollar against the ECU (ECU 0.7686/$ in 1992 versus ECU 0.8566/$ in 1993), actual growth is not as it appears when denominated in U.S. dollars. With 75 percent of the Asian market in Japan, denominating in yen gives a rough indication of real growth in the Asian market, which was a negative 7.9 percent.

About This Document

This document contains Dataquest's detailed market share information on the CAD/CAM/CAE/GIS industry. We no longer publish worldwide all-application market statistics for the entire CAD/CAM/CAE/GIS industry. This data is available by calling Suzanne Snygg at (408) 437-8241. The category "Other Companies" is the aggregation of small companies. More detailed data on these markets may be requested through our Client Inquiry service.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

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Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic Computer-Aided Engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of products). Schematic capture and simulation are examples of electronic CAE applications.
- IC Layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/Hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe. Market share data is available for each of these countries.

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong. Market share data is available for each of these countries.

Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed

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by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

Metrics

The following paragraphs define measurements.

- Total factory revenue is defined as the amount of money received by a manufacturer for its goods and services measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue). Total factory revenue is the sum of software revenue, hardware revenue, and service revenue.
- Unit shipment is defined as the number of seats delivered (number of possible simultaneous users of product delivered) excluding OEM shipments.

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- Hardware revenue is revenue derived from sales of CPUs (including operating systems), terminals (for host-dependent systems), and peripherals.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled application software.
- Service revenue is defined as all revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
  - Maintenance fees for hardware and software
  - Management and operations services—help desk, education and training, disaster recovery, vaulting, and configuration management.
  - Service bureau—project work, including construction of database, data conversion, product design, analysis, or manufacturing.
  - Application development—design and development of customized software applications or the modification, enhancement, or customization of existing software applications, adding new functionality.
  - Consulting revenue—assessment of CAD/CAM/CAE/GIS business and information technology needs and the formulation of a plan based on needs identification.
  - Implementation and integration services—planning, implementation, migration, and integration of software products (software network support and integration, account integration management, data center design, and construction).

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year and second quarter of the subsequent year, we survey all participants in each industry. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contacts at large companies. (Dataquest maintains a large contact database on all sources of information.) The following are examples of the job titles of people contacted for information:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning

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- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE/GIS marketing programs
- Market research analyst

The Audit Process

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks
- Articles in both the general and trade press
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice; Dataquest also checks with multiple sources at one company to cross-check data on that company.

Dataquest analysts have many years of experience in how to apply the above tools to get the most accurate information possible on a particular company (such as what to use when and what industry averages are). We believe that the estimates presented here are the most accurate and meaningful generally available today. It is the CAD/CAM/CAE/GIS group's policy to continually update our market information for any year, based on any new data received, in order to arrive at the most accurate market representation possible.

Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

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Publishing Schedule

We publish both market share and forecasting twice each year, allowing for timely distribution of data and thorough analysis and forecasting. Our annual delivery schedule is as follows:

- Market share data is available January 31. All tables will be published and distributed to clients by March 31.
- Forecasting from the market share tables provides a five-year forecast period, available after March 31. The books will be shipped by May 31.
- Final updated market share tables, based on additional data collection and analysis, will be completed by May 31. At this point, the market share database is frozen and will not be changed until the end of the year. For the next six months, supplementary market data will be based on this final market data. Books will be shipped by July 31.
- We provide complete final forecast tables by July 31. These tables take into consideration changes in the market share during the previous six months. Books will be shipped by September 30.

Database Changes

Tables 2 through 5 show changes made to the database since last year's market share update. PC clone manufacturers are no longer tracked individually. We continue to show PC sales by IBM, Hewlett-Packard, and Digital, which also sell other platforms. The 1993 sales of GeoVision Systems to SHL Systemhouse, Computervision-GIS to Unisys, Racal-Redac to Zuken, Chronologic to Viewlogic, ASG to Softdesk, CDC's mechanical software product to ICEM Technologies, PDA to MacNeal-Schwendler, and Logic Modeling Corporation to Synopsys; the merger of Sysdeco and SysScan; and the change of GDS to Convergent Group will be recognized in market reporting for 1994.

Table 2
Companies Renamed

Company Name	Renamed to:
Alper Systems	Sysdeco Ltd.
Areon	Kreon
CADAM	Altium
Catalpa	Catalpa groupe Missler
Geotrace Technologies	Cadlynx
Logic Control	Logic Systems Designers
RIB/RZB	RIB Bausoftware
Sener Sistemas Marinos	Sener Inginiera y Sistemas
STI Strassle	Strassle Informationssysteme
Test Systems Strategies	Summitt

Source: Dataquest (July 1994)

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Table 3
Companies (or CAD Portions Thereof) Sold/Merged

Company Name	Acquired by, Merged with, Technology Sold to:
ANACAD & Electrical Eng. Software	ANACAD-EES
Aries Technology	MacNeal-Schwendler
CAD Language Systems	Compass Design Automation
CAD/CAM Group	Data I/O
Comdisco	Cadence
DAT Standard info ssystemes	ISD Software
EEsof	Hewlett-Packard
Expertest	Sunrise Test
Fides Industrielle Automation	Strassle
HP Cade	Hewlett-Packard
Inca	Zycad
Infocel	Understanding Systems
PiE Design	Quickturn Design Systems
Quad Design Technology	Viewlogic
Wisdom Systems	ICAD

Source: Dataquest (July 1994)

Table 4
Companies Deleted

Company Removed from Database:
European
Asicom
Club Informatico SA
DATAID Technologies
DECISA
Micrograph
Olivetti*
Research Machines*
North American
Bechtel
CADLYNX
Compaq*
Dell Computer*
Engineering Systems Corporation
GeoQuest
Mega CADD
NCR Microelectronics
Object Design
Objectivity
Ontos
Quicklogic
The CAD Group
Ultimap

*We no longer follow individual PC clone makers.
Source: Dataquest (July 1994)

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Table 5
Companies Added

Company Added to Database:
European
APIC Systemes
ISD Software
SPEED
Ultimate Technology
North American
AT&T
Aptix
ARC SYS
EAGLE Point
Earth Resource Mapping
Graftek
Graphic Data Systems (GDS)
Model Technology
Systems Science Inc.
Tactics Int'l Ltd.
VLSI Libraries
Asian
Adam Net
Kozo
Okura
Tachnodia
TECHSPERT
Toshiba Engineering
Yokogawa Digital Computer

Source: Dataquest (July 1994)

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Table 6
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	72.6	48.4	12.5	3,125	19.8%	26.4%	11.9%	21.4%
Intergraph	45.1	17.4	14.8	738	12.3%	9.5%	14.0%	5.1%
Digital	43.3	34.2	.0	1,781	11.8%	18.7%	.0%	12.2%
Hewlett-Packard	31.9	23.2	2.9	1,237	8.7%	12.6%	2.8%	8.5%
Computervision	22.4	5.1	6.9	318	6.1%	2.8%	6.5%	2.2%
Sun Microsystems	14.6	11.6	.0	500	4.0%	6.3%	.0%	3.4%
Mentor Graphics	11.9	1.7	5.2	57	3.2%	.9%	5.0%	.4%
Autodesk	11.5	.0	11.5	0	3.1%	.0%	11.0%	.0%
Data Technology/DATECH*	10.7	2.6	6.9	5,852	2.9%	1.4%	6.6%	40.1%
ESRI	6.0	.0	4.9	0	1.6%	.0%	4.6%	.0%
Silicon Graphics	6.0	5.2	.0	159	1.6%	2.8%	.0%	1.1%
Apple Computer	5.6	5.6	.0	1,185	1.5%	3.1%	.0%	8.1%
EDS Unigraphics	5.6	1.7	2.7	85	1.5%	.9%	2.5%	.6%
Cadence	5.2	.0	3.7	0	1.4%	.0%	3.5%	.0%
Parametric Technology	4.4	.0	3.6	0	1.2%	.0%	3.5%	.0%
SDRC	4.2	.0	2.9	0	1.2%	.0%	2.8%	.0%
Sysscan	4.0	1.6	1.2	41	1.1%	.9%	1.1%	.3%
Racal-Redac	3.2	.4	1.5	16	.9%	.2%	1.4%	.1%
Harris EDA	2.4	.2	1.5	16	.7%	.1%	1.4%	.1%
Synopsys	2.2	.0	1.5	0	.6%	.0%	1.4%	.0%
Control Data Systems	1.9	1.0	.4	27	.5%	.5%	.4%	.2%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Dassault*	1.7	.0	1.5	0	.5%	.0%	1.4%	.0%
Altium*	1.7	.0	1.6	0	.4%	.0%	1.5%	.0%
PDA Engineering	1.6	.0	1.5	0	.4%	.0%	1.5%	.0%
Genasys II	1.6	.2	1.1	6	.4%	.1%	1.0%	.0%
MacNeal-Schwendler	1.5	.0	1.4	0	.4%	.0%	1.3%	.0%
Sener Inginiera y Sistemaus	1.4	.0	1.4	0	.4%	.0%	1.4%	.0%
Viewlogic Systems	1.4	.0	1.2	0	.4%	.0%	1.1%	.0%
Cimlinc	1.3	.1	.7	3	.4%	.0%	.6%	.0%
Siemens Nixdorf Info systeme	1.3	.4	.5	21	.3%	.2%	.5%	.1%
Kockums Computer Systems	1.2	.3	.2	56	.3%	.2%	.2%	.4%
Tebis	1.2	.3	.2	8	.3%	.2%	.2%	.1%
Swanson Analysis	1.0	.0	.9	0	.3%	.0%	.8%	.0%
MapInfo	1.0	.0	.9	0	.3%	.0%	.8%	.0%
CAD Centre	1.0	.1	.7	4	.3%	.0%	.6%	.0%
Investronica SA	.9	.6	.3	32	.3%	.3%	.2%	.2%
Ziegler Informatics	.9	.0	.9	0	.3%	.0%	.9%	.0%
Enghouse Systems Ltd.	.9	.1	.8	4	.2%	.0%	.7%	.0%
GDS	.8	.4	.3	12	.2%	.2%	.3%	.1%
Applicon	.8	.3	.3	8	.2%	.1%	.3%	.1%
PAFEC	.7	.2	.4	10	.2%	.1%	.4%	.1%
Exapt	.7	.3	.3	14	.2%	.2%	.2%	.1%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ANACAD EES*	.7	.0	.7	0	.2%	.0%	.7%	.0%
MEDESIGN	.6	.2	.2	7	.2%	.1%	.2%	.0%
Unisys	.6	.1	.2	6	.2%	.1%	.2%	.0%
Other Companies	19.7	18.8	.0	0	5.4%	10.2%	.0%	.0%
All Companies	367.0	183.2	105.1	14,588	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	343.7	177.7	93.4	14,254	93.7%	97.0%	88.9%	97.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	23.3	5.5	11.6	334	6.3%	3.0%	11.1%	2.3%
All Hardware Companies	135.0	117.1	.0	12,126	36.8%	63.9%	.0%	83.1%
All Turnkey & SW Companies	232.0	66.1	105.1	2,463	63.2%	36.1%	100.0%	16.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 7
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	41.9	28.6	6.5	799	18.4%	28.6%	9.5%	20.7%
Intergraph	37.0	14.6	11.5	485	16.3%	14.6%	16.8%	12.6%
Hewlett-Packard	30.1	21.7	2.8	844	13.2%	21.6%	4.1%	21.9%
Computervision	22.0	5.0	6.6	306	9.7%	5.0%	9.6%	7.9%
Mentor Graphics	11.9	1.7	5.2	57	5.2%	1.7%	7.7%	1.5%
Sun Microsystems	11.2	8.9	.0	439	4.9%	8.9%	.0%	11.4%
Digital	10.8	8.3	.0	425	4.7%	8.3%	.0%	11.0%
Silicon Graphics	5.1	4.5	.0	150	2.2%	4.5%	.0%	3.9%
Cadence	4.9	.0	3.5	0	2.1%	.0%	5.1%	.0%
EDS Unigraphics	4.5	1.3	2.1	73	2.0%	1.3%	3.1%	1.9%
Parametric Technology	4.2	.0	3.5	0	1.9%	.0%	5.1%	.0%
SDRC	4.2	.0	2.9	0	1.8%	.0%	4.2%	.0%
Racal-Redac	2.7	.4	1.2	16	1.2%	.4%	1.8%	.4%
ESRI	2.4	.0	1.9	0	1.1%	.0%	2.7%	.0%
Synopsys	2.2	.0	1.5	0	.9%	.0%	2.2%	.0%
Sysscan	2.1	.7	.8	26	.9%	.7%	1.1%	.7%
Harris EDA	1.9	.2	1.2	9	.9%	.1%	1.7%	.2%
PDA Engineering	1.5	.0	1.4	0	.6%	.0%	2.0%	.0%
Sener Inginiera y Sistemaus	1.4	.0	1.4	0	.6%	.0%	2.1%	.0%
Genasys II	1.4	.1	1.0	3	.6%	.1%	1.4%	.1%
Cimlinc	1.2	.1	.6	3	.5%	.0%	.9%	.1%
Kockums Computer Systems	1.2	.3	.2	56	.5%	.3%	.3%	1.5%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Siemens Nixdorf Info systeme	1.2	.4	.5	20	.5%	.4%	.7%	.5%
Control Data Systems	1.1	.6	.3	18	.5%	.6%	.5%	.5%
Data Technology/DATECH*	1.1	.0	1.0	0	.5%	.0%	1.5%	.0%
CAD Centre	1.0	.1	.7	4	.4%	.1%	1.0%	.1%
Viewlogic Systems	1.0	.0	.7	0	.4%	.0%	1.0%	.0%
Dassault*	.9	.0	.8	0	.4%	.0%	1.1%	.0%
GDS	.8	.4	.3	12	.3%	.4%	.5%	.3%
Applicon	.8	.3	.3	8	.3%	.2%	.4%	.2%
PAFEC	.7	.2	.3	10	.3%	.2%	.5%	.2%
ANACAD EES	.7	.0	.6	0	.3%	.0%	.9%	.0%
MEDESIGN	.6	.2	.2	7	.3%	.2%	.3%	.2%
Swanson Analysis	.6	.0	.6	0	.3%	.0%	.8%	.0%
Autodesk	.6	.0	.6	0	.3%	.0%	.8%	.0%
Other Companies	5.9	.7	3.3	22	2.6%	.7%	4.8%	.6%
All Companies	227.5	100.1	68.4	3,856	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	212.4	97.1	60.6	3,669	93.4%	96.9%	88.6%	95.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	15.0	3.1	7.8	187	6.6%	3.1%	11.4%	4.9%
All Hardware Companies	62.8	53.0	.0	2,152	27.6%	52.9%	.0%	55.8%
All Turnkey & SW Companies	164.7	47.2	68.4	1,704	72.4%	47.1%	100.0%	44.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 8
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	18.2	10.5	3.7	313	42.2%	35.7%	65.5%	50.9%
Digital	13.9	10.8	.0	0	32.3%	36.6%	.0%	.0%
MacNeal-Schwendler	1.0	.0	1.0	0	2.4%	.0%	18.1%	.0%
Control Data Systems	.7	.4	.1	8	1.5%	1.3%	1.1%	1.3%
Dassault*	.6	.0	.5	0	1.3%	.0%	8.9%	.0%
Exapt	.5	.2	.2	7	1.2%	.8%	3.2%	1.1%
Other Companies	7.7	7.5	.0	282	17.8%	25.5%	.0%	45.9%
All Companies	43.1	29.5	5.6	615	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	42.4	29.2	5.3	607	98.4%	99.1%	94.8%	98.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.7	.3	.3	8	1.6%	.9%	5.2%	1.2%
All Hardware Companies	22.1	18.5	.0	286	51.3%	62.9%	.0%	46.6%
All Turnkey & SW Companies	21.0	10.9	5.6	328	48.7%	37.1%	100.0%	53.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 9
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	14.7	11.4	.0	143	40.7%	53.5%	.0%	40.4%
Intergraph	3.9	1.6	1.2	46	10.7%	7.3%	18.7%	12.9%
IBM	3.8	2.2	.8	43	10.4%	10.4%	12.9%	12.2%
Sun Microsystems	3.3	2.8	.0	62	9.2%	13.0%	.0%	17.3%
ESRI	2.4	.0	1.8	0	6.6%	.0%	29.4%	.0%
Sysscan	1.9	.9	.4	15	5.2%	4.1%	6.3%	4.2%
EDS Unigraphics	1.1	.4	.5	12	3.1%	1.6%	8.4%	3.4%
Silicon Graphics	.9	.8	.0	10	2.4%	3.5%	.0%	2.7%
Other Companies	2.7	.9	.9	14	7.4%	4.2%	14.2%	4.1%
All Companies	36.1	21.2	6.2	355	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	34.1	20.4	5.7	340	94.6%	95.9%	92.6%	95.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	2.0	.9	.5	15	5.4%	4.1%	7.4%	4.2%
All Hardware Companies	19.9	15.7	.0	236	55.0%	74.0%	.0%	66.4%
All Turnkey & SW Companies	16.2	5.5	6.2	120	45.0%	26.0%	100.0%	33.6%

Source: Dataquest (July 1994)

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Table 10
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Autodesk	10.9	.0	10.9	0	18.1%	.0%	43.9%	.0%
Data Technology/DATECH*	9.6	2.6	5.9	5,852	15.9%	7.9%	23.7%	59.9%
IBM	8.8	7.1	1.6	1,970	14.5%	21.9%	6.3%	20.2%
Apple Computer	5.6	5.6	.0	1,185	9.3%	17.4%	.0%	12.1%
Intergraph	4.2	1.3	2.1	208	7.0%	3.9%	8.5%	2.1%
Digital	4.0	3.8	.0	1,213	6.6%	11.7%	.0%	12.4%
Altium*	1.7	.0	1.6	0	2.7%	.0%	6.3%	.0%
Hewlett-Packard	1.4	1.2	.1	387	2.4%	3.7%	.4%	4.0%
ESRI	1.2	.0	1.2	0	2.0%	.0%	4.6%	.0%
Tebis	1.2	.3	.2	8	1.9%	.9%	.7%	.1%
MapInfo	1.0	.0	.8	0	1.6%	.0%	3.3%	.0%
Investronica SA	.9	.6	.3	32	1.6%	1.8%	1.0%	.3%
Ziegler Informatics	.9	.0	.9	0	1.5%	.0%	3.7%	.0%
Enghouse Systems Ltd.	.7	.0	.6	3	1.1%	.1%	2.3%	.0%
Other Companies	3.5	9.6	.0	0	5.8%	29.7%	.0%	.0%
All Companies	60.4	32.4	24.9	9,763	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	54.8	31.1	21.8	9,638	90.8%	96.1%	87.5%	98.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	5.6	1.3	3.1	125	9.2%	3.9%	12.5%	1.3%
All Hardware Companies	30.2	29.9	.0	9,452	50.1%	92.2%	.0%	96.8%
All Turnkey & SW Companies	30.1	2.5	24.9	311	49.9%	7.8%	100.0%	3.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 11
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	51.7	30.9	11.1	1,516	28.8%	32.1%	24.8%	25.7%
Digital	26.4	21.0	.0	943	14.7%	21.7%	.0%	16.0%
Hewlett-Packard	19.3	13.1	2.3	656	10.8%	13.6%	5.1%	11.1%
Computervision	16.7	3.8	5.2	236	9.3%	3.9%	11.6%	4.0%
Intergraph	7.6	2.8	2.4	106	4.2%	2.8%	5.4%	1.8%
Data Technology/DATECH*	6.3	1.8	3.8	347	3.5%	1.9%	8.6%	5.9%
EDS Unigraphics	5.6	1.7	2.7	85	3.1%	1.7%	5.9%	1.4%
Silicon Graphics	5.3	4.6	.0	139	2.9%	4.8%	.0%	2.4%
Sun Microsystems	5.2	4.2	.0	171	2.9%	4.3%	.0%	2.9%
Autodesk	4.6	.0	4.6	0	2.6%	.0%	10.3%	.0%
Parametric Technology	4.4	.0	3.6	0	2.5%	.0%	8.1%	.0%
SDRC	4.2	.0	2.9	0	2.4%	.0%	6.5%	.0%
Apple Computer	2.1	2.1	.0	431	1.1%	2.1%	.0%	7.3%
Control Data Systems	1.8	.9	.4	26	1.0%	1.0%	.8%	.4%
PDA Engineering	1.6	.0	1.5	0	.9%	.0%	3.4%	.0%
Dassault*	1.5	.0	1.3	0	.9%	.0%	3.0%	.0%
Cimlinc	1.3	.1	.7	3	.7%	.1%	1.5%	.1%
MacNeal-Schwendler	1.3	.0	1.3	0	.7%	.0%	2.8%	.0%
Altium*	1.3	.0	1.2	0	.7%	.0%	2.7%	.0%
Tebis	1.2	.3	.2	8	.6%	.3%	.4%	.1%
Swanson Analysis	1.0	.0	.9	0	.6%	.0%	2.0%	.0%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Investronica SA	.9	.6	.3	32	.5%	.6%	.6%	.5%
Applicon	.8	.3	.3	8	.4%	.3%	.7%	.1%
Exapt	.7	.3	.3	14	.4%	.4%	.6%	.2%
PAFEC	.5	.2	.3	7	.3%	.2%	.7%	.1%
Other Companies	2.1	7.3	.0	1,092	1.2%	7.5%	.0%	18.5%
All Companies	179.4	96.5	44.7	5,892	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	172.1	94.3	41.3	5,742	95.9%	97.7%	92.3%	97.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	7.3	2.2	3.5	150	4.1%	2.3%	7.7%	2.5%
All Hardware Companies	66.0	56.7	.0	4,530	36.8%	58.7%	.0%	76.9%
All Turnkey & SW Companies	113.5	39.8	44.7	1,362	63.2%	41.3%	100.0%	23.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 12
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	18.0	6.8	5.7	335	33.5%	26.3%	33.7%	10.0%
IBM	9.1	7.3	.8	854	16.9%	28.3%	4.9%	25.4%
Computervision	5.2	1.2	1.5	75	9.6%	4.6%	9.0%	2.2%
Autodesk	5.0	.0	5.0	0	9.2%	.0%	29.3%	.0%
Data Technology/DATECH*	4.0	.7	2.8	5,221	7.5%	2.7%	16.3%	155.2%
Apple Computer	3.1	3.1	.0	655	5.8%	12.1%	.0%	19.5%
Digital	2.6	2.2	.0	384	4.8%	8.6%	.0%	11.4%
Sener Inginiera y Sistemaus	1.4	.0	1.4	0	2.7%	.0%	8.5%	.0%
Kockums Computer Systems	1.2	.3	.2	56	2.3%	1.2%	1.3%	1.7%
Hewlett-Packard	1.1	1.0	.0	66	2.1%	3.7%	.0%	2.0%
CAD Centre	.8	.1	.5	4	1.5%	.3%	3.1%	.1%
MEDESIGN	.6	.2	.2	7	1.2%	.7%	1.3%	.2%
GDS	.6	.3	.3	9	1.1%	1.0%	1.5%	.3%
Other Companies	.0	2.2	.0	0	.0%	8.4%	.0%	.0%
All Companies	53.7	25.8	16.9	3,364	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	48.9	25.2	13.9	3,278	91.0%	97.6%	82.3%	97.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	4.8	.6	3.0	86	9.0%	2.4%	17.7%	2.6%
All Hardware Companies	16.4	15.4	.0	2,829	30.5%	59.6%	.0%	84.1%
All Turnkey & SW Companies	37.4	10.4	16.9	535	69.5%	40.4%	100.0%	15.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 13
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	18.5	7.8	5.8	296	30.3%	27.9%	28.9%	11.2%
ESRI	6.0	.0	4.9	0	9.8%	.0%	24.2%	.0%
IBM	4.4	3.7	.2	227	7.2%	13.1%	1.2%	8.6%
Digital	4.0	3.0	.0	173	6.5%	10.5%	.0%	6.5%
Sysscan	4.0	1.6	1.2	41	6.5%	5.6%	5.7%	1.6%
Hewlett-Packard	3.6	3.1	.0	170	5.9%	11.0%	.0%	6.4%
Sun Microsystems	2.5	2.0	.0	64	4.0%	7.1%	.0%	2.4%
Genasys II	1.6	.2	1.1	6	2.5%	.5%	5.4%	.2%
Autodesk	1.3	.0	1.3	0	2.1%	.0%	6.3%	.0%
Siemens Nixdorf Info systeme	1.3	.4	.5	21	2.1%	1.5%	2.4%	.8%
MapInfo	1.0	.0	.9	0	1.6%	.0%	4.3%	.0%
Enghouse Systems Ltd.	.9	.1	.8	4	1.4%	.2%	3.7%	.2%
Unisys	.6	.1	.2	6	.9%	.5%	1.1%	.2%
Other Companies	9.8	5.6	2.4	1,595	16.0%	20.0%	11.9%	60.2%
All Companies	61.3	28.1	20.1	2,649	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	54.7	25.9	17.6	2,576	89.2%	92.2%	87.7%	97.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	6.6	2.2	2.5	74	10.8%	7.8%	12.3%	2.8%
All Hardware Companies	18.1	15.8	.0	2,227	29.6%	56.4%	.0%	84.1%
All Turnkey & SW Companies	43.2	12.3	20.1	422	70.4%	43.6%	100.0%	15.9%

Source: Dataquest (July 1994)

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Table 14
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	11.9	1.7	5.2	57	16.4%	5.2%	22.4%	2.1%
Digital	10.3	8.1	.0	281	14.2%	24.6%	.0%	10.5%
Hewlett-Packard	7.9	6.0	.6	345	10.8%	18.3%	2.7%	12.9%
IBM	7.4	6.5	.4	528	10.2%	19.8%	1.5%	19.7%
Sun Microsystems	6.4	5.1	.0	248	8.9%	15.5%	.0%	9.3%
Cadence	5.2	.0	3.7	0	7.2%	.0%	15.9%	.0%
Racal-Redac	3.2	.4	1.5	16	4.4%	1.2%	6.2%	.6%
Harris EDA	2.4	.2	1.5	16	3.4%	.7%	6.5%	.6%
Synopsys	2.2	.0	1.5	0	3.0%	.0%	6.4%	.0%
Viewlogic Systems	1.4	.0	1.2	0	2.0%	.0%	4.9%	.0%
Intergraph	1.0	.0	.9	0	1.3%	.1%	3.6%	.0%
ANACAD EES	.7	.0	.7	0	1.0%	.0%	3.0%	.0%
Autodesk	.7	.0	.7	0	1.0%	.0%	3.0%	.0%
Other Companies	8.4	3.7	3.7	813	11.6%	11.3%	15.9%	30.3%
All Companies	72.5	32.8	23.3	2,682	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	68.0	32.4	20.6	2,659	93.8%	98.7%	88.4%	99.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	4.5	.4	2.7	24	6.2%	1.3%	11.6%	.9%
All Hardware Companies	34.6	29.2	.0	2,540	47.7%	88.9%	.0%	94.7%
All Turnkey & SW Companies	37.9	3.6	23.3	143	52.3%	11.1%	100.0%	5.3%

Source: Dataquest (July 1994)

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Table 15
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	6.3	.9	2.8	30	14.0%	4.6%	17.3%	1.7%
Digital	6.2	4.9	.0	193	13.8%	25.0%	.0%	11.1%
Hewlett-Packard	5.0	3.6	.6	221	11.1%	18.4%	4.0%	12.7%
Sun Microsystems	3.9	3.1	.0	160	8.6%	15.8%	.0%	9.2%
IBM	3.7	3.5	.0	345	8.2%	18.0%	.0%	19.9%
Cadence	3.1	.0	2.2	0	6.8%	.0%	13.9%	.0%
Synopsys	2.2	.0	1.5	0	4.8%	.0%	9.3%	.0%
Harris EDA	1.7	.2	1.1	12	3.8%	.9%	6.9%	.7%
Viewlogic Systems	1.4	.0	1.2	0	3.2%	.0%	7.2%	.0%
Racal-Redac	.9	.1	.4	5	2.0%	.7%	2.4%	.3%
ANACAD EES	.7	.0	.7	0	1.6%	.0%	4.3%	.0%
Autodesk	.6	.0	.6	0	1.3%	.0%	3.6%	.0%
Intergraph	.5	.0	.5	0	1.2%	.1%	2.9%	.0%
Other Companies	6.9	2.3	3.7	410	15.3%	11.8%	23.3%	23.6%
All Companies	45.2	19.6	16.0	1,734	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	43.2	19.4	14.6	1,721	95.7%	99.2%	91.4%	99.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	2.0	.2	1.4	13	4.3%	.8%	8.6%	.8%
All Hardware Companies	20.8	17.5	.0	1,647	46.1%	89.5%	.0%	95.0%
All Turnkey & SW Companies	24.4	2.1	16.0	86	53.9%	10.5%	100.0%	5.0%

Source: Dataquest (July 1994)

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Table 16
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	2.2	1.7	.0	32	19.5%	27.6%	.0%	15.5%
Mentor Graphics	2.2	.3	1.0	10	19.3%	5.1%	39.4%	5.0%
Sun Microsystems	2.0	1.6	.0	67	17.9%	26.0%	.0%	32.4%
IBM	1.9	1.7	.0	54	16.9%	28.4%	.0%	26.1%
Cadence	1.9	.0	1.3	0	16.5%	.0%	54.8%	.0%
Hewlett-Packard	.9	.7	.0	33	7.6%	11.8%	.0%	15.9%
Other Companies	.2	.1	.1	10	1.6%	1.0%	3.3%	5.0%
All Companies	11.2	6.1	2.4	206	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	11.2	6.1	2.4	206	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	7.0	5.8	.0	195	62.6%	94.9%	.0%	94.9%
All Turnkey & SW Companies	4.2	.3	2.4	10	37.4%	5.1%	100.0%	5.1%

Source: Dataquest (July 1994)

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Table 17
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Scandinavia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	3.5	.5	1.5	17	21.4%	6.9%	30.5%	2.2%
Racal-Redac	2.3	.3	1.1	11	14.1%	3.8%	21.3%	1.4%
Hewlett-Packard	2.0	1.7	.0	92	12.3%	23.6%	.0%	12.4%
Digital	1.9	1.5	.0	56	11.8%	21.2%	.0%	7.5%
IBM	1.8	1.2	.4	130	11.3%	17.4%	7.2%	17.5%
Harris EDA	.7	.1	.4	4	4.4%	.7%	8.4%	.5%
Sun Microsystems	.5	.4	.0	22	3.3%	6.0%	.0%	3.0%
Other Companies	1.3	1.3	.0	392	8.1%	18.7%	.0%	52.8%
All Companies	16.1	7.1	5.0	743	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	13.6	6.9	3.6	732	84.1%	96.2%	73.1%	98.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	2.6	.3	1.3	11	15.9%	3.8%	26.9%	1.4%
All Hardware Companies	6.7	5.9	.0	697	41.7%	82.0%	.0%	93.8%
All Turnkey & SW Companies	9.4	1.3	5.0	46	58.3%	18.0%	100.0%	6.2%

Source: Dataquest (July 1994)

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Software

CAD/CAM/CAE and GIS Rest of Europe Market Share Update

Market Statistics

1994

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Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9408
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Note: All tables show estimated data.

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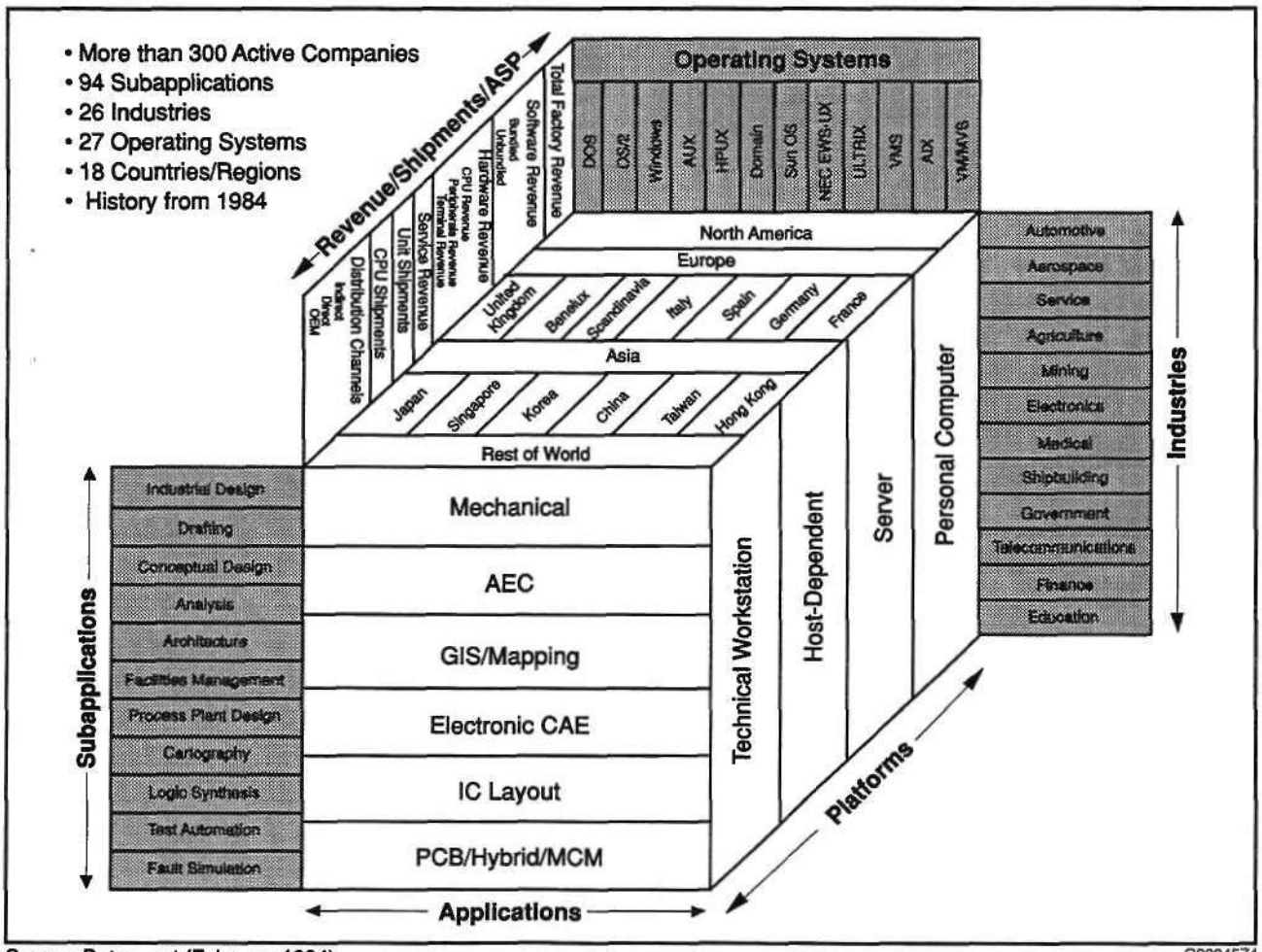
CAD/CAM/CAE and GIS Rest of Europe Market Share Update

Introduction

CAD/CAM/CAE/GIS systems have dramatically changed the methods by which designers and production managers originate and implement products. CAD and CAE systems allow designers to create, draft, analyze, test, and manipulate products on a screen in two and three dimensions. As CAD/CAM/CAE/GIS systems continue to decrease in cost, they become more available and cost justifiable to new users.

In order to provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure 1.

Figure 1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (February 1994)

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Table 1
CAD/CAM/CAE/GIS 1992-1993 Market Summary

	Software Revenue 1992 ($M)	Software Revenue 1993 ($M)	Growth Rate (%)	Total Revenue 1992 ($M)	Total Revenue 1993 ($M)	Growth Rate (%)	Hardware Unit Shipments 1992	Hardware Unit Shipments 1993	Growth Rate (%)
Application									
Mechanical	2,170.4	2,294.7	5.7	7,988.2	7,862.7	-1.6	302,347	303,364	0.3
AEC	746.9	794.1	6.3	2,356.5	2,444.0	3.7	178,629	198,075	10.9
GIS/Mapping	580.1	662.2	14.2	2,005.6	2,179.1	8.7	86,513	102,624	18.6
Electronic CAE	741.5	797.1	7.5	2,086.4	2,271.7	8.9	94,176	99,129	5.3
IC Layout	212.7	203.0	-4.6	628.4	676.4	7.6	9,771	13,049	33.5
PCB/Hybrid/MCM	265.9	271.2	2.0	870.9	900.2	3.4	35,110	38,030	8.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
Region									
North America	1,562.5	1,754.6	12.3	5,253.5	5,690.7	8.3	286,939	325,318	13.4
Europe	1,693.8	1,608.9	-5.0	5,755.5	5,432.7	-5.6	231,062	240,603	4.1
Asia	1,352.7	1,534.4	13.4	4,601.2	4,830.6	5.0	169,839	163,620	-3.7
Rest of World	108.5	124.3	14.6	325.9	380.2	16.7	18,706	24,730	32.2
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
In Local Currencies									
Europe (ECU)	1,301.8	1,378.2	5.9	4,423.7	4,653.7	5.2			
Asia (yen)	170,895	170,093	-0.5	581,318	535,468	-7.9			
Platform									
Technical Workstation	3,060.1	3,312.8	8.3	9,640.0	10,458.3	8.5	173,705	194,848	12.2
Host-Dependent	360.2	306.1	-15.0	2,436.6	1,754.7	-28.0	34,524	28,573	-17.2
Server	140.0	176.2	25.9	906.3	1,056.8	16.6	11,566	13,381	15.7
Personal Computer	1,157.1	1,227.1	6.1	2,953.2	3,064.4	3.8	486,751	517,469	6.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8

Source: Dataquest (July 1994)

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A companion article analyzing major shifts in the 1993 market was published in our *Dataquest Perspective*, dated June 27, 1994.

Table 1 summarizes the performance in various segments of the CAD/CAM/CAE/GIS markets in 1993 versus 1992. With the devaluation of the dollar against the yen (¥126.34/$ in 1992 versus ¥110.85/$ in 1993) and the appreciation of the dollar against the ECU (ECU 0.7686/$ in 1992 versus ECU 0.8566/$ in 1993), actual growth is not as it appears when denominated in U.S. dollars. With 75 percent of the Asian market in Japan, denominating in yen gives a rough indication of real growth in the Asian market, which was a negative 7.9 percent.

About This Document

This document contains Dataquest's detailed market share information on the CAD/CAM/CAE/GIS industry. We no longer publish worldwide all-application market statistics for the entire CAD/CAM/CAE/GIS industry. This data is available by calling Suzanne Snygg at (408) 437-8241. The category "Other Companies" is the aggregation of small companies. More detailed data on these markets may be requested through our Client Inquiry service.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

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Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic Computer-Aided Engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of products). Schematic capture and simulation are examples of electronic CAE applications.
- IC Layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/Hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe. Market share data is available for each of these countries.

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong. Market share data is available for each of these countries.

Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed

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by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

Metrics

The following paragraphs define measurements.

- Total factory revenue is defined as the amount of money received by a manufacturer for its goods and services measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue). Total factory revenue is the sum of software revenue, hardware revenue, and service revenue.
- Unit shipment is defined as the number of seats delivered (number of possible simultaneous users of product delivered) excluding OEM shipments.

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- Hardware revenue is revenue derived from sales of CPUs (including operating systems), terminals (for host-dependent systems), and peripherals.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled application software.
- Service revenue is defined as all revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
  - Maintenance fees for hardware and software
  - Management and operations services—help desk, education and training, disaster recovery, vaulting, and configuration management.
  - Service bureau—project work, including construction of database, data conversion, product design, analysis, or manufacturing.
  - Application development—design and development of customized software applications or the modification, enhancement, or customization of existing software applications, adding new functionality.
  - Consulting revenue—assessment of CAD/CAM/CAE/GIS business and information technology needs and the formulation of a plan based on needs identification.
  - Implementation and integration services—planning, implementation, migration, and integration of software products (software network support and integration, account integration management, data center design, and construction).

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year and second quarter of the subsequent year, we survey all participants in each industry. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contacts at large companies. (Dataquest maintains a large contact database on all sources of information.) The following are examples of the job titles of people contacted for information:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning

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- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE/GIS marketing programs
- Market research analyst

The Audit Process

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks
- Articles in both the general and trade press
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice; Dataquest also checks with multiple sources at one company to cross-check data on that company.

Dataquest analysts have many years of experience in how to apply the above tools to get the most accurate information possible on a particular company (such as what to use when and what industry averages are). We believe that the estimates presented here are the most accurate and meaningful generally available today. It is the CAD/CAM/CAE/GIS group's policy to continually update our market information for any year, based on any new data received, in order to arrive at the most accurate market representation possible.

Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

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Publishing Schedule

We publish both market share and forecasting twice each year, allowing for timely distribution of data and thorough analysis and forecasting. Our annual delivery schedule is as follows:

- Market share data is available January 31. All tables will be published and distributed to clients by March 31.
- Forecasting from the market share tables provides a five-year forecast period, available after March 31. The books will be shipped by May 31.
- Final updated market share tables, based on additional data collection and analysis, will be completed by May 31. At this point, the market share database is frozen and will not be changed until the end of the year. For the next six months, supplementary market data will be based on this final market data. Books will be shipped by July 31.
- We provide complete final forecast tables by July 31. These tables take into consideration changes in the market share during the previous six months. Books will be shipped by September 30.

Database Changes

Tables 2 through 5 show changes made to the database since last year's market share update. PC clone manufacturers are no longer tracked individually. We continue to show PC sales by IBM, Hewlett-Packard, and Digital, which also sell other platforms. The 1993 sales of GeoVision Systems to SHL Systemhouse, Computervision-GIS to Unisys, Racal-Redac to Zuken, Chronologic to Viewlogic, ASG to Softdesk, CDC's mechanical software product to ICEM Technologies, PDA to MacNeal-Schwendler, and Logic Modeling Corporation to Synopsys; the merger of Sysdeco and SysScan; and the change of GDS to Convergent Group will be recognized in market reporting for 1994.

Table 2
Companies Renamed

Company Name	Renamed to:
Alper Systems	Sysdeco Ltd.
Areon	Kreon
CADAM	Altium
Catalpa	Catalpa groupe Missler
Geotrace Technologies	Cadlynx
Logic Control	Logic Systems Designers
RIB/RZB	RIB Bausoftware
Sener Sistemas Marinos	Sener Inginiera y Sistemas
STI Strassle	Strassle Informationssysteme
Test Systems Strategies	Summitt

Source: Dataquest (July 1994)

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Table 3
Companies (or CAD Portions Thereof) Sold/Merged

Company Name	Acquired by, Merged with, Technology Sold to:
ANACAD & Electrical Eng. Software	ANACAD-EES
Aries Technology	MacNeal-Schwendler
CAD Language Systems	Compass Design Automation
CAD/CAM Group	Data I/O
Comdisco	Cadence
DAT Standard info ssystemes	ISD Software
EEsof	Hewlett-Packard
Expertest	Sunrise Test
Fides Industrielle Automation	Strassle
HP Cade	Hewlett-Packard
Inca	Zycad
Infocel	Understanding Systems
PiE Design	Quickturn Design Systems
Quad Design Technology	Viewlogic
Wisdom Systems	ICAD

Source: Dataquest (July 1994)

Table 4
Companies Deleted

Company Removed from Database:
European
Asicom
Club Informatico SA
DATAID Technologies
DECISA
Micrograph
Olivetti*
Research Machines*
North American
Bechtel
CADLYNX
Compaq*
Dell Computer*
Engineering Systems Corporation
GeoQuest
Mega CADD
NCR Microelectronics
Object Design
Objectivity
Ontos
Quicklogic
The CAD Group
Ultimap

*We no longer follow individual PC clone makers.
Source: Dataquest (July 1994)

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Table 5
Companies Added

Company Added to Database:
European
APIC Systemes
ISD Software
SPEED
Ultimate Technology
North American
AT&T
Aptix
ARC SYS
EAGLE Point
Earth Resource Mapping
Graftek
Graphic Data Systems (GDS)
Model Technology
Systems Science Inc.
Tactics Int'l Ltd.
VLSI Libraries
Asian
Adam Net
Kozo
Okura
Tachnodia
TECHSPERT
Toshiba Engineering
Yokogawa Digital Computer

Source: Dataquest (July 1994)

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Table 6
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	105.9	66.8	20.7	3,831	18.7%	24.5%	10.9%	13.5%
Hewlett-Packard	42.4	31.2	3.6	1,700	7.5%	11.5%	1.9%	6.0%
Intergraph	39.8	15.7	12.9	647	7.0%	5.8%	6.8%	2.3%
Digital	23.4	18.2	.0	896	4.1%	6.7%	.0%	3.2%
Siemens Nixdorf Info systeme	21.7	7.8	7.7	434	3.8%	2.8%	4.1%	1.5%
Silicon Graphics	20.3	17.8	.0	541	3.6%	6.5%	.0%	1.9%
IEZ	17.8	6.0	9.2	427	3.1%	2.2%	4.9%	1.5%
Autodesk	16.5	.0	16.5	0	2.9%	.0%	8.7%	.0%
EDS Unigraphics	15.4	4.6	7.3	234	2.7%	1.7%	3.9%	.8%
Marcus Computer Systeme	13.2	6.8	4.5	400	2.3%	2.5%	2.4%	1.4%
Dassault*	13.0	.0	11.3	0	2.3%	.0%	6.0%	.0%
Straessle Informationssysteme	12.5	1.7	7.9	177	2.2%	.6%	4.2%	.6%
Computervision	11.8	2.6	3.6	161	2.1%	1.0%	1.9%	.6%
Control Data Systems	9.4	4.3	2.3	111	1.7%	1.6%	1.2%	.4%
CAD Distribution	8.0	.2	7.0	42	1.4%	.1%	3.7%	.1%
Han Dataport	8.0	2.3	4.1	243	1.4%	.8%	2.2%	.9%
SDRC	7.8	.0	5.3	0	1.4%	.0%	2.8%	.0%
Applicon	7.3	2.4	2.9	81	1.3%	.9%	1.5%	.3%
ESRI	6.8	.0	5.5	0	1.2%	.0%	2.9%	.0%
Sun Microsystems	5.9	4.7	.0	225	1.0%	1.7%	.0%	.8%
Nemetschek	5.1	1.5	3.1	126	.9%	.6%	1.7%	.4%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cimatron	4.8	2.1	2.2	128	.8%	.8%	1.1%	.5%
Cadence	4.6	.0	3.3	0	.8%	.0%	1.7%	.0%
MacNeal-Schwendler	4.2	.0	4.1	0	.7%	.0%	2.1%	.0%
Digital Kienzle	4.2	2.1	1.2	65	.7%	.8%	.6%	.2%
ISD Software	4.2	.9	2.7	136	.7%	.3%	1.4%	.5%
Smallworld Systems	3.5	.2	2.1	6	.6%	.1%	1.1%	.0%
Delcam International	3.3	1.1	1.4	43	.6%	.4%	.8%	.2%
Investronica SA	3.2	2.0	.8	108	.6%	.7%	.4%	.4%
Technische Computer Systeme	3.1	.6	2.2	58	.5%	.2%	1.2%	.2%
Sagantec	3.0	.0	2.8	0	.5%	.0%	1.5%	.0%
Isicad CAD/CAM Systeme	2.8	.8	1.5	39	.5%	.3%	.8%	.1%
Soft-Tech Software Technologies	2.8	.4	2.1	214	.5%	.2%	1.1%	.8%
Mentor Graphics	2.8	.4	1.2	13	.5%	.1%	.6%	.0%
Altium*	2.5	.0	2.4	0	.4%	.0%	1.3%	.0%
Unisys	2.4	.6	1.0	24	.4%	.2%	.5%	.1%
Apple Computer	2.3	2.3	.0	487	.4%	.9%	.0%	1.7%
Moss Systems	2.1	.3	.9	22	.4%	.1%	.5%	.1%
Synopsys	2.0	.0	1.4	0	.4%	.0%	.7%	.0%
Ziegler Informatics	2.0	.0	2.0	0	.4%	.0%	1.1%	.0%
RIB/Bausoftware	2.0	.2	1.6	15	.4%	.1%	.9%	.1%
Parametric Technology	2.0	.0	1.6	0	.3%	.0%	.9%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sysscan	2.0	.8	.6	20	.3%	.3%	.3%	.1%
Wiechers Datentechnik	1.8	.4	1.1	32	.3%	.1%	.6%	.1%
CIMTEK*	1.7	.6	.9	15	.3%	.2%	.5%	.1%
Exapt	1.6	.8	.6	30	.3%	.3%	.3%	.1%
Geometria GIS Systems House	1.5	.1	.1	8	.3%	.0%	.0%	.0%
Tebis	1.5	.4	.2	10	.3%	.1%	.1%	.0%
Graphisoft Software Dev	1.5	.0	1.5	0	.3%	.0%	.8%	.0%
Laser-Scan	1.4	.4	.6	9	.3%	.2%	.3%	.0%
Matra Datavision	1.4	.5	.8	26	.2%	.2%	.4%	.1%
Microway	1.4	.8	.4	16	.2%	.3%	.2%	.1%
Aucotec	1.3	.4	.7	52	.2%	.1%	.4%	.2%
Kockums Computer Systems	1.2	.3	.2	56	.2%	.1%	.1%	.2%
APIC Systemes	.9	.0	.6	0	.2%	.0%	.3%	.0%
Gerber Systems	.9	.4	.4	14	.2%	.2%	.2%	.1%
Kloeckner-Moeller	.9	.1	.7	10	.2%	.0%	.4%	.0%
ASCAD/ASCAM	.9	.5	.3	13	.2%	.2%	.1%	.0%
CAD Centre	.8	.1	.5	4	.1%	.0%	.3%	.0%
PDA Engineering	.8	.0	.7	0	.1%	.0%	.4%	.0%
RoboCAD Solutions	.8	.0	.6	0	.1%	.0%	.3%	.0%
Lamp Software	.7	.2	.5	51	.1%	.1%	.3%	.2%
BATISOFT	.7	.3	.2	49	.1%	.1%	.1%	.2%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
PAFEC	.6	.2	.4	8	.1%	.1%	.2%	.0%
Cisigraph	.6	.2	.3	10	.1%	.1%	.2%	.0%
Viewlogic Systems	.6	.0	.5	0	.1%	.0%	.2%	.0%
Hochtief	.5	.1	.3	7	.1%	.0%	.1%	.0%
ANACAD EES	.5	.0	.5	0	.1%	.0%	.3%	.0%
Swanson Analysis	.5	.0	.5	0	.1%	.0%	.2%	.0%
Other Companies	55.3	55.3	.0	16,076	9.8%	20.3%	.0%	56.9%
All Companies	566.2	272.5	189.0	28,272	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	412.8	228.8	109.6	25,122	72.9%	84.0%	58.0%	88.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	153.5	43.7	79.5	3,150	27.1%	16.0%	42.0%	11.1%
All Hardware Companies	163.2	147.1	.0	22,404	28.8%	54.0%	.0%	79.2%
All Turnkey & SW Companies	403.1	125.4	189.0	5,867	71.2%	46.0%	100.0%	20.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 7
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	59.0	37.8	10.8	1,031	16.8%	24.8%	9.1%	16.3%
Hewlett-Packard	39.9	29.1	3.5	1,157	11.4%	19.1%	2.9%	18.3%
Intergraph	32.4	13.2	9.9	412	9.3%	8.6%	8.3%	6.5%
Siemens Nixdorf Info systeme	20.2	6.8	7.5	326	5.8%	4.5%	6.3%	5.2%
IEZ	17.8	6.0	9.2	427	5.1%	3.9%	7.7%	6.8%
Silicon Graphics	17.3	15.2	.0	509	4.9%	9.9%	.0%	8.0%
Marcus Computer Systeme	13.2	6.8	4.5	400	3.8%	4.4%	3.8%	6.3%
Straessle Informationssysteme	12.5	1.7	7.9	177	3.6%	1.1%	6.7%	2.8%
EDS Unigraphics	12.3	3.6	5.9	200	3.5%	2.4%	4.9%	3.2%
Computervision	11.5	2.6	3.4	159	3.3%	1.7%	2.9%	2.5%
SDRC	7.8	.0	5.3	0	2.2%	.0%	4.5%	.0%
Applicon	7.3	2.4	2.9	81	2.1%	1.6%	2.4%	1.3%
Dassault*	7.0	.0	6.0	0	2.0%	.0%	5.1%	.0%
Han Dataport	6.8	1.9	3.5	197	1.9%	1.2%	2.9%	3.1%
Digital	6.1	4.6	.0	231	1.7%	3.0%	.0%	3.7%
Control Data Systems	6.0	2.6	2.0	77	1.7%	1.7%	1.6%	1.2%
Sun Microsystems	5.6	4.4	.0	219	1.6%	2.9%	.0%	3.5%
Cadence	4.3	.0	3.1	0	1.2%	.0%	2.6%	.0%
Digital Kienzle	4.2	2.1	1.2	65	1.2%	1.4%	1.0%	1.0%
ISD Software	3.7	.9	2.2	136	1.1%	.6%	1.9%	2.2%
Cimatron	3.6	1.6	1.6	73	1.0%	1.0%	1.4%	1.2%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Smallworld Systems	3.5	.2	2.1	6	1.0%	.1%	1.7%	.1%
Delcam International	3.2	1.1	1.4	39	.9%	.7%	1.2%	.6%
Sagantec	3.0	.0	2.8	0	.9%	.0%	2.3%	.0%
Mentor Graphics	2.8	.4	1.2	13	.8%	.3%	1.0%	.2%
ESRI	2.7	.0	2.1	0	.8%	.0%	1.8%	.0%
Isicad CAD/CAM Systeme	2.3	.8	.9	39	.7%	.5%	.8%	.6%
Moss Systems	2.1	.3	.9	22	.6%	.2%	.7%	.3%
Synopsys	2.0	.0	1.4	0	.6%	.0%	1.2%	.0%
Parametric Technology	1.9	.0	1.5	0	.5%	.0%	1.3%	.0%
Technische Computer Systeme	1.8	.4	1.2	20	.5%	.2%	1.0%	.3%
Unisys	1.7	.4	.7	16	.5%	.3%	.6%	.3%
CIMTEK*	1.5	.5	.8	13	.4%	.3%	.7%	.2%
Matra Datavision	1.4	.5	.8	23	.4%	.3%	.6%	.4%
Laser-Scan	1.4	.4	.6	8	.4%	.2%	.5%	.1%
MacNeal-Schwendler	1.3	.0	1.1	0	.4%	.0%	.9%	.0%
Kockums Computer Systems	1.2	.3	.2	56	.3%	.2%	.2%	.9%
Nemetschek	1.1	.3	.7	13	.3%	.2%	.6%	.2%
Sysscan	1.0	.3	.4	13	.3%	.2%	.3%	.2%
Geometria GIS Systems House	1.0	.1	.1	2	.3%	.0%	.1%	.0%
APIC Systemes	.9	.0	.6	0	.3%	.0%	.5%	.0%
Gerber Systems	.9	.4	.4	14	.3%	.3%	.3%	.2%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
CAD Centre	.8	.1	.5	4	.2%	.1%	.4%	.1%
ASCAD/ASCAM	.8	.5	.3	12	.2%	.3%	.2%	.2%
Autodesk	.8	.0	.8	0	.2%	.0%	.7%	.0%
PDA Engineering	.7	.0	.7	0	.2%	.0%	.6%	.0%
Microway	.7	.4	.2	7	.2%	.3%	.2%	.1%
PAFEC	.6	.2	.3	8	.2%	.1%	.2%	.1%
Cisigraph	.6	.2	.3	9	.2%	.1%	.3%	.1%
Other Companies	1.6	.5	.0	18	.5%	.3%	.0%	.3%
All Companies	350.1	152.7	118.6	6,325	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	238.4	118.8	64.9	4,209	68.1%	77.8%	54.7%	66.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	111.7	33.9	53.8	2,116	31.9%	22.2%	45.3%	33.5%
All Hardware Companies	73.7	63.2	.0	2,410	21.0%	41.4%	.0%	38.1%
All Turnkey & SW Companies	276.5	89.6	118.6	3,914	79.0%	58.6%	100.0%	61.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 8
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	30.4	17.5	6.2	522	49.2%	44.0%	56.5%	46.3%
Digital	6.8	5.2	.0	0	11.1%	13.1%	.0%	.0%
Dassault*	4.4	.0	3.9	0	7.1%	.0%	35.7%	.0%
Control Data Systems	3.1	1.5	.3	31	5.0%	3.8%	3.1%	2.7%
MacNeal-Schwendler	3.0	.0	3.0	0	4.8%	.0%	27.3%	.0%
Exapt	1.1	.5	.4	14	1.8%	1.3%	3.6%	1.3%
Siemens Nixdorf Info systeme	1.0	.4	.3	15	1.5%	1.1%	2.4%	1.3%
Other Companies	11.4	14.4	.0	540	18.4%	36.2%	.0%	47.8%
All Companies	61.7	39.8	10.9	1,129	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	59.3	38.7	10.1	1,097	96.1%	97.3%	92.7%	97.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	2.4	1.1	.8	32	3.9%	2.7%	7.3%	2.8%
All Hardware Companies	22.9	20.3	.0	554	37.1%	51.0%	.0%	49.1%
All Turnkey & SW Companies	38.8	19.5	10.9	575	62.9%	49.0%	100.0%	50.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 9
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	8.6	6.5	.0	82	25.6%	37.4%	.0%	25.4%
IBM	6.1	3.5	1.4	69	18.2%	19.9%	17.0%	21.4%
Intergraph	3.5	1.4	1.0	40	10.3%	7.9%	12.9%	12.5%
EDS Unigraphics	3.1	.9	1.4	33	9.2%	5.4%	17.9%	10.3%
Silicon Graphics	3.0	2.6	.0	32	9.0%	14.8%	.0%	10.1%
ESRI	2.7	.0	2.1	0	8.1%	.0%	26.0%	.0%
Dassault*	1.7	.0	1.4	0	5.0%	.0%	17.9%	.0%
Sysscan	.9	.4	.2	7	2.7%	2.4%	2.4%	2.2%
Han Dataport	.7	.3	.3	21	2.1%	1.8%	3.5%	6.4%
Unisys	.6	.1	.2	3	1.7%	.7%	3.0%	1.0%
Hewlett-Packard	.5	.4	.0	8	1.6%	2.5%	.0%	2.5%
Other Companies	1.0	.8	.0	11	3.1%	4.5%	.0%	3.6%
All Companies	33.5	17.5	8.0	322	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	31.8	16.7	7.5	293	94.8%	95.7%	93.3%	91.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.7	.8	.5	28	5.2%	4.3%	6.7%	8.8%
All Hardware Companies	13.2	10.5	.0	141	39.3%	59.8%	.0%	43.7%
All Turnkey & SW Companies	20.3	7.0	8.0	181	60.7%	40.2%	100.0%	56.3%

*Contains reseller or OEM revenue; All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 10
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Autodesk	15.6	.0	15.6	0	12.9%	.0%	30.3%	.0%
IBM	10.5	8.0	2.4	2,209	8.7%	12.7%	4.7%	10.8%
CAD Distribution	7.6	.2	6.6	41	6.3%	.4%	12.9%	.2%
Nemetschek	4.1	1.2	2.5	113	3.4%	2.0%	4.8%	.6%
Intergraph	4.0	1.2	2.0	195	3.3%	1.9%	3.9%	1.0%
Investronica SA	3.2	2.0	.8	108	2.6%	3.2%	1.6%	.5%
Soft-Tech Software Technologies	2.8	.4	2.1	214	2.3%	.7%	4.0%	1.0%
Altium*	2.5	.0	2.4	0	2.1%	.0%	4.7%	.0%
Apple Computer	2.3	2.3	.0	487	1.9%	3.7%	.0%	2.4%
Ziegler Informatics	2.0	.0	2.0	0	1.7%	.0%	3.9%	.0%
Hewlett-Packard	2.0	1.7	.2	535	1.6%	2.7%	.3%	2.6%
Digital	1.9	1.8	.0	583	1.6%	2.9%	.0%	2.8%
Wiechers Datentechnik	1.7	.3	1.0	28	1.4%	.5%	1.9%	.1%
RIB/Bausoftware	1.5	.1	1.2	12	1.2%	.2%	2.4%	.1%
Tebis	1.5	.4	.2	10	1.2%	.6%	.4%	.0%
Graphisoft Software Dev	1.5	.0	1.5	0	1.2%	.0%	2.9%	.0%
ESRI	1.4	.0	1.3	0	1.1%	.0%	2.5%	.0%
Technische Computer Systeme	1.2	.2	1.0	38	1.0%	.4%	1.8%	.2%
Cimatron	1.2	.5	.5	55	1.0%	.8%	1.0%	.3%
Aucotec	1.0	.3	.5	46	.8%	.5%	1.0%	.2%
Kloeckner-Moeller	.9	.1	.7	10	.7%	.2%	1.3%	.1%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
RoboCAD Solutions	.8	.0	.6	0	.6%	.0%	1.2%	.0%
BATISOFT	.7	.3	.2	49	.6%	.4%	.4%	.2%
Microway	.7	.4	.2	9	.5%	.6%	.4%	.0%
Isicad CAD/CAM Systeme	.5	.0	.5	0	.4%	.0%	1.0%	.0%
Siemens Nixdorf Info systeme	.5	.5	.0	93	.4%	.8%	.0%	.5%
Hochtief	.5	.1	.3	7	.4%	.1%	.5%	.0%
Geometria GIS Systems House	.5	.1	.0	6	.4%	.1%	.0%	.0%
Other Companies	41.3	39.5	1.6	15,506	34.2%	63.3%	3.1%	75.6%
All Companies	120.8	62.4	51.5	20,497	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	83.3	54.5	27.1	19,522	68.9%	87.3%	52.6%	95.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	37.6	7.9	24.4	975	31.1%	12.7%	47.4%	4.8%
All Hardware Companies	53.4	53.2	.0	19,300	44.2%	85.2%	.0%	94.2%
All Turnkey & SW Companies	67.5	9.2	51.5	1,197	55.8%	14.8%	100.0%	5.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 11
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	82.8	48.9	18.2	2,299	27.7%	32.0%	20.1%	19.8%
Hewlett-Packard	22.4	15.2	2.6	760	7.5%	10.0%	2.9%	6.5%
Silicon Graphics	17.9	15.7	.0	474	6.0%	10.2%	.0%	4.1%
EDS Unigraphics	15.4	4.6	7.3	234	5.1%	3.0%	8.1%	2.0%
Marcus Computer Systeme	13.2	6.8	4.5	400	4.4%	4.4%	5.0%	3.4%
Digital	12.4	9.9	.0	443	4.2%	6.4%	.0%	3.8%
Dassault*	11.4	.0	9.9	0	3.8%	.0%	10.9%	.0%
Computervision	10.6	2.4	3.3	144	3.5%	1.6%	3.6%	1.2%
Control Data Systems	9.3	4.2	2.3	109	3.1%	2.8%	2.6%	.9%
Straessle Informationssysteme	8.5	1.4	5.1	145	2.8%	.9%	5.7%	1.2%
SDRC	7.8	.0	5.3	0	2.6%	.0%	5.9%	.0%
Applicon	7.3	2.4	2.9	81	2.4%	1.6%	3.2%	.7%
Autodesk	6.6	.0	6.6	0	2.2%	.0%	7.3%	.0%
Cimatron	4.8	2.1	2.2	128	1.6%	1.3%	2.4%	1.1%
Intergraph	4.6	1.7	1.5	65	1.6%	1.1%	1.6%	.6%
Digital Kienzle	4.2	2.1	1.2	65	1.4%	1.4%	1.3%	.6%
MacNeal-Schwendler	4.2	.0	4.0	0	1.4%	.0%	4.4%	.0%
ISD Software	4.1	.9	2.6	136	1.4%	.6%	2.9%	1.2%
Han Dataport	3.9	1.1	2.0	119	1.3%	.7%	2.2%	1.0%
CAD Distribution	3.6	.1	3.1	19	1.2%	.1%	3.4%	.2%

(Continued)

Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Delcam International	3.3	1.1	1.4	43	1.1%	.7%	1.6%	.4%
Investronica SA	3.2	2.0	.8	108	1.1%	1.3%	.9%	.9%
Siemens Nixdorf Info systeme	2.5	1.2	.5	117	.8%	.8%	.5%	1.0%
Altium*	2.1	.0	2.0	0	.7%	.0%	2.2%	.0%
Parametric Technology	2.0	.0	1.6	0	.7%	.0%	1.8%	.0%
Wiechers Datentechnik	1.7	.4	1.0	30	.6%	.2%	1.1%	.3%
CIMTEK*	1.7	.6	.9	15	.6%	.4%	1.0%	.1%
Exapt	1.6	.8	.6	30	.5%	.5%	.6%	.3%
Tebis	1.5	.4	.2	10	.5%	.3%	.3%	.1%
Matra Datavision	1.4	.5	.8	25	.5%	.3%	.8%	.2%
Isicad CAD/CAM Systeme	1.2	.4	.5	20	.4%	.3%	.5%	.2%
Technische Computer Systeme	.9	.2	.7	17	.3%	.1%	.7%	.2%
Gerber Systems	.9	.4	.4	14	.3%	.3%	.4%	.1%
ASCAD/ASCAM	.9	.5	.3	13	.3%	.3%	.3%	.1%
PDA Engineering	.8	.0	.7	0	.3%	.0%	.8%	.0%
Ziegler Informatics	.8	.0	.8	0	.3%	.0%	.9%	.0%
Apple Computer	.7	.7	.0	154	.2%	.5%	.0%	1.3%
Cisigraph	.6	.2	.3	10	.2%	.1%	.4%	.1%
Kloeckner-Moeller	.5	.1	.4	0	.2%	.0%	.5%	.0%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Swanson Analysis	.5	.0	.5	0	.2%	.0%	.5%	.0%
Other Companies	12.7	23.5	.0	5,345	4.3%	15.4%	.0%	46.0%
All Companies	299.3	152.8	90.5	11,633	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	235.7	130.6	60.7	10,172	78.8%	85.5%	67.0%	87.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	63.5	22.2	29.8	1,461	21.2%	14.5%	33.0%	12.6%
All Hardware Companies	79.7	71.9	.0	8,345	26.6%	47.0%	.0%	71.7%
All Turnkey & SW Companies	219.5	80.9	90.5	3,287	73.4%	53.0%	100.0%	28.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 12
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IEZ	17.8	6.0	9.2	427	16.3%	11.8%	20.9%	4.2%
IBM	12.0	8.7	1.7	846	11.0%	17.1%	3.8%	8.4%
Intergraph	11.7	4.4	3.7	217	10.7%	8.7%	8.4%	2.2%
Autodesk	7.1	.0	7.1	0	6.5%	.0%	16.1%	.0%
Nemetschek	5.1	1.5	3.1	126	4.7%	3.0%	7.1%	1.2%
Han Dataport	4.0	1.2	2.1	124	3.7%	2.3%	4.7%	1.2%
CAD Distribution	3.4	.1	2.9	18	3.1%	.2%	6.7%	.2%
Hewlett-Packard	2.8	2.4	.0	166	2.6%	4.7%	.0%	1.6%
Soft-Tech Software Technologies	2.8	.4	2.1	214	2.5%	.8%	4.7%	2.1%
Moss Systems	2.1	.3	.9	22	1.9%	.5%	2.0%	.2%
Technische Computer Systeme	1.9	.4	1.3	35	1.7%	.7%	3.0%	.3%
Isicad CAD/CAM Systeme	1.7	.4	1.0	20	1.5%	.8%	2.3%	.2%
Dassault*	1.7	.0	1.4	0	1.5%	.0%	3.3%	.0%
RIB/Bausoftware	1.6	.1	1.3	11	1.4%	.2%	2.9%	.1%
Graphisoft Software Dev	1.5	.0	1.5	0	1.3%	.0%	3.3%	.0%
Apple Computer	1.4	1.4	.0	295	1.3%	2.8%	.0%	2.9%
Microway	1.4	.8	.4	16	1.2%	1.6%	1.0%	.2%
Kockums Computer Systems	1.2	.3	.2	56	1.1%	.6%	.5%	.6%
Computervision	.8	.2	.3	12	.8%	.4%	.6%	.1%
CAD Centre	.8	.1	.5	4	.8%	.2%	1.2%	.0%
BATISOFT	.7	.3	.2	49	.7%	.5%	.5%	.5%

(Continued)

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Table 12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Lamp Software	.7	.2	.5	48	.6%	.4%	1.2%	.5%
Silicon Graphics	.6	.5	.0	16	.5%	.9%	.0%	.2%
Hochtief	.5	.1	.3	7	.5%	.2%	.6%	.1%
Other Companies	19.9	19.8	.0	7,250	18.3%	38.8%	.1%	71.9%
All Companies	109.2	50.9	43.9	10,083	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	60.9	38.4	15.6	8,893	55.8%	75.5%	35.6%	88.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	48.3	12.5	28.3	1,189	44.2%	24.5%	64.4%	11.8%
All Hardware Companies	30.7	29.8	.0	8,536	28.1%	58.5%	.0%	84.7%
All Turnkey & SW Companies	78.5	21.1	43.9	1,546	71.9%	41.5%	100.0%	15.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 13
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	22.8	9.7	7.1	365	23.4%	25.5%	20.5%	11.5%
Siemens Nixdorf Info systeme	19.0	6.4	7.2	308	19.5%	17.0%	20.8%	9.7%
ESRI	6.8	.0	5.5	0	7.0%	.0%	15.9%	.0%
Digital	6.8	5.1	.0	296	7.0%	13.4%	.0%	9.3%
Hewlett-Packard	5.0	4.3	.0	235	5.1%	11.3%	.0%	7.4%
IBM	4.4	3.3	.4	177	4.5%	8.7%	1.3%	5.6%
Straessle Informationssysteme	4.0	.3	2.8	32	4.1%	.8%	8.0%	1.0%
Smallworld Systems	3.5	.2	2.1	6	3.6%	.4%	6.0%	.2%
Unisys	2.4	.6	1.0	24	2.5%	1.5%	2.9%	.8%
Sysscan	2.0	.8	.6	20	2.0%	2.0%	1.6%	.6%
Autodesk	1.8	.0	1.8	0	1.9%	.0%	5.2%	.0%
Geometria GIS Systems House	1.5	.1	.1	8	1.6%	.3%	.2%	.3%
Laser-Scan	1.4	.4	.6	9	1.5%	1.1%	1.8%	.3%
APIC Systemes	.9	.0	.6	0	.9%	.0%	1.7%	.0%
Other Companies	12.5	5.9	3.6	1,638	12.8%	15.7%	10.3%	51.5%
All Companies	97.3	37.8	34.7	3,178	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	63.5	29.4	19.7	2,766	65.3%	77.7%	56.8%	87.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	33.7	8.4	15.0	412	34.7%	22.3%	43.2%	13.0%
All Hardware Companies	19.4	16.6	.0	2,314	19.9%	43.8%	.0%	72.8%
All Turnkey & SW Companies	77.9	21.2	34.7	864	80.1%	56.2%	100.0%	27.2%

Source: Dataquest (July 1994)

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Table 14
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Hewlett-Packard	12.2	9.3	1.0	539	20.2%	30.2%	5.0%	15.9%
IBM	6.8	5.9	.4	508	11.2%	19.0%	2.0%	15.0%
Sun Microsystems	5.4	4.3	.0	208	8.9%	13.7%	.0%	6.1%
Cadence	4.6	.0	3.3	0	7.5%	.0%	16.4%	.0%
Digital	3.7	2.9	.0	102	6.2%	9.5%	.0%	3.0%
Sagantec	3.0	.0	2.8	0	5.0%	.0%	13.8%	.0%
Mentor Graphics	2.8	.4	1.2	13	4.6%	1.3%	6.1%	.4%
Synopsys	2.0	.0	1.4	0	3.4%	.0%	7.0%	.0%
Silicon Graphics	1.5	1.3	.0	43	2.5%	4.3%	.0%	1.3%
Aucotec	1.3	.4	.7	52	2.2%	1.2%	3.4%	1.5%
Autodesk	1.0	.0	1.0	0	1.6%	.0%	5.0%	.0%
CAD Distribution	.9	.0	.8	5	1.4%	.1%	3.8%	.1%
Intergraph	.7	.0	.6	0	1.2%	.0%	3.1%	.0%
Ziegler Informatics	.6	.0	.6	0	1.0%	.0%	3.1%	.0%
Viewlogic Systems	.6	.0	.5	0	1.0%	.0%	2.4%	.0%
ANACAD EES	.5	.0	.5	0	.9%	.0%	2.5%	.0%
Other Companies	10.2	6.0	3.4	1,843	16.8%	19.5%	17.2%	54.5%
All Companies	60.5	31.0	19.9	3,379	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	52.6	30.3	13.5	3,291	87.0%	98.0%	67.9%	97.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	7.9	.6	6.4	88	13.0%	2.0%	32.1%	2.6%
All Hardware Companies	33.3	28.9	.0	3,208	55.1%	93.2%	.0%	95.0%
All Turnkey & SW Companies	27.1	2.1	19.9	170	44.9%	6.8%	100.0%	5.0%

Source: Dataquest (July 1994)

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Table 15
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	7.8	5.6	1.0	344	19.7%	27.6%	7.6%	13.4%
IBM	3.8	3.6	.0	350	9.5%	17.5%	.0%	13.6%
Sun Microsystems	3.3	2.6	.0	133	8.2%	12.7%	.0%	5.2%
Cadence	2.7	.0	1.9	0	6.8%	.0%	14.7%	.0%
Digital	2.3	1.8	.0	70	5.7%	8.7%	.0%	2.7%
Synopsys	2.0	.0	1.4	0	5.1%	.0%	10.6%	.0%
Mentor Graphics	1.5	.2	.6	7	3.7%	1.0%	4.8%	.3%
Silicon Graphics	1.5	1.3	.0	41	3.7%	6.3%	.0%	1.6%
Aucotec	1.3	.4	.7	52	3.3%	1.8%	5.1%	2.0%
CAD Distribution	.9	.0	.8	5	2.2%	.1%	5.7%	.2%
Autodesk	.8	.0	.8	0	2.1%	.0%	6.2%	.0%
Viewlogic Systems	.6	.0	.5	0	1.5%	.0%	3.6%	.0%
ANACAD EES	.5	.0	.5	0	1.3%	.0%	3.8%	.0%
Other Companies	8.5	4.5	3.3	1,510	21.3%	22.3%	24.9%	58.8%
All Companies	39.8	20.3	13.2	2,569	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	35.6	19.6	10.2	2,486	89.4%	96.9%	77.1%	96.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	4.2	.6	3.0	83	10.6%	3.1%	22.9%	3.2%
All Hardware Companies	21.6	18.8	.0	2,423	54.4%	92.7%	.0%	94.3%
All Turnkey & SW Companies	18.1	1.5	13.2	146	45.6%	7.3%	100.0%	5.7%

Source: Dataquest (July 1994)

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Table 16
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Saganiec	3.0	.0	2.8	0	28.7%	.0%	61.5%	.0%
Sun Microsystems	1.7	1.3	.0	56	15.8%	31.0%	.0%	35.0%
Cadence	1.6	.0	1.2	0	15.2%	.0%	26.0%	.0%
Hewlett-Packard	1.3	1.1	.0	51	12.5%	26.3%	.0%	32.0%
IBM	1.2	1.1	.0	34	11.2%	25.4%	.0%	21.1%
Digital	.8	.6	.0	12	7.5%	14.3%	.0%	7.3%
Other Companies	.2	.0	.2	4	2.0%	.7%	3.6%	2.4%
All Companies	10.6	4.3	4.5	159	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	7.5	4.3	1.7	159	71.3%	100.0%	38.5%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	3.0	.0	2.8	0	28.7%	.0%	61.5%	.0%
All Hardware Companies	5.0	4.2	.0	157	47.5%	98.4%	.0%	98.5%
All Turnkey & SW Companies	5.6	.1	4.5	2	52.5%	1.6%	100.0%	1.5%

Source: Dataquest (July 1994)

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Table 17
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Rest of Europe
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Hewlett-Packard	3.1	2.6	.0	143	30.5%	40.8%	.0%	22.1%
IBM	1.8	1.2	.4	125	18.1%	19.2%	17.7%	19.2%
Mentor Graphics	.8	.1	.4	4	7.9%	1.7%	15.9%	.6%
Digital	.7	.6	.0	20	6.8%	8.5%	.0%	3.1%
Other Companies	1.5	1.5	.0	329	14.4%	22.9%	.0%	50.5%
All Companies	10.1	6.5	2.2	650	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	9.5	6.5	1.6	646	93.9%	100.0%	72.3%	99.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.6	.0	.6	5	6.1%	.0%	27.7%	.7%
All Hardware Companies	6.7	5.9	.0	628	66.0%	91.5%	.0%	96.6%
All Turnkey & SW Companies	3.4	.6	2.2	22	34.0%	8.5%	100.0%	3.4%

Source: Dataquest (July 1994)

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Software

CAD/CAM/CAE and GIS Italy Market Share Update

Market Statistics

1994

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Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9407
Publication Date: July 25, 1994

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Note: All tables show estimated data.

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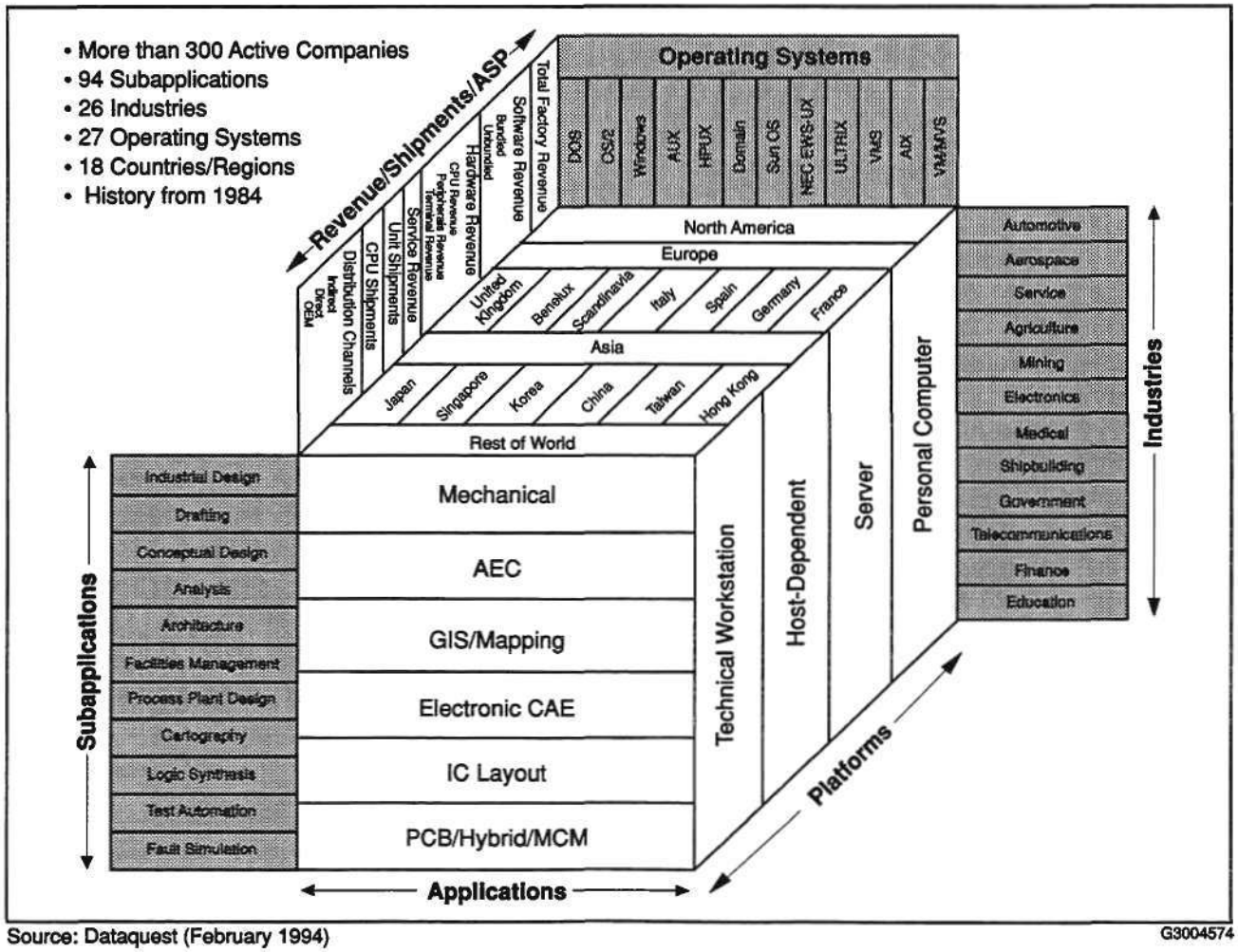
CAD/CAM/CAE and GIS Italy Market Share Update

Introduction

CAD/CAM/CAE/GIS systems have dramatically changed the methods by which designers and production managers originate and implement products. CAD and CAE systems allow designers to create, draft, analyze, test, and manipulate products on a screen in two and three dimensions. As CAD/CAM/CAE/GIS systems continue to decrease in cost, they become more available and cost justifiable to new users.

In order to provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure 1.

Figure 1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (February 1994)

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Table 1
CAD/CAM/CAE/GIS 1992-1993 Market Summary

	Software Revenue 1992 ($M)	Software Revenue 1993 ($M)	Growth Rate (%)	Total Revenue 1992 ($M)	Total Revenue 1993 ($M)	Growth Rate (%)	Hardware Unit Shipments 1992	Hardware Unit Shipments 1993	Growth Rate (%)
Application									
Mechanical	2,170.4	2,294.7	5.7	7,988.2	7,862.7	-1.6	302,347	303,364	0.3
AEC	746.9	794.1	6.3	2,356.5	2,444.0	3.7	178,629	198,075	10.9
GIS/Mapping	580.1	662.2	14.2	2,005.6	2,179.1	8.7	86,513	102,624	18.6
Electronic CAE	741.5	797.1	7.5	2,086.4	2,271.7	8.9	94,176	99,129	5.3
IC Layout	212.7	203.0	-4.6	628.4	676.4	7.6	9,771	13,049	33.5
PCB/Hybrid/MCM	265.9	271.2	2.0	870.9	900.2	3.4	35,110	38,030	8.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
Region									
North America	1,562.5	1,754.6	12.3	5,253.5	5,690.7	8.3	286,939	325,318	13.4
Europe	1,693.8	1,608.9	-5.0	5,755.5	5,432.7	-5.6	231,062	240,603	4.1
Asia	1,352.7	1,534.4	13.4	4,601.2	4,830.6	5.0	169,839	163,620	-3.7
Rest of World	108.5	124.3	14.6	325.9	380.2	16.7	18,706	24,730	32.2
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
In Local Currencies									
Europe (ECU)	1,301.8	1,378.2	5.9	4,423.7	4,653.7	5.2			
Asia (yen)	170,895	170,093	-0.5	581,318	535,468	-7.9			
Platform									
Technical Workstation	3,060.1	3,312.8	8.3	9,640.0	10,458.3	8.5	173,705	194,848	12.2
Host-Dependent	360.2	306.1	-15.0	2,436.6	1,754.7	-28.0	34,524	28,573	-17.2
Server	140.0	176.2	25.9	906.3	1,056.8	16.6	11,566	13,381	15.7
Personal Computer	1,157.1	1,227.1	6.1	2,953.2	3,064.4	3.8	486,751	517,469	6.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8

Source: Dataquest (July 1994)

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A companion article analyzing major shifts in the 1993 market was published in our *Dataquest Perspective*, dated June 27, 1994.

Table 1 summarizes the performance in various segments of the CAD/CAM/CAE/GIS markets in 1993 versus 1992. With the devaluation of the dollar against the yen (¥126.34/$ in 1992 versus ¥110.85/$ in 1993) and the appreciation of the dollar against the ECU (ECU 0.7686/$ in 1992 versus ECU 0.8566/$ in 1993), actual growth is not as it appears when denominated in U.S. dollars. With 75 percent of the Asian market in Japan, denominating in yen gives a rough indication of real growth in the Asian market, which was a negative 7.9 percent.

About This Document

This document contains Dataquest's detailed market share information on the CAD/CAM/CAE/GIS industry. We no longer publish worldwide all-application market statistics for the entire CAD/CAM/CAE/GIS industry. This data is available by calling Suzanne Snygg at (408) 437-8241. The category "Other Companies" is the aggregation of small companies. More detailed data on these markets may be requested through our Client Inquiry service.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

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Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic Computer-Aided Engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of products). Schematic capture and simulation are examples of electronic CAE applications.
- IC Layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/Hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe. Market share data is available for each of these countries.

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong. Market share data is available for each of these countries.

Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed

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by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

Metrics

The following paragraphs define measurements.

- Total factory revenue is defined as the amount of money received by a manufacturer for its goods and services measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue). Total factory revenue is the sum of software revenue, hardware revenue, and service revenue.
- Unit shipment is defined as the number of seats delivered (number of possible simultaneous users of product delivered) excluding OEM shipments.

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- Hardware revenue is revenue derived from sales of CPUs (including operating systems), terminals (for host-dependent systems), and peripherals.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled application software.
- Service revenue is defined as all revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
  - Maintenance fees for hardware and software
  - Management and operations services—help desk, education and training, disaster recovery, vaulting, and configuration management.
  - Service bureau—project work, including construction of database, data conversion, product design, analysis, or manufacturing.
  - Application development—design and development of customized software applications or the modification, enhancement, or customization of existing software applications, adding new functionality.
  - Consulting revenue—assessment of CAD/CAM/CAE/GIS business and information technology needs and the formulation of a plan based on needs identification.
  - Implementation and integration services—planning, implementation, migration, and integration of software products (software network support and integration, account integration management, data center design, and construction).

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year and second quarter of the subsequent year, we survey all participants in each industry. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contacts at large companies. (Dataquest maintains a large contact database on all sources of information.) The following are examples of the job titles of people contacted for information:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning

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- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE/GIS marketing programs
- Market research analyst

The Audit Process

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks
- Articles in both the general and trade press
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice; Dataquest also checks with multiple sources at one company to cross-check data on that company.

Dataquest analysts have many years of experience in how to apply the above tools to get the most accurate information possible on a particular company (such as what to use when and what industry averages are). We believe that the estimates presented here are the most accurate and meaningful generally available today. It is the CAD/CAM/CAE/GIS group's policy to continually update our market information for any year, based on any new data received, in order to arrive at the most accurate market representation possible.

Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

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Publishing Schedule

We publish both market share and forecasting twice each year, allowing for timely distribution of data and thorough analysis and forecasting. Our annual delivery schedule is as follows:

- Market share data is available January 31. All tables will be published and distributed to clients by March 31.
- Forecasting from the market share tables provides a five-year forecast period, available after March 31. The books will be shipped by May 31.
- Final updated market share tables, based on additional data collection and analysis, will be completed by May 31. At this point, the market share database is frozen and will not be changed until the end of the year. For the next six months, supplementary market data will be based on this final market data. Books will be shipped by July 31.
- We provide complete final forecast tables by July 31. These tables take into consideration changes in the market share during the previous six months. Books will be shipped by September 30.

Database Changes

Tables 2 through 5 show changes made to the database since last year's market share update. PC clone manufacturers are no longer tracked individually. We continue to show PC sales by IBM, Hewlett-Packard, and Digital, which also sell other platforms. The 1993 sales of GeoVision Systems to SHL Systemhouse, Computervision-GIS to Unisys, Racal-Redac to Zuken, Chronologic to Viewlogic, ASG to Softdesk, CDC's mechanical software product to ICEM Technologies, PDA to MacNeal-Schwendler, and Logic Modeling Corporation to Synopsys; the merger of Sysdeco and SysScan; and the change of GDS to Convergent Group will be recognized in market reporting for 1994.

Table 2
Companies Renamed

Company Name	Renamed to:
Alper Systems	Sysdeco Ltd.
Areon	Kreon
CADAM	Altium
Catalpa	Catalpa groupe Missler
Geotrace Technologies	Cadlynx
Logic Control	Logic Systems Designers
RIB/RZB	RIB Bausoftware
Sener Sistemas Marinos	Sener Inginiera y Sistemas
STI Strassle	Strassle Informationssysteme
Test Systems Strategies	Summitt

Source: Dataquest (July 1994)

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Table 3
Companies (or CAD Portions Thereof) Sold/Merged

Company Name	Acquired by, Merged with, Technology Sold to:
ANACAD & Electrical Eng. Software	ANACAD-EES
Aries Technology	MacNeal-Schwendler
CAD Language Systems	Compass Design Automation
CAD/CAM Group	Data I/O
Comdisco	Cadence
DAT Standard info ssystemes	ISD Software
EEsof	Hewlett-Packard
Expertest	Sunrise Test
Fides Industrielle Automation	Strassle
HP Cade	Hewlett-Packard
Inca	Zycad
Infocel	Understanding Systems
PiE Design	Quickturn Design Systems
Quad Design Technology	Viewlogic
Wisdom Systems	ICAD

Source: Dataquest (July 1994)

Table 4
Companies Deleted

Company Removed from Database:
European
Asicom
Club Informatico SA
DATAID Technologies
DECISA
Micrograph
Olivetti*
Research Machines*
North American
Bechtel
CADLYNX
Compaq*
Dell Computer*
Engineering Systems Corporation
GeoQuest
Mega CADD
NCR Microelectronics
Object Design
Objectivity
Ontos
Quicklogic
The CAD Group
Ultimap

*We no longer follow individual PC clone makers.
Source: Dataquest (July 1994)

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Table 5
Companies Added

Company Added to Database:
European
APIC Systemes
ISD Software
SPEED
Ultimate Technology
North American
AT&T
Aptix
ARC SYS
EAGLE Point
Earth Resource Mapping
Graftek
Graphic Data Systems (GDS)
Model Technology
Systems Science Inc.
Tactics Int'l Ltd.
VLSI Libraries
Asian
Adam Net
Kozo
Okura
Tachnodia
TECHSPERT
Toshiba Engineering
Yokogawa Digital Computer

Source: Dataquest (July 1994)

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Table 6
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	95.3	62.6	17.1	3,926	20.2%	26.1%	12.7%	20.5%
Digital	47.6	37.5	.0	1,957	10.1%	15.6%	.0%	10.2%
Hewlett-Packard	46.9	33.6	4.6	1,804	9.9%	14.0%	3.4%	9.4%
Computervision	41.7	9.3	13.1	570	8.8%	3.9%	9.8%	3.0%
Sun Microsystems	24.0	19.2	.0	806	5.1%	8.0%	.0%	4.2%
CAD Lab	23.2	7.2	10.7	546	4.9%	3.0%	8.0%	2.8%
Intergraph	14.3	5.4	4.7	226	3.0%	2.3%	3.5%	1.2%
Siemens Nixdorf Info systeme	14.0	4.9	5.1	267	3.0%	2.1%	3.8%	1.4%
ItalCad	12.7	3.6	5.3	280	2.7%	1.5%	4.0%	1.5%
Autodesk	12.4	.0	12.4	0	2.6%	.0%	9.3%	.0%
Matra Datavision	8.9	3.0	5.0	163	1.9%	1.2%	3.7%	.8%
Silicon Graphics	8.4	7.3	.0	223	1.8%	3.1%	.0%	1.2%
Mentor Graphics	8.3	1.2	3.6	40	1.7%	.5%	2.7%	.2%
Cimatron	7.0	3.1	3.2	253	1.5%	1.3%	2.4%	1.3%
Investronica SA	6.6	4.1	1.7	226	1.4%	1.7%	1.3%	1.2%
ESRI	5.9	.0	4.8	0	1.3%	.0%	3.6%	.0%
Dassault*	5.9	.0	5.1	0	1.2%	.0%	3.8%	.0%
SDRC	5.5	.0	3.8	0	1.2%	.0%	2.8%	.0%
Cadence	5.2	.0	3.7	0	1.1%	.0%	2.8%	.0%
Parametric Technology	4.4	.0	3.6	0	.9%	.0%	2.7%	.0%
MacNeal-Schwendler	3.9	.0	3.7	0	.8%	.0%	2.8%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Apple Computer	3.3	3.2	.0	684	.7%	1.4%	.0%	3.6%
IEZ	2.9	1.0	1.5	69	.6%	.4%	1.1%	.4%
Altium*	2.2	.0	2.1	0	.5%	.0%	1.5%	.0%
EDS Unigraphics	2.1	.6	1.0	32	.4%	.3%	.7%	.2%
Control Data Systems	1.7	.9	.3	24	.4%	.4%	.2%	.1%
Star Informatic	1.6	.3	1.0	25	.3%	.1%	.8%	.1%
Tebis	1.6	.4	.2	11	.3%	.2%	.2%	.1%
Harris EDA	1.5	.1	.9	8	.3%	.1%	.7%	.0%
Delcam International	1.5	.5	.6	19	.3%	.2%	.5%	.1%
Unisys	1.4	.3	.6	14	.3%	.1%	.4%	.1%
PDA Engineering	1.2	.0	1.1	0	.3%	.0%	.8%	.0%
Synopsys	1.2	.0	.8	0	.2%	.0%	.6%	.0%
Applicon	1.2	.4	.5	13	.2%	.2%	.3%	.1%
Racal-Redac	1.1	.1	.5	6	.2%	.1%	.4%	.0%
Vero International Software	.9	.0	.9	0	.2%	.0%	.6%	.0%
ISD Software	.9	.1	.8	14	.2%	.0%	.6%	.1%
Swanson Analysis	.8	.0	.7	0	.2%	.0%	.5%	.0%
Technische Computer Systeme	.8	.2	.6	15	.2%	.1%	.4%	.1%
Han Dataport	.8	.2	.4	23	.2%	.1%	.3%	.1%
Nemetschek	.7	.2	.4	18	.2%	.1%	.3%	.1%
COMPASS Design Automation	.7	.0	.5	0	.1%	.0%	.4%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Soft-Tech Software Technologies	.6	.2	.4	114	.1%	.1%	.3%	.6%
Gerber Systems	.5	.3	.2	8	.1%	.1%	.2%	.0%
Viewlogic Systems	.5	.0	.4	0	.1%	.0%	.3%	.0%
Other Companies	31.3	27.5	1.2	6,733	6.6%	11.5%	.9%	35.1%
All Companies	472.8	239.8	134.0	19,198	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	380.9	209.7	91.5	17,095	80.6%	87.5%	68.3%	89.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	91.9	30.1	42.5	2,103	19.4%	12.5%	31.7%	11.0%
All Hardware Companies	168.9	146.1	.0	14,877	35.7%	60.9%	.0%	77.5%
All Turnkey & SW Companies	303.9	93.7	134.0	4,321	64.3%	39.1%	100.0%	22.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 7
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	54.4	36.5	8.9	1,014	18.1%	26.9%	9.9%	17.9%
Hewlett-Packard	44.2	31.4	4.4	1,233	14.7%	23.1%	4.9%	21.8%
Computervision	40.5	9.2	12.0	558	13.4%	6.8%	13.4%	9.8%
CAD Lab	18.1	5.6	8.4	296	6.0%	4.1%	9.3%	5.2%
Sun Microsystems	17.8	14.0	.0	691	5.9%	10.3%	.0%	12.2%
Siemens Nixdorf Info systeme	13.1	4.4	4.9	212	4.3%	3.2%	5.5%	3.7%
ItalCad	12.7	3.6	5.3	280	4.2%	2.7%	6.0%	4.9%
Digital	12.0	9.2	.0	470	4.0%	6.8%	.0%	8.3%
Intergraph	11.8	4.6	3.7	152	3.9%	3.4%	4.2%	2.7%
Matra Datavision	8.7	2.9	4.9	144	2.9%	2.1%	5.4%	2.5%
Mentor Graphics	8.3	1.2	3.6	40	2.7%	.9%	4.0%	.7%
Silicon Graphics	7.1	6.3	.0	210	2.4%	4.6%	.0%	3.7%
SDRC	5.5	.0	3.7	0	1.8%	.0%	4.2%	.0%
Cadence	4.9	.0	3.5	0	1.6%	.0%	3.9%	.0%
Parametric Technology	4.2	.0	3.5	0	1.4%	.0%	3.9%	.0%
Cimatron	3.2	1.4	1.5	66	1.1%	1.1%	1.6%	1.2%
Dassault*	3.1	.0	2.7	0	1.0%	.0%	3.0%	.0%
IEZ	2.9	1.0	1.5	69	1.0%	.7%	1.7%	1.2%
ESRI	2.4	.0	1.8	0	.8%	.0%	2.0%	.0%
EDS Unigraphics	1.7	.5	.8	27	.6%	.4%	.9%	.5%
Star Informatic	1.6	.3	1.0	21	.5%	.2%	1.1%	.4%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Harris EDA	1.5	.1	.9	7	.5%	.1%	1.0%	.1%
Delcam International	1.4	.5	.6	17	.5%	.4%	.7%	.3%
MacNeal-Schwendler	1.2	.0	1.0	0	.4%	.0%	1.1%	.0%
Synopsys	1.2	.0	.8	0	.4%	.0%	.9%	.0%
Applicon	1.2	.4	.5	13	.4%	.3%	.5%	.2%
PDA Engineering	1.1	.0	1.0	0	.4%	.0%	1.1%	.0%
Control Data Systems	1.0	.5	.3	16	.3%	.4%	.3%	.3%
Unisys	1.0	.2	.4	9	.3%	.2%	.4%	.2%
Racal-Redac	1.0	.1	.4	6	.3%	.1%	.5%	.1%
Han Dataport	.7	.2	.3	19	.2%	.1%	.4%	.3%
COMPASS Design Automation	.7	.0	.5	0	.2%	.0%	.6%	.0%
Autodesk	.6	.0	.6	0	.2%	.0%	.7%	.0%
Gerber Systems	.5	.3	.2	8	.2%	.2%	.3%	.1%
Other Companies	4.6	.7	2.3	23	1.5%	.5%	2.6%	.4%
All Companies	301.6	136.1	89.6	5,661	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	234.4	115.2	58.5	4,490	77.7%	84.7%	65.3%	79.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	67.2	20.8	31.1	1,171	22.3%	15.3%	34.7%	20.7%
All Hardware Companies	83.2	69.9	.0	2,872	27.6%	51.4%	.0%	50.7%
All Turnkey & SW Companies	218.4	66.1	89.6	2,789	72.4%	48.6%	100.0%	49.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 8
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	25.0	14.4	5.1	429	44.9%	39.0%	58.4%	51.2%
Digital	14.9	11.6	.0	0	26.9%	31.3%	.0%	.0%
MacNeal-Schwendler	2.7	.0	2.7	0	4.9%	.0%	31.5%	.0%
Dassault*	2.0	.0	1.8	0	3.6%	.0%	20.2%	.0%
Siemens Nixdorf Info systeme	.6	.3	.2	10	1.1%	.8%	2.0%	1.2%
Control Data Systems	.6	.4	.0	8	1.1%	1.0%	.5%	.9%
Other Companies	9.3	10.3	.0	385	16.8%	27.9%	.0%	45.9%
All Companies	55.6	37.0	8.7	838	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	54.9	36.7	8.4	828	98.7%	99.2%	97.3%	98.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.7	.3	.2	10	1.3%	.8%	2.7%	1.2%
All Hardware Companies	26.1	22.1	.0	389	46.9%	59.7%	.0%	46.4%
All Turnkey & SW Companies	29.6	14.9	8.7	449	53.1%	40.3%	100.0%	53.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 9
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	16.3	12.6	.0	158	45.3%	53.9%	.0%	41.3%
Sun Microsystems	6.2	5.2	.0	114	17.3%	22.2%	.0%	29.8%
IBM	5.0	2.9	1.1	58	14.0%	12.6%	23.6%	15.1%
ESRI	2.3	.0	1.8	0	6.5%	.0%	39.6%	.0%
Silicon Graphics	1.3	1.1	.0	13	3.5%	4.6%	.0%	3.5%
Intergraph	1.2	.5	.3	14	3.3%	2.0%	7.4%	3.6%
Dassault*	.8	.0	.6	0	2.1%	.0%	14.0%	.0%
Hewlett-Packard	.6	.5	.0	9	1.6%	2.0%	.0%	2.3%
Other Companies	.6	.2	.0	3	1.6%	.6%	.0%	.9%
All Companies	36.1	23.3	4.6	384	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	35.8	23.2	4.5	381	99.3%	99.6%	97.6%	99.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.3	.1	.1	3	.7%	.4%	2.4%	.7%
All Hardware Companies	25.1	20.0	.0	307	69.6%	85.5%	.0%	80.1%
All Turnkey & SW Companies	11.0	3.4	4.6	76	30.4%	14.5%	100.0%	19.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 10
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Autodesk	11.8	.0	11.8	0	14.9%	.0%	37.9%	.0%
IBM	10.9	8.7	2.1	2,425	13.7%	20.1%	6.6%	19.7%
Investronica SA	6.6	4.1	1.7	226	8.3%	9.5%	5.6%	1.8%
CAD Lab	5.1	1.6	2.4	250	6.4%	3.6%	7.6%	2.0%
Digital	4.4	4.2	.0	1,329	5.5%	9.6%	.0%	10.8%
Cimatron	3.7	1.7	1.7	187	4.7%	3.8%	5.5%	1.5%
Apple Computer	3.3	3.2	.0	684	4.1%	7.5%	.0%	5.6%
Altium*	2.2	.0	2.1	0	2.7%	.0%	6.6%	.0%
Hewlett-Packard	2.1	1.8	.2	562	2.6%	4.0%	.5%	4.6%
Tebis	1.6	.4	.2	11	2.0%	.9%	.8%	.1%
Intergraph	1.2	.4	.6	60	1.5%	.9%	2.0%	.5%
ESRI	1.2	.0	1.1	0	1.5%	.0%	3.6%	.0%
Computervision	1.1	.0	1.1	10	1.3%	.0%	3.4%	.1%
Vero International Software	.9	.0	.9	0	1.2%	.0%	2.7%	.0%
Soft-Tech Software Technologies	.6	.2	.4	114	.8%	.5%	1.2%	.9%
Nemetschek	.6	.2	.4	16	.7%	.4%	1.1%	.1%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ISD Software	.5	.0	.5	0	.7%	.0%	1.7%	.0%
Other Companies	16.7	16.3	.4	6,322	21.1%	37.6%	1.1%	51.3%
All Companies	79.5	43.4	31.2	12,315	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	55.8	34.6	20.1	11,396	70.2%	79.6%	64.4%	92.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	23.7	8.8	11.1	919	29.8%	20.4%	35.6%	7.5%
All Hardware Companies	34.6	34.1	.0	11,307	43.5%	78.6%	.0%	91.8%
All Turnkey & SW Companies	45.0	9.3	31.2	1,007	56.5%	21.4%	100.0%	8.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 11
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	70.4	42.1	15.2	2,056	23.5%	27.8%	18.0%	18.6%
Computervision	37.2	8.3	11.8	505	12.4%	5.5%	14.0%	4.6%
Hewlett-Packard	30.7	20.9	3.6	1,040	10.2%	13.8%	4.3%	9.4%
Digital	27.4	21.8	.0	979	9.2%	14.4%	.0%	8.8%
CAD Lab	23.2	7.2	10.7	546	7.7%	4.7%	12.8%	4.9%
Matra Datavision	8.8	3.0	5.0	163	2.9%	2.0%	5.9%	1.5%
Sun Microsystems	8.6	6.9	.0	284	2.9%	4.6%	.0%	2.6%
ItalCad	8.4	2.4	3.5	185	2.8%	1.6%	4.2%	1.7%
Silicon Graphics	7.4	6.5	.0	195	2.5%	4.3%	.0%	1.8%
Cimatron	7.0	3.1	3.2	253	2.3%	2.0%	3.8%	2.3%
Investronica SA	6.6	4.1	1.7	226	2.2%	2.7%	2.1%	2.0%
SDRC	5.5	.0	3.8	0	1.8%	.0%	4.5%	.0%
Dassault*	5.1	.0	4.4	0	1.7%	.0%	5.3%	.0%
Autodesk	5.0	.0	5.0	0	1.7%	.0%	5.9%	.0%
Parametric Technology	4.4	.0	3.6	0	1.5%	.0%	4.3%	.0%
Intergraph	4.0	1.4	1.3	56	1.3%	1.0%	1.5%	.5%
MacNeal-Schwendler	3.8	.0	3.6	0	1.3%	.0%	4.3%	.0%
EDS Unigraphics	2.1	.6	1.0	32	.7%	.4%	1.2%	.3%
Altium*	1.7	.0	1.6	0	.6%	.0%	2.0%	.0%
Control Data Systems	1.7	.9	.3	24	.6%	.6%	.4%	.2%
Tebis	1.6	.4	.2	11	.5%	.3%	.3%	.1%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Delcam International	1.5	.5	.6	19	.5%	.3%	.8%	.2%
Siemens Nixdorf Info systeme	1.3	.6	.2	58	.4%	.4%	.3%	.5%
PDA Engineering	1.2	.0	1.1	0	.4%	.0%	1.3%	.0%
Applicon	1.2	.4	.5	13	.4%	.3%	.5%	.1%
Apple Computer	1.1	1.1	.0	229	.4%	.7%	.0%	2.1%
Vero International Software	.9	.0	.9	0	.3%	.0%	1.0%	.0%
Swanson Analysis	.8	.0	.7	0	.3%	.0%	.8%	.0%
Han Dataport	.8	.2	.4	23	.3%	.1%	.5%	.2%
Gerber Systems	.5	.3	.2	8	.2%	.2%	.3%	.1%
Other Companies	15.2	18.3	.0	4,108	5.1%	12.1%	.0%	37.1%
All Companies	299.8	151.5	84.1	11,077	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	236.2	129.4	55.1	9,549	78.8%	85.5%	65.6%	86.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	63.6	22.0	29.0	1,528	21.2%	14.5%	34.4%	13.8%
All Hardware Companies	88.7	77.3	.0	7,792	29.6%	51.0%	.0%	70.3%
All Turnkey & SW Companies	211.1	74.1	84.1	3,285	70.4%	49.0%	100.0%	29.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 12
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	10.8	8.6	1.0	981	22.8%	34.2%	6.9%	26.3%
Autodesk	5.4	.0	5.4	0	11.3%	.0%	35.6%	.0%
Intergraph	4.6	1.7	1.4	85	9.6%	6.8%	9.6%	2.3%
ItalCad	3.8	1.1	1.6	84	8.0%	4.3%	10.7%	2.3%
Computervision	3.4	.8	1.0	49	7.2%	3.1%	6.7%	1.3%
Hewlett-Packard	3.1	2.7	.0	185	6.6%	10.6%	.0%	5.0%
JEZ	2.9	1.0	1.5	69	6.0%	3.8%	9.9%	1.8%
Digital	2.6	2.2	.0	384	5.5%	8.9%	.0%	10.3%
Apple Computer	1.8	1.8	.0	387	3.9%	7.3%	.0%	10.4%
Dassault*	.8	.0	.7	0	1.6%	.0%	4.4%	.0%
Nemetschek	.7	.2	.4	18	1.5%	.9%	2.9%	.5%
Soft-Tech Software Technologies	.6	.2	.4	114	1.3%	.9%	2.4%	3.1%
Star Informatic	.6	.1	.4	11	1.2%	.5%	2.4%	.3%
Other Companies	3.9	3.9	.0	1,313	8.2%	15.6%	.0%	35.3%
All Companies	47.5	25.2	15.0	3,725	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	37.2	22.4	9.5	3,409	78.4%	88.8%	63.5%	91.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	10.3	2.8	5.5	316	21.6%	11.2%	36.5%	8.5%
All Hardware Companies	19.0	17.8	.0	3,213	40.1%	70.5%	.0%	86.3%
All Turnkey & SW Companies	28.4	7.4	15.0	512	59.9%	29.5%	100.0%	13.7%

Source: Dataquest (July 1994)

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Table 13
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Siemens Nixdorf Info systeme	12.7	4.3	4.8	206	23.8%	17.2%	29.9%	11.4%
Digital	7.1	5.2	.0	307	13.3%	21.0%	.0%	17.0%
ESRI	5.9	.0	4.8	0	11.1%	.0%	29.7%	.0%
Sun Microsystems	5.4	4.4	.0	141	10.2%	17.8%	.0%	7.8%
Intergraph	5.3	2.3	1.7	85	10.0%	9.0%	10.2%	4.7%
IBM	5.3	4.3	.4	255	9.9%	17.2%	2.2%	14.1%
Unisys	1.4	.3	.6	14	2.6%	1.2%	3.5%	.7%
Autodesk	1.4	.0	1.4	0	2.6%	.0%	8.5%	.0%
Hewlett-Packard	.8	.6	.0	35	1.4%	2.6%	.0%	2.0%
ItalCad	.5	.2	.2	11	1.0%	.6%	1.3%	.6%
Other Companies	5.6	2.7	1.7	719	10.6%	10.8%	10.4%	39.9%
All Companies	53.2	25.0	16.1	1,803	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	38.6	20.1	10.5	1,578	72.7%	80.5%	65.1%	87.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	14.5	4.9	5.6	226	27.3%	19.5%	34.9%	12.5%
All Hardware Companies	19.3	16.0	.0	1,437	36.2%	64.2%	.0%	79.7%
All Turnkey & SW Companies	33.9	8.9	16.1	366	63.8%	35.8%	100.0%	20.3%

Source: Dataquest (July 1994)

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Table 14
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	12.3	9.4	1.0	543	17.0%	24.7%	5.3%	21.0%
Digital	10.5	8.3	.0	287	14.6%	21.7%	.0%	11.1%
Sun Microsystems	9.5	7.5	.0	366	13.1%	19.6%	.0%	14.1%
IBM	8.9	7.6	.5	635	12.3%	20.0%	2.9%	24.5%
Mentor Graphics	8.3	1.2	3.6	40	11.4%	3.1%	19.2%	1.5%
Cadence	5.2	.0	3.7	0	7.2%	.0%	19.7%	.0%
Harris EDA	1.5	.1	.9	8	2.1%	.3%	4.9%	.3%
Synopsys	1.2	.0	.8	0	1.6%	.0%	4.3%	.0%
Racal-Redac	1.1	.1	.5	6	1.5%	.3%	2.5%	.2%
Star Informatic	.9	.2	.6	12	1.2%	.4%	2.9%	.4%
Computervision	.8	.2	.2	12	1.1%	.5%	1.3%	.5%
Autodesk	.8	.0	.8	0	1.0%	.0%	4.0%	.0%
COMPASS Design Automation	.7	.0	.5	0	.9%	.0%	2.8%	.0%
Silicon Graphics	.6	.6	.0	18	.9%	1.4%	.0%	.7%
Viewlogic Systems	.5	.0	.4	0	.7%	.0%	2.2%	.0%
Other Companies	6.6	2.5	3.0	593	9.1%	6.5%	15.9%	22.9%
All Companies	72.4	38.2	18.8	2,593	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	68.9	37.8	16.4	2,559	95.2%	99.0%	87.0%	98.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	3.5	.4	2.4	34	4.8%	1.0%	13.0%	1.3%
All Hardware Companies	41.9	35.0	.0	2,434	57.9%	91.7%	.0%	93.9%
All Turnkey & SW Companies	30.5	3.2	18.8	159	42.1%	8.3%	100.0%	6.1%

Source: Dataquest (July 1994)

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Table 15
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	7.9	5.6	1.0	347	17.8%	24.9%	8.0%	21.2%
Digital	6.3	5.0	.0	197	14.3%	22.0%	.0%	12.1%
Sun Microsystems	5.7	4.5	.0	235	13.0%	20.0%	.0%	14.4%
IBM	4.4	4.2	.0	410	10.0%	18.4%	.0%	25.1%
Mentor Graphics	4.4	.6	1.9	21	9.9%	2.7%	15.3%	1.3%
Cadence	3.1	.0	2.2	0	7.0%	.0%	17.7%	.0%
Synopsys	1.2	.0	.8	0	2.6%	.0%	6.5%	.0%
Star Informatic	.9	.2	.6	12	1.9%	.8%	4.4%	.7%
Autodesk	.6	.0	.6	0	1.4%	.0%	5.0%	.0%
Silicon Graphics	.6	.5	.0	17	1.4%	2.3%	.0%	1.0%
Viewlogic Systems	.5	.0	.4	0	1.2%	.0%	3.4%	.0%
Racal-Redac	.5	.1	.2	3	1.2%	.3%	1.8%	.2%
Other Companies	5.3	1.4	3.0	332	12.1%	6.0%	23.8%	20.3%
All Companies	44.3	22.7	12.5	1,635	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	41.8	22.3	10.8	1,614	94.4%	98.6%	86.1%	98.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	2.5	.3	1.7	21	5.6%	1.4%	13.9%	1.3%
All Hardware Companies	25.2	20.9	.0	1,540	56.9%	92.3%	.0%	94.2%
All Turnkey & SW Companies	19.1	1.7	12.5	95	43.1%	7.7%	100.0%	5.8%

Source: Dataquest (July 1994)

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Table 16
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	3.0	2.3	.0	98	24.0%	32.1%	.0%	38.9%
Digital	2.2	1.7	.0	33	18.1%	23.9%	.0%	12.9%
IBM	2.0	1.8	.0	56	15.9%	24.7%	.0%	22.1%
Cadence	1.9	.0	1.3	0	15.1%	.0%	57.9%	.0%
Mentor Graphics	1.5	.2	.7	7	12.2%	2.9%	28.5%	2.8%
Hewlett-Packard	1.3	1.1	.0	51	10.8%	15.5%	.0%	20.4%
Other Companies	.2	.1	.1	7	1.3%	.7%	3.5%	2.6%
All Companies	12.3	7.3	2.3	252	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	12.3	7.3	2.3	252	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	8.6	7.1	.0	245	69.6%	97.1%	.0%	97.1%
All Turnkey & SW Companies	3.7	.2	2.3	7	30.4%	2.9%	100.0%	2.9%

Source: Dataquest (July 1994)

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Table 17
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Italy
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Hewlett-Packard	3.1	2.7	.0	145	19.7%	32.1%	.0%	20.5%
IBM	2.5	1.7	.5	169	15.7%	20.2%	13.3%	23.9%
Mentor Graphics	2.4	.3	1.1	11	15.1%	4.1%	25.8%	1.6%
Digital	2.0	1.5	.0	57	12.4%	18.6%	.0%	8.1%
Harris EDA	1.5	.1	.9	7	9.2%	1.5%	21.4%	1.0%
Sun Microsystems	.8	.6	.0	33	5.1%	7.6%	.0%	4.6%
Computervision	.6	.1	.2	9	3.9%	1.7%	4.4%	1.3%
Racal-Redac	.6	.1	.3	3	3.5%	.7%	6.4%	.4%
Other Companies	1.0	1.1	.0	254	6.6%	13.0%	.0%	36.1%
All Companies	15.8	8.3	4.1	705	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	14.8	8.2	3.4	693	93.7%	99.3%	82.8%	98.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.0	.1	.7	13	6.3%	.7%	17.2%	1.8%
All Hardware Companies	8.2	7.0	.0	650	51.7%	85.1%	.0%	92.1%
All Turnkey & SW Companies	7.7	1.2	4.1	56	48.3%	14.9%	100.0%	7.9%

Source: Dataquest (July 1994)

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Dataquest

Software

CAD/CAM/CAE and GIS Germany Market Share Update

Market Statistics

1994

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Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9406
Publication Date: July 19, 1994

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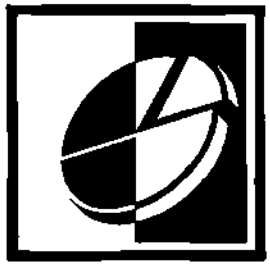

Market Statistics

1994

Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9406
Publication Date: July 19, 1994

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Note: All tables show estimated data.

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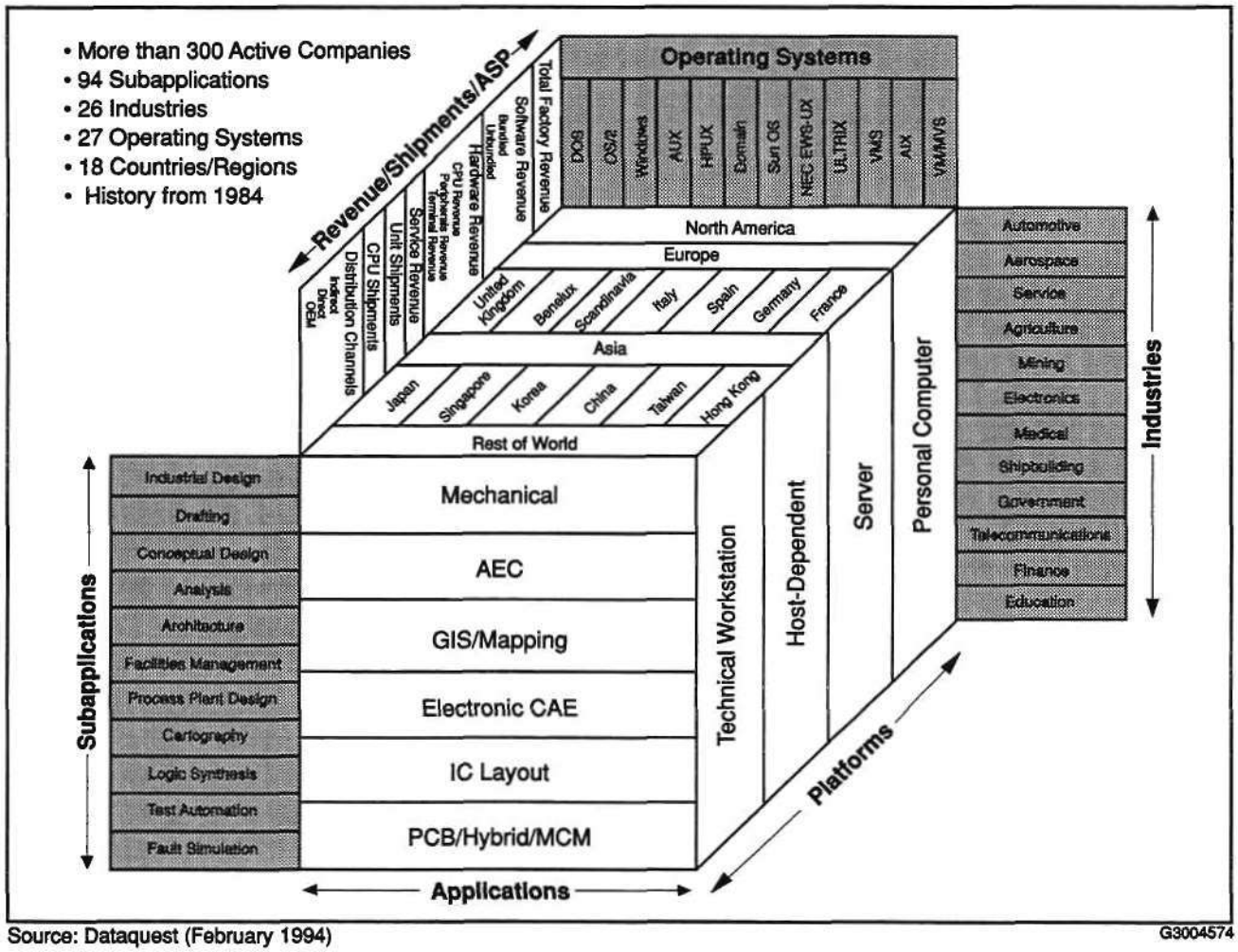
CAD/CAM/CAE and GIS Germany Market Share Update

Introduction

CAD/CAM/CAE/GIS systems have dramatically changed the methods by which designers and production managers originate and implement products. CAD and CAE systems allow designers to create, draft, analyze, test, and manipulate products on a screen in two and three dimensions. As CAD/CAM/CAE/GIS systems continue to decrease in cost, they become more available and cost justifiable to new users.

In order to provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure 1.

Figure 1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (February 1994)

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Table 1
CAD/CAM/CAE/GIS 1992-1993 Market Summary

	Software Revenue 1992 ($M)	Software Revenue 1993 ($M)	Growth Rate (%)	Total Revenue 1992 ($M)	Total Revenue 1993 ($M)	Growth Rate (%)	Hardware Unit Shipments 1992	Hardware Unit Shipments 1993	Growth Rate (%)
Application									
Mechanical	2,170.4	2,294.7	5.7	7,988.2	7,862.7	-1.6	302,347	303,364	0.3
AEC	746.9	794.1	6.3	2,356.5	2,444.0	3.7	178,629	198,075	10.9
GIS/Mapping	580.1	662.2	14.2	2,005.6	2,179.1	8.7	86,513	102,624	18.6
Electronic CAE	741.5	797.1	7.5	2,086.4	2,271.7	8.9	94,176	99,129	5.3
IC Layout	212.7	203.0	-4.6	628.4	676.4	7.6	9,771	13,049	33.5
PCB/Hybrid/MCM	265.9	271.2	2.0	870.9	900.2	3.4	35,110	38,030	8.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
Region									
North America	1,562.5	1,754.6	12.3	5,253.5	5,690.7	8.3	286,939	325,318	13.4
Europe	1,693.8	1,608.9	-5.0	5,755.5	5,432.7	-5.6	231,062	240,603	4.1
Asia	1,352.7	1,534.4	13.4	4,601.2	4,830.6	5.0	169,839	163,620	-3.7
Rest of World	108.5	124.3	14.6	325.9	380.2	16.7	18,706	24,730	32.2
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
In Local Currencies									
Europe (ECU)	1,301.8	1,378.2	5.9	4,423.7	4,653.7	5.2			
Asia (yen)	170,895	170,093	-0.5	581,318	535,468	-7.9			
Platform									
Technical Workstation	3,060.1	3,312.8	8.3	9,640.0	10,458.3	8.5	173,705	194,848	12.2
Host-Dependent	360.2	306.1	-15.0	2,436.6	1,754.7	-28.0	34,524	28,573	-17.2
Server	140.0	176.2	25.9	906.3	1,056.8	16.6	11,566	13,381	15.7
Personal Computer	1,157.1	1,227.1	6.1	2,953.2	3,064.4	3.8	486,751	517,469	6.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8

Source: Dataquest (July 1994)

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A companion article analyzing major shifts in the 1993 market was published in our *Dataquest Perspective*, dated June 27, 1994.

Table 1 summarizes the performance in various segments of the CAD/CAM/CAE/GIS markets in 1993 versus 1992. With the devaluation of the dollar against the yen (¥126.34/$ in 1992 versus ¥110.85/$ in 1993) and the appreciation of the dollar against the ECU (ECU 0.7686/$ in 1992 versus ECU 0.8566/$ in 1993), actual growth is not as it appears when denominated in U.S. dollars. With 75 percent of the Asian market in Japan, denominating in yen gives a rough indication of real growth in the Asian market, which was a negative 7.9 percent.

About This Document

This document contains Dataquest's detailed market share information on the CAD/CAM/CAE/GIS industry. We no longer publish worldwide all-application market statistics for the entire CAD/CAM/CAE/GIS industry. This data is available by calling Suzanne Snygg at (408) 437-8241. The category "Other Companies" is the aggregation of small companies. More detailed data on these markets may be requested through our Client Inquiry service.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

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Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic Computer-Aided Engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of products). Schematic capture and simulation are examples of electronic CAE applications.
- IC Layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/Hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe. Market share data is available for each of these countries.

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong. Market share data is available for each of these countries.

Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed

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by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

Metrics

The following paragraphs define measurements.

- Total factory revenue is defined as the amount of money received by a manufacturer for its goods and services measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue). Total factory revenue is the sum of software revenue, hardware revenue, and service revenue.
- Unit shipment is defined as the number of seats delivered (number of possible simultaneous users of product delivered) excluding OEM shipments.

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- Hardware revenue is revenue derived from sales of CPUs (including operating systems), terminals (for host-dependent systems), and peripherals.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled application software.
- Service revenue is defined as all revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
  - Maintenance fees for hardware and software
  - Management and operations services—help desk, education and training, disaster recovery, vaulting, and configuration management.
  - Service bureau—project work, including construction of database, data conversion, product design, analysis, or manufacturing.
  - Application development—design and development of customized software applications or the modification, enhancement, or customization of existing software applications, adding new functionality.
  - Consulting revenue—assessment of CAD/CAM/CAE/GIS business and information technology needs and the formulation of a plan based on needs identification.
  - Implementation and integration services—planning, implementation, migration, and integration of software products (software network support and integration, account integration management, data center design, and construction).

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year and second quarter of the subsequent year, we survey all participants in each industry. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contacts at large companies. (Dataquest maintains a large contact database on all sources of information.) The following are examples of the job titles of people contacted for information:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning

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- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE/GIS marketing programs
- Market research analyst

The Audit Process

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks
- Articles in both the general and trade press
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice; Dataquest also checks with multiple sources at one company to cross-check data on that company.

Dataquest analysts have many years of experience in how to apply the above tools to get the most accurate information possible on a particular company (such as what to use when and what industry averages are). We believe that the estimates presented here are the most accurate and meaningful generally available today. It is the CAD/CAM/CAE/GIS group's policy to continually update our market information for any year, based on any new data received, in order to arrive at the most accurate market representation possible.

Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

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Publishing Schedule

We publish both market share and forecasting twice each year, allowing for timely distribution of data and thorough analysis and forecasting. Our annual delivery schedule is as follows:

- Market share data is available January 31. All tables will be published and distributed to clients by March 31.
- Forecasting from the market share tables provides a five-year forecast period, available after March 31. The books will be shipped by May 31.
- Final updated market share tables, based on additional data collection and analysis, will be completed by May 31. At this point, the market share database is frozen and will not be changed until the end of the year. For the next six months, supplementary market data will be based on this final market data. Books will be shipped by July 31.
- We provide complete final forecast tables by July 31. These tables take into consideration changes in the market share during the previous six months. Books will be shipped by September 30.

Database Changes

Tables 2 through 5 show changes made to the database since last year's market share update. PC clone manufacturers are no longer tracked individually. We continue to show PC sales by IBM, Hewlett-Packard, and Digital, which also sell other platforms. The 1993 sales of GeoVision Systems to SHL Systemhouse, Computervision-GIS to Unisys, Racal-Redac to Zuken, Chronologic to Viewlogic, ASG to Softdesk, CDC's mechanical software product to ICEM Technologies, PDA to MacNeal-Schwendler, and Logic Modeling Corporation to Synopsys; the merger of Sysdeco and SysScan; and the change of GDS to Convergent Group will be recognized in market reporting for 1994.

Table 2
Companies Renamed

Company Name	Renamed to:
Alper Systems	Sysdeco Ltd.
Areon	Kreon
CADAM	Altium
Catalpa	Catalpa groupe Missler
Geotrace Technologies	Cadlynx
Logic Control	Logic Systems Designers
RIB/RZB	RIB Bausoftware
Sener Sistemas Marinos	Sener Inginiera y Sistemas
STI Strassle	Strassle Informationssysteme
Test Systems Strategies	Summitt

Source: Dataquest (July 1994)

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Table 3
Companies (or CAD Portions Thereof) Sold/Merged

Company Name	Acquired by, Merged with, Technology Sold to:
ANACAD & Electrical Eng. Software	ANACAD-EES
Aries Technology	MacNeal-Schwendler
CAD Language Systems	Compass Design Automation
CAD/CAM Group	Data I/O
Comdisco	Cadence
DAT Standard info ssystemes	ISD Software
EEsof	Hewlett-Packard
Expertest	Sunrise Test
Fides Industrielle Automation	Strassle
HP Cade	Hewlett-Packard
Inca	Zycad
Infocel	Understanding Systems
PiE Design	Quickturn Design Systems
Quad Design Technology	Viewlogic
Wisdom Systems	ICAD

Source: Dataquest (July 1994)

Table 4
Companies Deleted

Company Removed from Database:
European
Asicom
Club Informatico SA
DATAID Technologies
DECISA
Micrograph
Olivetti*
Research Machines*
North American
Bechtel
CADLYNX
Compaq*
Dell Computer*
Engineering Systems Corporation
GeoQuest
Mega CADD
NCR Microelectronics
Object Design
Objectivity
Ontos
Quicklogic
The CAD Group
Ultimap

*We no longer follow individual PC clone makers.
Source: Dataquest (July 1994)

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Table 5
Companies Added

Company Added to Database:
European
APIC Systemes
ISD Software
SPEED
Ultimate Technology
North American
AT&T
Aptix
ARC SYS
EAGLE Point
Earth Resource Mapping
Graftek
Graphic Data Systems (GDS)
Model Technology
Systems Science Inc.
Tactics Int'l Ltd.
VLSI Libraries
Asian
Adam Net
Kozo
Okura
Tachnodia
TECHSPERT
Toshiba Engineering
Yokogawa Digital Computer

Source: Dataquest (July 1994)

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Table 6
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	353.6	238.0	59.7	15,839	18.1%	23.8%	10.4%	17.3%
Hewlett-Packard	184.6	132.4	17.8	7,087	9.4%	13.3%	3.1%	7.8%
Siemens Nixdorf Info systeme	157.1	66.6	43.6	4,972	8.0%	6.7%	7.6%	5.4%
Digital	127.3	100.9	.0	5,151	6.5%	10.1%	.0%	5.6%
Computervision	90.8	20.6	27.7	1,255	4.6%	2.1%	4.8%	1.4%
Sun Microsystems	88.2	70.2	.0	3,182	4.5%	7.0%	.0%	3.5%
Intergraph	81.0	29.5	27.9	1,291	4.1%	3.0%	4.9%	1.4%
Nemetschek	66.8	20.2	40.7	1,632	3.4%	2.0%	7.1%	1.8%
Autodesk	37.0	.0	37.0	0	1.9%	.0%	6.5%	.0%
Mentor Graphics	31.2	4.4	13.7	149	1.6%	.4%	2.4%	.2%
Wiechers Datentechnik	28.9	7.9	15.3	588	1.5%	.8%	2.7%	.6%
IEZ	28.7	9.7	14.8	689	1.5%	1.0%	2.6%	.8%
Dassault*	27.8	.0	24.2	0	1.4%	.0%	4.2%	.0%
Silicon Graphics	26.3	23.0	.0	700	1.3%	2.3%	.0%	.8%
ASCAD/ASCAM	25.9	15.3	8.0	401	1.3%	1.5%	1.4%	.4%
Control Data Systems	25.6	13.4	5.1	365	1.3%	1.3%	.9%	.4%
Cadence	20.8	.0	14.9	0	1.1%	.0%	2.6%	.0%
EDS Unigraphics	18.9	5.6	9.0	287	1.0%	.6%	1.6%	.3%
Matra Datavision	18.8	6.3	10.6	346	1.0%	.6%	1.8%	.4%
Straessle Informationssysteme	18.7	2.7	11.7	282	1.0%	.3%	2.0%	.3%
Applicon	18.5	6.1	7.2	204	.9%	.6%	1.3%	.2%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ISD Software	13.8	2.9	8.7	457	.7%	.3%	1.5%	.5%
SDRC	12.8	.0	8.8	0	.7%	.0%	1.5%	.0%
Isicad CAD/CAM Systeme	12.6	4.2	5.5	202	.6%	.4%	1.0%	.2%
Digital Kienzle	12.1	6.0	3.4	183	.6%	.6%	.6%	.2%
Microway	11.8	7.1	3.6	129	.6%	.7%	.6%	.1%
Han Dataport	11.1	3.2	5.7	342	.6%	.3%	1.0%	.4%
Racal-Redac	11.1	1.4	5.1	55	.6%	.1%	.9%	.1%
Soft-Tech Software Technologies	10.9	1.2	8.7	593	.6%	.1%	1.5%	.6%
Synopsys	10.7	.0	7.4	0	.5%	.0%	1.3%	.0%
Ziegler Informatics	10.7	.0	10.7	0	.5%	.0%	1.9%	.0%
Parametric Technology	9.9	.0	8.1	0	.5%	.0%	1.4%	.0%
Technische Computer Systeme	8.6	1.6	6.1	163	.4%	.2%	1.1%	.2%
Marcus Computer Systeme	8.5	4.3	2.9	0	.4%	.4%	.5%	.0%
Smallworld Systems	8.3	.4	5.0	15	.4%	.0%	.9%	.0%
Exapt	7.6	3.7	2.7	147	.4%	.4%	.5%	.2%
Cimatron	7.6	3.4	3.5	279	.4%	.3%	.6%	.3%
Altium*	7.4	.0	7.0	0	.4%	.0%	1.2%	.0%
RIB/Bausoftware	7.4	.6	6.0	48	.4%	.1%	1.1%	.1%
Aucotec	7.3	2.0	3.7	289	.4%	.2%	.6%	.3%
Tebis	7.0	1.8	1.0	46	.4%	.2%	.2%	.1%
Kohns & Poppenhaeger	6.6	3.0	2.6	76	.3%	.3%	.5%	.1%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Complansoft CAD	6.2	3.1	3.1	148	.3%	.3%	.5%	.2%
Apple Computer	5.9	5.9	.0	1,233	.3%	.6%	.0%	1.4%
debis Systemhaus	5.8	1.3	3.8	39	.3%	.1%	.7%	.0%
ESRI	5.8	.0	4.7	0	.3%	.0%	.8%	.0%
Cisigraph	5.6	1.5	2.9	83	.3%	.2%	.5%	.1%
Investronica SA	5.4	3.4	1.4	183	.3%	.3%	.2%	.2%
mb Programme	5.3	2.2	2.2	120	.3%	.2%	.4%	.1%
Hochtief	4.9	.8	2.3	60	.2%	.1%	.4%	.1%
MacNeal-Schwendler	4.8	.0	4.6	0	.2%	.0%	.8%	.0%
Cadtronic*	3.9	1.9	2.0	117	.2%	.2%	.3%	.1%
Triplan	3.9	1.6	2.0	58	.2%	.2%	.3%	.1%
Kockums Computer Systems	3.5	.9	.6	163	.2%	.1%	.1%	.2%
PDA Engineering	3.3	.0	3.1	0	.2%	.0%	.5%	.0%
Kloeckner-Moeller	3.2	.7	2.1	30	.2%	.1%	.4%	.0%
ADRA Systems	3.2	.2	2.3	11	.2%	.0%	.4%	.0%
ISKA	3.0	1.3	1.2	54	.2%	.1%	.2%	.1%
COMPASS Design Automation	2.7	.0	2.2	0	.1%	.0%	.4%	.0%
Viewlogic Systems	2.7	.0	2.1	0	.1%	.0%	.4%	.0%
Swanson Analysis	2.4	.0	2.1	0	.1%	.0%	.4%	.0%
ICL	2.1	1.2	.7	59	.1%	.1%	.1%	.1%
GDS	2.0	.9	.9	32	.1%	.1%	.2%	.0%

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cimlinc	2.0	.1	1.0	5	.1%	.0%	.2%	.0%
CAD-UL	1.9	.0	1.9	0	.1%	.0%	.3%	.0%
CAD Centre	1.9	.2	1.2	9	.1%	.0%	.2%	.0%
Graphisoft Software Dev	1.8	.0	1.8	0	.1%	.0%	.3%	.0%
Sinus Software	1.7	.9	.6	40	.1%	.1%	.1%	.0%
Harris EDA	1.6	.1	1.0	9	.1%	.0%	.2%	.0%
Sagantec	1.6	.0	1.5	0	.1%	.0%	.3%	.0%
ISDATA	1.4	.0	1.3	0	.1%	.0%	.2%	.0%
Gerber Systems	1.4	.7	.6	23	.1%	.1%	.1%	.0%
Delcam International	1.4	.5	.6	17	.1%	.0%	.1%	.0%
Ground Modelling Systems	1.4	.8	.5	138	.1%	.1%	.1%	.2%
ANACAD EES	1.3	.0	1.3	0	.1%	.0%	.2%	.0%
Zycad	1.2	.7	.2	16	.1%	.1%	.0%	.0%
Mucke Software	1.2	.5	.5	25	.1%	.0%	.1%	.0%
RoboCAD Solutions	1.2	.0	.9	0	.1%	.0%	.2%	.0%
MCS	.9	.0	.8	5	.0%	.0%	.1%	.0%
PAFEC	.9	.3	.5	12	.0%	.0%	.1%	.0%
Aucos elektronische Gerate	.8	.3	.6	85	.0%	.0%	.1%	.1%
MEDESIGN	.8	.2	.3	9	.0%	.0%	.1%	.0%
Clemessy Geocity	.8	.4	.2	4	.0%	.0%	.0%	.0%
Star Informatic	.6	.1	.4	10	.0%	.0%	.1%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
CAD Distribution	.6	.0	.5	3	.0%	.0%	.1%	.0%
Other Companies	158.7	145.9	2.2	40,972	8.1%	14.6%	.4%	44.9%
All Companies	1,956.6	998.6	573.3	91,306	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1,387.3	804.6	310.3	78,145	70.9%	80.6%	54.1%	85.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	569.3	194.1	263.0	13,161	29.1%	19.4%	45.9%	14.4%
All Hardware Companies	636.3	559.8	.0	69,822	32.5%	56.1%	.0%	76.5%
All Turnkey & SW Companies	1,320.4	438.9	573.3	21,484	67.5%	43.9%	100.0%	23.5%

*Contains reseller or OEM revenue; All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 7
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	203.6	139.9	31.0	3,927	16.2%	24.1%	8.2%	16.8%
Hewlett-Packard	174.3	123.7	17.3	4,794	13.9%	21.3%	4.6%	20.5%
Siemens Nixdorf Info systeme	137.3	49.6	42.5	2,152	10.9%	8.6%	11.3%	9.2%
Computervision	89.3	20.4	26.6	1,228	7.1%	3.5%	7.1%	5.3%
Sun Microsystems	75.2	59.4	.0	2,942	6.0%	10.2%	.0%	12.6%
Intergraph	67.8	24.9	22.6	887	5.4%	4.3%	6.0%	3.8%
Digital	31.2	24.2	.0	1,242	2.5%	4.2%	.0%	5.3%
Mentor Graphics	31.2	4.4	13.7	149	2.5%	.8%	3.6%	.6%
IEZ	28.7	9.7	14.8	689	2.3%	1.7%	3.9%	3.0%
ASCAD/ASCAM	25.1	14.8	7.8	380	2.0%	2.6%	2.1%	1.6%
Silicon Graphics	22.3	19.6	.0	658	1.8%	3.4%	.0%	2.8%
Cadence	19.5	.0	13.9	0	1.5%	.0%	3.7%	.0%
Straessle Informationssysteme	18.7	2.7	11.7	282	1.5%	.5%	3.1%	1.2%
Applicon	18.5	6.1	7.2	204	1.5%	1.1%	1.9%	.9%
Matra Datavision	18.4	6.2	10.3	305	1.5%	1.1%	2.7%	1.3%
Control Data Systems	15.7	7.7	4.2	249	1.2%	1.3%	1.1%	1.1%
EDS Unigraphics	15.1	4.5	7.2	246	1.2%	.8%	1.9%	1.1%
Dassault*	14.9	.0	12.9	0	1.2%	.0%	3.4%	.0%
Nemetschek	14.0	4.2	8.5	166	1.1%	.7%	2.3%	.7%
Wiechers Datentechnik	13.8	4.8	6.2	333	1.1%	.8%	1.6%	1.4%
SDRC	12.7	.0	8.7	0	1.0%	.0%	2.3%	.0%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ISD Software	12.4	2.9	7.4	457	1.0%	.5%	2.0%	2.0%
Digital Kienzle	12.1	6.0	3.4	183	1.0%	1.0%	.9%	.8%
Isicad CAD/CAM Systeme	11.9	4.2	4.8	202	.9%	.7%	1.3%	.9%
Synopsys	10.7	.0	7.4	0	.9%	.0%	2.0%	.0%
Racal-Redac	9.5	1.4	4.2	55	.8%	.2%	1.1%	.2%
Parametric Technology	9.4	.0	7.7	0	.7%	.0%	2.0%	.0%
Han Dataport	9.4	2.6	4.8	272	.7%	.4%	1.3%	1.2%
Microway	8.7	5.3	2.7	86	.7%	.9%	.7%	.4%
Marcus Computer Systeme	8.5	4.3	2.9	0	.7%	.7%	.8%	.0%
Smallworld Systems	8.3	.4	5.0	15	.7%	.1%	1.3%	.1%
Kohns & Poppenhaeger	6.6	3.0	2.6	76	.5%	.5%	.7%	.3%
Complansoft CAD	6.2	3.1	3.1	148	.5%	.5%	.8%	.6%
Technische Computer Systeme	5.2	1.0	3.5	57	.4%	.2%	.9%	.2%
Cisigraph	5.0	1.4	2.7	80	.4%	.2%	.7%	.3%
debis Systemhaus	4.6	1.0	3.0	22	.4%	.2%	.8%	.1%
Triplan	3.9	1.6	2.0	58	.3%	.3%	.5%	.2%
Cimatron	3.6	1.6	1.7	74	.3%	.3%	.4%	.3%
Kockums Computer Systems	3.5	.9	.6	163	.3%	.2%	.2%	.7%
ISKA	3.0	1.3	1.2	54	.2%	.2%	.3%	.2%
PDA Engineering	3.0	.0	2.8	0	.2%	.0%	.7%	.0%
COMPASS Design Automation	2.7	.0	2.2	0	.2%	.0%	.6%	.0%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ESRI	2.3	.0	1.8	0	.2%	.0%	.5%	.0%
Exapt	2.3	1.1	.8	78	.2%	.2%	.2%	.3%
RIB/Bausoftware	2.3	.2	1.9	12	.2%	.0%	.5%	.1%
ADRA Systems	2.3	.2	1.6	11	.2%	.0%	.4%	.0%
ICL	2.1	1.2	.7	59	.2%	.2%	.2%	.3%
GDS	2.0	.9	.9	32	.2%	.2%	.2%	.1%
Cimlinc	1.9	.1	.9	4	.1%	.0%	.2%	.0%
Autodesk	1.9	.0	1.9	0	.1%	.0%	.5%	.0%
CAD Centre	1.9	.2	1.2	9	.1%	.0%	.3%	.0%
Aucotec	1.8	.4	.9	35	.1%	.1%	.2%	.1%
Viewlogic Systems	1.7	.0	1.2	0	.1%	.0%	.3%	.0%
Sinus Software	1.7	.9	.6	40	.1%	.2%	.2%	.2%
Sagantec	1.6	.0	1.5	0	.1%	.0%	.4%	.0%
Swanson Analysis	1.5	.0	1.3	0	.1%	.0%	.4%	.0%
MacNeal-Schwendler	1.5	.0	1.2	0	.1%	.0%	.3%	.0%
Gerber Systems	1.4	.7	.6	23	.1%	.1%	.2%	.1%
Harris EDA	1.4	.1	.8	6	.1%	.0%	.2%	.0%
Delcam International	1.3	.4	.6	16	.1%	.1%	.1%	.1%
ANACAD EES	1.2	.0	1.2	0	.1%	.0%	.3%	.0%
Zycad	.8	.5	.1	12	.1%	.1%	.0%	.1%
MEDESIGN	.8	.2	.3	9	.1%	.0%	.1%	.0%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
PAFEC	.8	.3	.4	12	.1%	.0%	.1%	.0%
Clemessy Geocity	.8	.4	.2	4	.1%	.1%	.0%	.0%
Star Informatic	.6	.1	.4	8	.0%	.0%	.1%	.0%
Other Companies	19.9	3.3	8.8	116	1.6%	.6%	2.3%	.5%
All Companies	1,256.5	580.2	376.4	23,339	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	867.7	444.8	211.5	16,938	69.1%	76.7%	56.2%	72.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	388.8	135.5	165.0	6,401	30.9%	23.3%	43.8%	27.4%
All Hardware Companies	317.9	268.2	.0	10,898	25.3%	46.2%	.0%	46.7%
All Turnkey & SW Companies	938.5	312.0	376.4	12,441	74.7%	53.8%	100.0%	53.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 8
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	86.9	50.2	17.6	1,495	43.9%	37.2%	66.5%	44.8%
Digital	41.6	32.4	.0	0	21.0%	24.0%	.0%	.0%
Dassault*	9.4	.0	8.3	0	4.7%	.0%	31.2%	.0%
Control Data Systems	8.9	5.1	.7	106	4.5%	3.8%	2.8%	3.2%
Exapt	5.3	2.6	1.9	68	2.7%	1.9%	7.1%	2.0%
Siemens Nixdorf Info systeme	3.9	1.7	1.1	60	2.0%	1.3%	4.0%	1.8%
MacNeal-Schwendler	3.4	.0	3.4	0	1.7%	.0%	12.8%	.0%
debis Systemhaus	.6	.1	.4	2	.3%	.1%	1.6%	.1%
Other Companies	37.0	42.8	.0	1,601	18.7%	31.7%	.0%	48.0%
All Companies	197.9	134.9	26.5	3,337	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	187.9	130.4	23.0	3,206	94.9%	96.7%	86.8%	96.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	10.0	4.5	3.5	131	5.1%	3.3%	13.2%	3.9%
All Hardware Companies	90.7	78.3	.0	1,667	45.8%	58.0%	.0%	50.0%
All Turnkey & SW Companies	107.2	56.6	26.5	1,670	54.2%	42.0%	100.0%	50.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 9
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	43.1	33.5	.0	424	42.5%	50.2%	.0%	36.8%
IBM	19.1	11.2	4.0	221	18.8%	16.8%	32.2%	19.2%
Sun Microsystems	13.0	10.8	.0	240	12.9%	16.2%	.0%	20.9%
Intergraph	6.6	2.6	2.0	81	6.6%	3.9%	15.9%	7.0%
Silicon Graphics	3.9	3.3	.0	42	3.9%	5.0%	.0%	3.6%
EDS Unigraphics	3.8	1.2	1.8	41	3.7%	1.7%	14.0%	3.5%
Dassault*	3.6	.0	3.1	0	3.5%	.0%	24.5%	.0%
ESRI	2.3	.0	1.8	0	2.3%	.0%	14.2%	.0%
Hewlett-Packard	2.0	1.6	.0	30	2.0%	2.5%	.0%	2.6%
Cadence	1.4	.0	1.0	0	1.4%	.0%	7.8%	.0%
Han Dataport	1.1	.5	.4	32	1.1%	.7%	3.4%	2.8%
Control Data Systems	1.0	.5	.1	10	1.0%	.8%	.8%	.8%
Cisigraph	.6	.2	.3	4	.6%	.2%	2.3%	.3%
Other Companies	.0	.9	.0	17	.0%	1.3%	.0%	1.4%
All Companies	101.2	66.7	12.6	1,151	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	99.4	66.0	11.7	1,115	98.2%	99.0%	93.3%	96.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.8	.7	.8	36	1.8%	1.0%	6.7%	3.1%
All Hardware Companies	65.4	52.3	.0	800	64.6%	78.4%	.0%	69.5%
All Turnkey & SW Companies	35.8	14.4	12.6	351	35.4%	21.6%	100.0%	30.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 10
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Nemetschek	52.8	16.0	32.1	1,466	13.2%	7.4%	20.4%	2.3%
IBM	44.1	36.7	7.0	10,196	11.0%	16.9%	4.4%	16.1%
Autodesk	35.2	.0	35.2	0	8.8%	.0%	22.3%	.0%
Siemens Nixdorf Info systeme	16.0	15.2	.0	2,761	4.0%	7.0%	.0%	4.4%
Wiechers Datentechnik	15.1	3.0	9.1	255	3.8%	1.4%	5.7%	.4%
Digital	11.5	10.9	.0	3,486	2.9%	5.0%	.0%	5.5%
Soft-Tech Software Technologies	10.9	1.2	8.7	593	2.7%	.5%	5.5%	.9%
Ziegler Informatics	10.7	.0	10.7	0	2.7%	.0%	6.8%	.0%
Hewlett-Packard	8.3	7.1	.5	2,263	2.1%	3.3%	.3%	3.6%
Altium*	7.4	.0	7.0	0	1.8%	.0%	4.4%	.0%
Tebis	7.0	1.8	1.0	46	1.7%	.8%	.7%	.1%
Intergraph	6.6	2.0	3.3	323	1.6%	.9%	2.1%	.5%
Apple Computer	5.9	5.9	.0	1,233	1.5%	2.7%	.0%	1.9%
Aucotec	5.5	1.6	2.7	254	1.4%	.8%	1.7%	.4%
Investronica SA	5.4	3.4	1.4	183	1.3%	1.5%	.9%	.3%
mb Programme	5.3	2.2	2.2	120	1.3%	1.0%	1.4%	.2%
RIB/Bausoftware	5.1	.4	4.2	36	1.3%	.2%	2.6%	.1%
Hochtief	4.8	.8	2.3	59	1.2%	.4%	1.5%	.1%
Cimatron	4.0	1.8	1.8	205	1.0%	.8%	1.1%	.3%
Cadtronic*	3.9	1.9	2.0	117	1.0%	.9%	1.3%	.2%
Technische Computer Systeme	3.5	.6	2.7	106	.9%	.3%	1.7%	.2%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Kloeckner-Moeller	3.2	.7	2.1	30	.8%	.3%	1.4%	.0%
Microway	3.1	1.8	.9	43	.8%	.8%	.6%	.1%
Graphisoft Software Dev	1.8	.0	1.8	0	.5%	.0%	1.2%	.0%
Racal-Redac	1.6	.0	1.0	0	.4%	.0%	.6%	.0%
CAD-UL	1.5	.0	1.5	0	.4%	.0%	1.0%	.0%
ISD Software	1.4	.0	1.4	0	.3%	.0%	.9%	.0%
Ground Modelling Systems	1.4	.8	.5	138	.3%	.3%	.3%	.2%
ESRI	1.2	.0	1.1	0	.3%	.0%	.7%	.0%
Mucke Software	1.2	.5	.5	25	.3%	.2%	.3%	.0%
RoboCAD Solutions	1.2	.0	.9	0	.3%	.0%	.6%	.0%
Computervision	1.1	.0	1.1	23	.3%	.0%	.7%	.0%
Viewlogic Systems	.9	.0	.9	0	.2%	.0%	.6%	.0%
ISDATA	.9	.0	.8	0	.2%	.0%	.5%	.0%
ADRA Systems	.9	.0	.7	0	.2%	.0%	.4%	.0%
Aucos elektronische Gerate	.8	.3	.6	85	.2%	.1%	.4%	.1%
ASCAD/ASCAM	.8	.5	.2	21	.2%	.2%	.2%	.0%
Isicad CAD/CAM Systeme	.7	.0	.7	0	.2%	.0%	.5%	.0%
Han Dataport	.7	.1	.5	38	.2%	.1%	.3%	.1%
debis Systemhaus	.7	.2	.4	15	.2%	.1%	.2%	.0%
Swanson Analysis	.6	.0	.6	0	.2%	.0%	.4%	.0%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
CAD Distribution	.6	.0	.5	3	.1%	.0%	.3%	.0%
Other Companies	103.1	98.9	3.2	39,239	25.7%	45.6%	2.0%	61.8%
All Companies	401.0	216.9	157.8	63,479	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	232.3	163.4	64.1	56,885	57.9%	75.3%	40.6%	89.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	168.7	53.5	93.7	6,594	42.1%	24.7%	59.4%	10.4%
All Hardware Companies	162.3	161.0	.0	56,458	40.5%	74.2%	.0%	88.9%
All Turnkey & SW Companies	238.8	55.9	157.8	7,021	59.5%	25.8%	100.0%	11.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 11
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	240.8	144.4	51.5	7,140	23.7%	27.1%	19.3%	21.0%
Hewlett-Packard	124.2	84.5	14.5	4,217	12.2%	15.8%	5.4%	12.4%
Computervision	84.9	19.2	25.9	1,170	8.3%	3.6%	9.7%	3.4%
Digital	82.4	65.4	.0	2,943	8.1%	12.3%	.0%	8.6%
Siemens Nixdorf Info systeme	57.8	28.4	11.0	2,690	5.7%	5.3%	4.1%	7.9%
ASCAD/ASCAM	25.9	15.3	8.0	401	2.5%	2.9%	3.0%	1.2%
Dassault*	25.3	.0	22.0	0	2.5%	.0%	8.3%	.0%
Control Data Systems	24.7	12.7	5.1	342	2.4%	2.4%	1.9%	1.0%
Silicon Graphics	23.2	20.3	.0	614	2.3%	3.8%	.0%	1.8%
Intergraph	22.5	8.1	7.1	315	2.2%	1.5%	2.7%	.9%
Sun Microsystems	22.4	18.0	.0	735	2.2%	3.4%	.0%	2.2%
EDS Unigraphics	18.9	5.6	9.0	287	1.9%	1.1%	3.4%	.8%
Matra Datavision	18.7	6.3	10.5	345	1.8%	1.2%	3.9%	1.0%
Applicon	18.5	6.1	7.2	204	1.8%	1.1%	2.7%	.6%
Wiechers Datentechnik	15.3	3.3	9.0	270	1.5%	.6%	3.4%	.8%
Autodesk	14.8	.0	14.8	0	1.5%	.0%	5.6%	.0%
Straessle Informationssysteme	14.6	2.4	8.8	249	1.4%	.5%	3.3%	.7%
ISD Software	13.8	2.9	8.7	457	1.4%	.5%	3.3%	1.3%
SDRC	12.8	.0	8.8	0	1.3%	.0%	3.3%	.0%
Digital Kienzle	12.1	6.0	3.4	183	1.2%	1.1%	1.3%	.5%
Isicad CAD/CAM Systeme	10.4	3.6	4.1	176	1.0%	.7%	1.6%	.5%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Parametric Technology	9.9	.0	8.1	0	1.0%	.0%	3.0%	.0%
Marcus Computer Systeme	8.5	4.3	2.9	0	.8%	.8%	1.1%	.0%
Exapt	7.6	3.7	2.7	147	.8%	.7%	1.0%	.4%
Cimatron	7.6	3.4	3.5	279	.7%	.6%	1.3%	.8%
Tebis	7.0	1.8	1.0	46	.7%	.3%	.4%	.1%
Altium*	5.9	.0	5.6	0	.6%	.0%	2.1%	.0%
Cisigraph	5.6	1.5	2.9	83	.5%	.3%	1.1%	.2%
Investronica SA	5.4	3.4	1.4	183	.5%	.6%	.5%	.5%
MacNeal-Schwendler	4.7	.0	4.5	0	.5%	.0%	1.7%	.0%
Ziegler Informatics	4.3	.0	4.3	0	.4%	.0%	1.6%	.0%
PDA Engineering	3.3	.0	3.1	0	.3%	.0%	1.2%	.0%
ADRA Systems	3.2	.2	2.3	11	.3%	.0%	.9%	.0%
debis Systemhaus	3.0	.7	2.0	22	.3%	.1%	.7%	.1%
Han Dataport	3.0	.9	1.6	91	.3%	.2%	.6%	.3%
Technische Computer Systeme	2.6	.5	1.8	49	.3%	.1%	.7%	.1%
Swanson Analysis	2.4	.0	2.1	0	.2%	.0%	.8%	.0%
Kloeckner-Moeller	2.2	.5	1.4	0	.2%	.1%	.5%	.0%
ISKA	2.1	.9	.9	39	.2%	.2%	.3%	.1%
Cimlinc	2.0	.1	1.0	5	.2%	.0%	.4%	.0%
Apple Computer	1.9	1.9	.0	403	.2%	.4%	.0%	1.2%
Gerber Systems	1.4	.7	.6	23	.1%	.1%	.2%	.1%

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Delcam International	1.4	.5	.6	17	.1%	.1%	.2%	.1%
Cadtronic*	1.0	.6	.4	37	.1%	.1%	.1%	.1%
MCS	.9	.0	.8	5	.1%	.0%	.3%	.0%
ICL	.7	.4	.2	19	.1%	.1%	.1%	.1%
CAD Distribution	.6	.0	.5	3	.1%	.0%	.2%	.0%
PAFEC	.6	.2	.3	7	.1%	.0%	.1%	.0%
Other Companies	33.7	54.5	.0	9,796	3.3%	10.2%	.0%	28.8%
All Companies	1,017.9	533.3	266.6	34,045	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	795.9	445.9	177.9	28,430	78.2%	83.6%	66.7%	83.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	222.1	87.4	88.8	5,615	21.8%	16.4%	33.3%	16.5%
All Hardware Companies	289.0	251.2	.0	22,093	28.4%	47.1%	.0%	64.9%
All Turnkey & SW Companies	729.0	282.1	266.6	11,952	71.6%	52.9%	100.0%	35.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 12
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Nemetschek	66.8	20.2	40.7	1,632	16.1%	9.5%	27.5%	4.5%
IBM	55.3	43.2	5.8	4,785	13.3%	20.3%	4.0%	13.1%
Intergraph	38.5	14.5	12.2	718	9.3%	6.8%	8.3%	2.0%
IEZ	28.7	9.7	14.8	689	6.9%	4.6%	10.0%	1.9%
Siemens Nixdorf Info systeme	20.0	10.8	2.9	932	4.8%	5.1%	1.9%	2.6%
Autodesk	15.9	.0	15.9	0	3.8%	.0%	10.8%	.0%
Hewlett-Packard	12.4	10.6	.0	738	3.0%	5.0%	.0%	2.0%
Wiechers Datentechnik	12.3	4.3	5.5	296	3.0%	2.0%	3.7%	.8%
Microway	11.1	6.7	3.4	122	2.7%	3.1%	2.3%	.3%
Soft-Tech Software Technologies	10.9	1.2	8.7	593	2.6%	.6%	5.9%	1.6%
Han Dataport	8.1	2.4	4.2	250	2.0%	1.1%	2.8%	.7%
Digital	7.4	6.4	.0	1,097	1.8%	3.0%	.0%	3.0%
Complansoft CAD	6.2	3.1	3.1	148	1.5%	1.4%	2.1%	.4%
RIB/Bausoftware	5.8	.4	4.8	30	1.4%	.2%	3.2%	.1%
mb Programme	5.3	2.2	2.2	120	1.3%	1.0%	1.5%	.3%
Technische Computer Systeme	5.2	1.0	3.7	98	1.2%	.5%	2.5%	.3%
Hochtief	4.9	.8	2.3	60	1.2%	.4%	1.6%	.2%
Kockums Computer Systems	3.5	.9	.6	163	.8%	.4%	.4%	.4%
Apple Computer	3.5	3.5	.0	735	.8%	1.6%	.0%	2.0%
Computervision	3.4	.8	1.0	49	.8%	.4%	.7%	.1%
Triplan	3.2	1.3	1.6	47	.8%	.6%	1.1%	.1%
Cadtronic*	2.9	1.3	1.6	80	.7%	.6%	1.1%	.2%

(Continued)

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Table 12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Dassault*	2.5	.0	2.2	0	.6%	.0%	1.5%	.0%
Isicad CAD/CAM Systeme	2.3	.5	1.3	26	.5%	.3%	.9%	.1%
Sun Microsystems	2.2	1.8	.0	84	.5%	.8%	.0%	.2%
Graphisoft Software Dev	1.8	.0	1.8	0	.4%	.0%	1.2%	.0%
Ziegler Informatics	1.7	.0	1.7	0	.4%	.0%	1.2%	.0%
Sinus Software	1.7	.9	.6	40	.4%	.4%	.4%	.1%
CAD Centre	1.7	.2	1.1	9	.4%	.1%	.7%	.0%
Mucke Software	1.2	.5	.5	25	.3%	.2%	.3%	.1%
GDS	1.1	.5	.5	17	.3%	.2%	.3%	.0%
MEDESIGN	.8	.2	.3	9	.2%	.1%	.2%	.0%
Altium*	.8	.0	.8	0	.2%	.0%	.5%	.0%
Silicon Graphics	.7	.6	.0	21	.2%	.3%	.0%	.1%
RoboCAD Solutions	.6	.0	.5	0	.1%	.0%	.3%	.0%
Other Companies	63.1	61.4	.7	22,796	15.2%	28.9%	.5%	62.5%
All Companies	415.3	212.6	147.7	36,475	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	212.5	145.5	42.0	31,157	51.2%	68.5%	28.5%	85.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	202.8	67.0	105.7	5,318	48.8%	31.5%	71.5%	14.6%
All Hardware Companies	122.4	117.2	.0	29,991	29.5%	55.1%	.0%	82.2%
All Turnkey & SW Companies	293.0	95.4	147.7	6,484	70.5%	44.9%	100.0%	17.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 13
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Siemens Nixdorf Info systeme	77.2	26.2	29.4	1,254	39.0%	30.1%	44.4%	20.1%
IBM	23.4	19.8	1.2	1,238	11.8%	22.8%	1.7%	19.9%
Intergraph	16.1	6.8	5.0	257	8.1%	7.8%	7.6%	4.1%
Smallworld Systems	8.3	.4	5.0	15	4.2%	.5%	7.5%	.2%
Hewlett-Packard	7.5	6.4	.0	355	3.8%	7.4%	.0%	5.7%
Sun Microsystems	7.0	5.7	.0	182	3.6%	6.6%	.0%	2.9%
Kohns & Poppenhaeger	6.6	3.0	2.6	76	3.3%	3.5%	3.9%	1.2%
ESRI	5.8	.0	4.7	0	2.9%	.0%	7.1%	.0%
Digital	5.5	4.1	.0	240	2.8%	4.7%	.0%	3.9%
Straessle Informationssysteme	4.1	.3	2.9	33	2.1%	.4%	4.3%	.5%
Autodesk	4.1	.0	4.1	0	2.1%	.0%	6.1%	.0%
RIB/Bausoftware	1.6	.2	1.2	18	.8%	.2%	1.9%	.3%
ICL	1.4	.8	.5	40	.7%	.9%	.7%	.6%
Ziegler Informatics	1.4	.0	1.4	0	.7%	.0%	2.1%	.0%
Ground Modelling Systems	1.1	.6	.4	111	.5%	.7%	.6%	1.8%
GDS	.9	.4	.4	14	.4%	.5%	.6%	.2%
Clemessy Geocity	.8	.4	.2	4	.4%	.5%	.2%	.1%
Triplan	.7	.3	.4	11	.4%	.3%	.6%	.2%
Microway	.7	.4	.2	7	.4%	.5%	.3%	.1%

(Continued)

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Table 13 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Computervision	.7	.2	.2	8	.3%	.2%	.3%	.1%
Other Companies	19.9	9.4	5.8	2,299	10.1%	10.8%	8.8%	36.9%
All Companies	198.0	86.9	66.3	6,235	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	92.0	53.7	21.3	4,648	46.4%	61.7%	32.2%	74.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	106.0	33.3	44.9	1,587	53.6%	38.3%	67.8%	25.4%
All Hardware Companies	46.8	41.5	.0	4,235	23.6%	47.7%	.0%	67.9%
All Turnkey & SW Companies	151.2	45.5	66.3	2,000	76.4%	52.3%	100.0%	32.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 14
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	56.6	44.7	.0	2,181	17.4%	27.0%	.0%	15.0%
Hewlett-Packard	40.4	30.8	3.3	1,777	12.4%	18.6%	3.5%	12.2%
IBM	34.1	30.5	1.2	2,676	10.5%	18.4%	1.3%	18.4%
Digital	31.9	25.0	.0	870	9.8%	15.1%	.0%	6.0%
Mentor Graphics	31.2	4.4	13.7	149	9.6%	2.7%	14.7%	1.0%
Cadence	20.8	.0	14.9	0	6.4%	.0%	16.1%	.0%
Racal-Redac	11.1	1.4	5.1	55	3.4%	.8%	5.5%	.4%
Synopsys	10.7	.0	7.4	0	3.3%	.0%	7.9%	.0%
Aucotec	7.3	2.0	3.7	289	2.2%	1.2%	3.9%	2.0%
Intergraph	4.0	.1	3.5	2	1.2%	.0%	3.8%	.0%
Ziegler Informatics	3.2	.0	3.2	0	1.0%	.0%	3.5%	.0%
debis Systemhaus	2.8	.6	1.8	17	.9%	.4%	1.9%	.1%
COMPASS Design Automation	2.7	.0	2.2	0	.8%	.0%	2.3%	.0%
Viewlogic Systems	2.7	.0	2.1	0	.8%	.0%	2.3%	.0%
Autodesk	2.2	.0	2.2	0	.7%	.0%	2.4%	.0%
Siemens Nixdorf Info systeme	2.1	1.1	.3	97	.6%	.7%	.3%	.7%
Silicon Graphics	2.0	1.7	.0	56	.6%	1.0%	.0%	.4%
CAD-UL	1.9	.0	1.9	0	.6%	.0%	2.1%	.0%
Computervision	1.9	.5	.6	29	.6%	.3%	.6%	.2%
Harris EDA	1.6	.1	1.0	9	.5%	.1%	1.1%	.1%
Sagantec	1.6	.0	1.5	0	.5%	.0%	1.6%	.0%

(Continued)

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Table 14 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
ISDATA	1.4	.0	1.3	0	.4%	.0%	1.3%	.0%
ANACAD EES	1.3	.0	1.3	0	.4%	.0%	1.4%	.0%
Wiechers Datentechnik	1.3	.3	.8	22	.4%	.2%	.9%	.2%
Zycad	1.2	.7	.2	16	.4%	.4%	.2%	.1%
Kloeckner-Moeller	1.0	.2	.7	30	.3%	.1%	.8%	.2%
Technische Computer Systeme	.9	.2	.6	16	.3%	.1%	.7%	.1%
ISKA	.9	.4	.4	15	.3%	.2%	.4%	.1%
Aucos elektronische Geraete	.8	.3	.6	85	.3%	.2%	.6%	.6%
Altium*	.7	.0	.7	0	.2%	.0%	.7%	.0%
Other Companies	42.0	20.6	16.1	6,081	12.9%	12.4%	17.4%	41.8%
All Companies	325.4	165.9	92.7	14,551	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	287.0	159.5	69.1	13,909	88.2%	96.1%	74.5%	95.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	38.4	6.4	23.7	642	11.8%	3.9%	25.5%	4.4%
All Hardware Companies	178.1	150.0	.0	13,503	54.7%	90.4%	.0%	92.8%
All Turnkey & SW Companies	147.3	15.9	92.7	1,047	45.3%	9.6%	100.0%	7.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 15
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	34.2	27.0	.0	1,402	16.3%	25.9%	.0%	14.1%
Hewlett-Packard	25.8	18.4	3.3	1,136	12.3%	17.7%	5.1%	11.4%
IBM	21.4	20.1	.0	1,977	10.2%	19.3%	.0%	19.9%
Digital	19.2	15.1	.0	598	9.1%	14.5%	.0%	6.0%
Mentor Graphics	16.5	2.3	7.2	79	7.9%	2.2%	11.3%	.8%
Cadence	12.4	.0	8.8	0	5.9%	.0%	13.8%	.0%
Synopsys	10.7	.0	7.4	0	5.1%	.0%	11.5%	.0%
Aucotec	7.3	2.0	3.7	289	3.5%	1.9%	5.7%	2.9%
debis Systemhaus	2.8	.6	1.8	17	1.3%	.6%	2.8%	.2%
Viewlogic Systems	2.7	.0	2.1	0	1.3%	.0%	3.3%	.0%
Racal-Redac	2.6	.4	1.1	15	1.2%	.4%	1.7%	.1%
Intergraph	2.2	.0	1.9	1	1.0%	.0%	3.0%	.0%
Siemens Nixdorf Info systeme	2.1	1.1	.3	97	1.0%	1.1%	.5%	1.0%
Silicon Graphics	1.9	1.7	.0	52	.9%	1.6%	.0%	.5%
Autodesk	1.9	.0	1.9	0	.9%	.0%	2.9%	.0%
Ziegler Informatics	1.7	.0	1.7	0	.8%	.0%	2.7%	.0%
COMPASS Design Automation	1.6	.0	1.3	0	.8%	.0%	2.0%	.0%
ISDATA	1.4	.0	1.3	0	.7%	.0%	1.9%	.0%
ANACAD EES	1.3	.0	1.3	0	.6%	.0%	2.0%	.0%
Wiechers Datentechnik	1.3	.3	.8	22	.6%	.2%	1.2%	.2%
Zycad	1.2	.7	.2	16	.6%	.7%	.2%	.2%

(Continued)

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Table 15 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Kloeckner-Moeller	1.0	.2	.7	30	.5%	.2%	1.1%	.3%
Technische Computer Systeme	.9	.2	.6	16	.4%	.2%	1.0%	.2%
ISKA	.9	.4	.4	15	.4%	.3%	.5%	.2%
Aucos elektronische Gerate	.8	.3	.6	85	.4%	.3%	.9%	.9%
Harris EDA	.7	.1	.5	5	.3%	.1%	.7%	.1%
Computervision	.5	.1	.2	8	.2%	.1%	.2%	.1%
Other Companies	32.9	13.1	15.1	4,013	15.6%	12.5%	23.5%	40.4%
All Companies	210.2	104.3	64.1	9,931	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	186.1	98.9	50.0	9,344	88.5%	94.9%	77.9%	94.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	24.1	5.3	14.2	586	11.5%	5.1%	22.1%	5.9%
All Hardware Companies	110.9	93.2	.0	9,069	52.8%	89.4%	.0%	91.3%
All Turnkey & SW Companies	99.3	11.1	64.1	861	47.2%	10.6%	100.0%	8.7%

Source: Dataquest (July 1994)

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Table 16
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	17.6	13.9	.0	584	34.0%	47.2%	.0%	54.4%
Cadence	7.4	.0	5.3	0	14.3%	.0%	48.8%	.0%
Digital	6.7	5.3	.0	98	13.0%	17.8%	.0%	9.2%
IBM	6.1	5.6	.0	173	11.8%	18.9%	.0%	16.1%
Mentor Graphics	5.7	.8	2.5	27	10.9%	2.7%	22.9%	2.5%
Hewlett-Packard	4.4	3.7	.0	168	8.4%	12.5%	.0%	15.7%
Sagantec	1.6	.0	1.5	0	3.1%	.0%	13.4%	.0%
COMPASS Design Automation	1.1	.0	.9	0	2.1%	.0%	8.0%	.0%
Other Companies	.9	.2	.5	21	1.7%	.7%	4.4%	1.9%
All Companies	51.7	29.6	10.8	1,073	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	50.1	29.6	9.4	1,073	96.9%	100.0%	86.6%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.6	.0	1.5	0	3.1%	.0%	13.4%	.0%
All Hardware Companies	35.1	28.8	.0	1,046	67.8%	97.3%	.0%	97.5%
All Turnkey & SW Companies	16.6	.8	10.8	27	32.2%	2.7%	100.0%	2.5%

Source: Dataquest (July 1994)

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Table 17
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Germany
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	10.2	8.7	.0	474	16.1%	27.1%	.0%	13.3%
Mentor Graphics	9.0	1.3	4.0	43	14.2%	4.0%	22.2%	1.2%
Racal-Redac	8.6	1.0	4.0	40	13.5%	3.1%	22.5%	1.1%
IBM	6.7	4.8	1.2	526	10.5%	15.0%	6.6%	14.8%
Digital	5.9	4.7	.0	174	9.3%	14.5%	.0%	4.9%
Sun Microsystems	4.7	3.8	.0	195	7.5%	11.7%	.0%	5.5%
CAD-UL	1.9	.0	1.9	0	3.0%	.0%	10.8%	.0%
Intergraph	1.5	.0	1.3	1	2.4%	.1%	7.5%	.0%
Ziegler Informatics	1.5	.0	1.5	0	2.4%	.0%	8.4%	.0%
Computervision	1.4	.3	.4	21	2.2%	1.0%	2.3%	.6%
Cadence	1.1	.0	.8	0	1.7%	.0%	4.4%	.0%
Harris EDA	.9	.1	.5	4	1.3%	.2%	2.9%	.1%
Altium*	.7	.0	.7	0	1.1%	.0%	3.8%	.0%
Other Companies	8.2	7.4	.6	2,047	12.9%	22.9%	3.1%	57.7%
All Companies	63.5	32.1	17.8	3,547	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	50.8	31.0	9.8	3,492	80.0%	96.7%	54.8%	98.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	12.7	1.1	8.1	55	20.0%	3.3%	45.2%	1.6%
All Hardware Companies	32.2	28.1	.0	3,388	50.6%	87.4%	.0%	95.5%
All Turnkey & SW Companies	31.3	4.0	17.8	159	49.4%	12.6%	100.0%	4.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Dataquest

Software

CAD/CAM/CAE and GIS France Market Share Update

Market Statistics

1994

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Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9405
Publication Date: July 18, 1994

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Note: All tables show estimated data.

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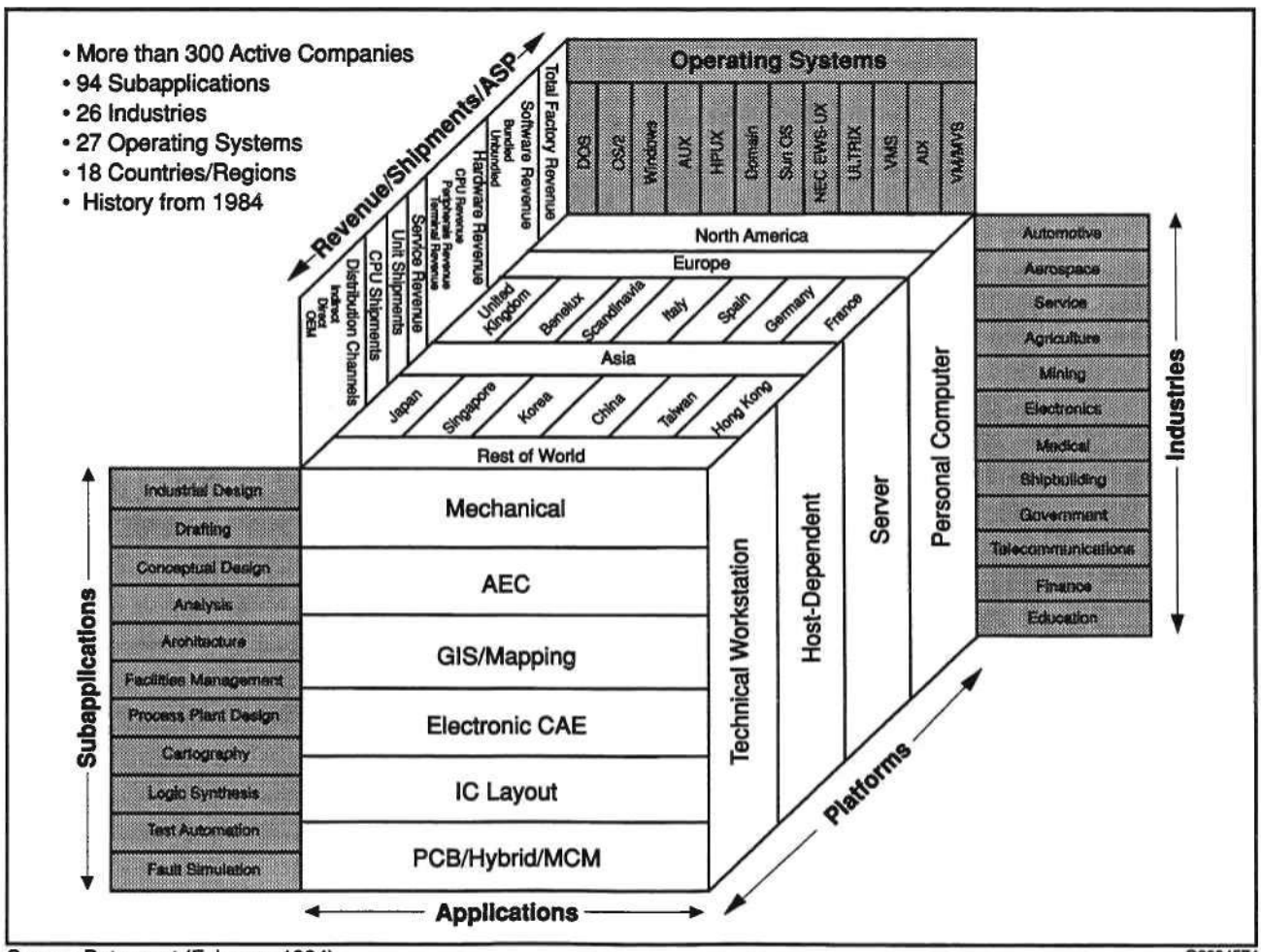
CAD/CAM/CAE and GIS France Market Share Update

Introduction

CAD/CAM/CAE/GIS systems have dramatically changed the methods by which designers and production managers originate and implement products. CAD and CAE systems allow designers to create, draft, analyze, test, and manipulate products on a screen in two and three dimensions. As CAD/CAM/CAE/GIS systems continue to decrease in cost, they become more available and cost justifiable to new users.

In order to provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure 1.

Figure 1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (February 1994)

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Table 1
CAD/CAM/CAE/GIS 1992-1993 Market Summary

	Software Revenue 1992 ($M)	Software Revenue 1993 ($M)	Growth Rate (%)	Total Revenue 1992 ($M)	Total Revenue 1993 ($M)	Growth Rate (%)	Hardware Unit Shipments 1992	Hardware Unit Shipments 1993	Growth Rate (%)
Application									
Mechanical	2,170.4	2,294.7	5.7	7,988.2	7,862.7	-1.6	302,347	303,364	0.3
AEC	746.9	794.1	6.3	2,356.5	2,444.0	3.7	178,629	198,075	10.9
GIS/Mapping	580.1	662.2	14.2	2,005.6	2,179.1	8.7	86,513	102,624	18.6
Electronic CAE	741.5	797.1	7.5	2,086.4	2,271.7	8.9	94,176	99,129	5.3
IC Layout	212.7	203.0	-4.6	628.4	676.4	7.6	9,771	13,049	33.5
PCB/Hybrid/MCM	265.9	271.2	2.0	870.9	900.2	3.4	35,110	38,030	8.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
Region									
North America	1,562.5	1,754.6	12.3	5,253.5	5,690.7	8.3	286,939	325,318	13.4
Europe	1,693.8	1,608.9	-5.0	5,755.5	5,432.7	-5.6	231,062	240,603	4.1
Asia	1,352.7	1,534.4	13.4	4,601.2	4,830.6	5.0	169,839	163,620	-3.7
Rest of World	108.5	124.3	14.6	325.9	380.2	16.7	18,706	24,730	32.2
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
In Local Currencies									
Europe (ECU)	1,301.8	1,378.2	5.9	4,423.7	4,653.7	5.2			
Asia (yen)	170,895	170,093	-0.5	581,318	535,468	-7.9			
Platform									
Technical Workstation	3,060.1	3,312.8	8.3	9,640.0	10,458.3	8.5	173,705	194,848	12.2
Host-Dependent	360.2	306.1	-15.0	2,436.6	1,754.7	-28.0	34,524	28,573	-17.2
Server	140.0	176.2	25.9	906.3	1,056.8	16.6	11,566	13,381	15.7
Personal Computer	1,157.1	1,227.1	6.1	2,953.2	3,064.4	3.8	486,751	517,469	6.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8

Source: Dataquest (July 1994)

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A companion article analyzing major shifts in the 1993 market was published in our *Dataquest Perspective*, dated June 27, 1994.

Table 1 summarizes the performance in various segments of the CAD/CAM/CAE/GIS markets in 1993 versus 1992. With the devaluation of the dollar against the yen (¥126.34/$ in 1992 versus ¥110.85/$ in 1993) and the appreciation of the dollar against the ECU (ECU 0.7686/$ in 1992 versus ECU 0.8566/$ in 1993), actual growth is not as it appears when denominated in U.S. dollars. With 75 percent of the Asian market in Japan, denominating in yen gives a rough indication of real growth in the Asian market, which was a negative 7.9 percent.

About This Document

This document contains Dataquest's detailed market share information on the CAD/CAM/CAE/GIS industry. We no longer publish worldwide all-application market statistics for the entire CAD/CAM/CAE/GIS industry. This data is available by calling Suzanne Snygg at (408) 437-8241. The category "Other Companies" is the aggregation of small companies. More detailed data on these markets may be requested through our Client Inquiry service.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

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Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic Computer-Aided Engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of products). Schematic capture and simulation are examples of electronic CAE applications.
- IC Layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/Hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe. Market share data is available for each of these countries.

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong. Market share data is available for each of these countries.

Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed

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by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

Metrics

The following paragraphs define measurements.

- Total factory revenue is defined as the amount of money received by a manufacturer for its goods and services measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue). Total factory revenue is the sum of software revenue, hardware revenue, and service revenue.
- Unit shipment is defined as the number of seats delivered (number of possible simultaneous users of product delivered) excluding OEM shipments.

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- Hardware revenue is revenue derived from sales of CPUs (including operating systems), terminals (for host-dependent systems), and peripherals.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled application software.
- Service revenue is defined as all revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
  - Maintenance fees for hardware and software
  - Management and operations services—help desk, education and training, disaster recovery, vaulting, and configuration management.
  - Service bureau—project work, including construction of database, data conversion, product design, analysis, or manufacturing.
  - Application development—design and development of customized software applications or the modification, enhancement, or customization of existing software applications, adding new functionality.
  - Consulting revenue—assessment of CAD/CAM/CAE/GIS business and information technology needs and the formulation of a plan based on needs identification.
  - Implementation and integration services—planning, implementation, migration, and integration of software products (software network support and integration, account integration management, data center design, and construction).

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year and second quarter of the subsequent year, we survey all participants in each industry. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contacts at large companies. (Dataquest maintains a large contact database on all sources of information.) The following are examples of the job titles of people contacted for information:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning

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- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE/GIS marketing programs
- Market research analyst

The Audit Process

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks
- Articles in both the general and trade press
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice; Dataquest also checks with multiple sources at one company to cross-check data on that company.

Dataquest analysts have many years of experience in how to apply the above tools to get the most accurate information possible on a particular company (such as what to use when and what industry averages are). We believe that the estimates presented here are the most accurate and meaningful generally available today. It is the CAD/CAM/CAE/GIS group's policy to continually update our market information for any year, based on any new data received, in order to arrive at the most accurate market representation possible.

Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

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Publishing Schedule

We publish both market share and forecasting twice each year, allowing for timely distribution of data and thorough analysis and forecasting. Our annual delivery schedule is as follows:

- Market share data is available January 31. All tables will be published and distributed to clients by March 31.
- Forecasting from the market share tables provides a five-year forecast period, available after March 31. The books will be shipped by May 31.
- Final updated market share tables, based on additional data collection and analysis, will be completed by May 31. At this point, the market share database is frozen and will not be changed until the end of the year. For the next six months, supplementary market data will be based on this final market data. Books will be shipped by July 31.
- We provide complete final forecast tables by July 31. These tables take into consideration changes in the market share during the previous six months. Books will be shipped by September 30.

Database Changes

Tables 2 through 5 show changes made to the database since last year's market share update. PC clone manufacturers are no longer tracked individually. We continue to show PC sales by IBM, Hewlett-Packard, and Digital, which also sell other platforms. The 1993 sales of GeoVision Systems to SHL Systemhouse, Computervision-GIS to Unisys, Racal-Redac to Zuken, Chronologic to Viewlogic, ASG to Softdesk, CDC's mechanical software product to ICEM Technologies, PDA to MacNeal-Schwendler, and Logic Modeling Corporation to Synopsys; the merger of Sysdeco and SysScan; and the change of GDS to Convergent Group will be recognized in market reporting for 1994.

Table 2
Companies Renamed

Company Name	Renamed to:
Alper Systems	Sysdeco Ltd.
Areon	Kreon
CADAM	Altium
Catalpa	Catalpa groupe Missler
Geotrace Technologies	Cadlynx
Logic Control	Logic Systems Designers
RIB/RZB	RIB Bausoftware
Sener Sistemas Marinos	Sener Inginiera y Sistemas
STI Strassle	Strassle Informationssysteme
Test Systems Strategies	Summitt

Source: Dataquest (July 1994)

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Table 3
Companies (or CAD Portions Thereof) Sold/Merged

Company Name	Acquired by, Merged with, Technology Sold to:
ANACAD & Electrical Eng. Software	ANACAD-EES
Aries Technology	MacNeal-Schwendler
CAD Language Systems	Compass Design Automation
CAD/CAM Group	Data I/O
Comdisco	Cadence
DAT Standard info ssystemes	ISD Software
EEsof	Hewlett-Packard
Expertest	Sunrise Test
Fides Industrielle Automation	Strassle
HP Cade	Hewlett-Packard
Inca	Zycad
Infocel	Understanding Systems
PiE Design	Quickturn Design Systems
Quad Design Technology	Viewlogic
Wisdom Systems	ICAD

Source: Dataquest (July 1994)

Table 4
Companies Deleted

Company Removed from Database:
European
Asicom
Club Informatico SA
DATAID Technologies
DECISA
Micrograph
Olivetti*
Research Machines*
North American
Bechtel
CADLYNX
Compaq*
Dell Computer*
Engineering Systems Corporation
GeoQuest
Mega CADD
NCR Microelectronics
Object Design
Objectivity
Ontos
Quicklogic
The CAD Group
Ultimap

*We no longer follow individual PC clone makers.
Source: Dataquest (July 1994)

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Table 5
Companies Added

Company Added to Database:
European
APIC Systemes
ISD Software
SPEED
Ultimate Technology
North American
AT&T
Aptix
ARC SYS
EAGLE Point
Earth Resource Mapping
Graftek
Graphic Data Systems (GDS)
Model Technology
Systems Science Inc.
Tactics Int'l Ltd.
VLSI Libraries
Asian
Adam Net
Kozo
Okura
Technodia
TECHSPERT
Toshiba Engineering
Yokogawa Digital Computer

Source: Dataquest (July 1994)

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Table 6
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	128.4	83.2	23.7	5,086	16.6%	21.5%	10.3%	16.1%
Digital	72.4	57.3	.0	2,922	9.3%	14.8%	.0%	9.2%
Sun Microsystems	67.1	53.6	.0	2,332	8.7%	13.9%	.0%	7.4%
Hewlett-Packard	56.6	40.6	5.5	2,167	7.3%	10.5%	2.4%	6.8%
Computervision	54.3	12.3	16.8	759	7.0%	3.2%	7.3%	2.4%
Intergraph	51.5	20.2	17.2	820	6.6%	5.2%	7.4%	2.6%
Matra Datavision	42.6	14.4	23.9	784	5.5%	3.7%	10.4%	2.5%
Dassault*	40.3	.0	35.0	0	5.2%	.0%	15.1%	.0%
Silicon Graphics	21.5	18.8	.0	573	2.8%	4.9%	.0%	1.8%
Autodesk	19.9	.0	19.9	0	2.6%	.0%	8.6%	.0%
Mentor Graphics	15.8	2.3	6.9	76	2.0%	.6%	3.0%	.2%
Cadence	15.0	.0	10.7	0	1.9%	.0%	4.6%	.0%
Cisigraph	13.4	3.6	7.1	200	1.7%	.9%	3.1%	.6%
Parametric Technology	12.3	.0	10.1	0	1.6%	.0%	4.4%	.0%
SDRC	9.1	.0	6.2	0	1.2%	.0%	2.7%	.0%
Apple Computer	9.0	9.0	.0	1,901	1.2%	2.3%	.0%	6.0%
EDS Unigraphics	8.4	2.5	4.0	127	1.1%	.6%	1.7%	.4%
Framasoft + CSI	7.8	.3	3.5	17	1.0%	.1%	1.5%	.1%
Serbi	7.0	.9	6.1	273	.9%	.2%	2.7%	.9%
ESRI	5.7	.0	4.6	0	.7%	.0%	2.0%	.0%
COMPASS Design Automation	5.6	.0	4.5	0	.7%	.0%	2.0%	.0%
Applicon	4.6	1.5	1.8	51	.6%	.4%	.8%	.2%
ICL	4.2	2.4	1.4	120	.5%	.6%	.6%	.4%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Racal-Redac	3.7	.5	1.7	18	.5%	.1%	.7%	.1%
Clemessy Geocity	3.5	1.9	.7	20	.5%	.5%	.3%	.1%
BATISOFT	3.4	1.2	1.0	227	.4%	.3%	.4%	.7%
Datagraphic	3.1	1.5	1.3	55	.4%	.4%	.5%	.2%
Altium*	3.1	.0	2.9	0	.4%	.0%	1.3%	.0%
APIC Systemes	3.0	.0	2.0	0	.4%	.0%	.9%	.0%
Synopsys	2.9	.0	2.0	0	.4%	.0%	.9%	.0%
Star Informatic	2.9	.6	1.9	47	.4%	.2%	.8%	.1%
Viewlogic Systems	2.9	.0	2.3	0	.4%	.0%	1.0%	.0%
Assigraph	2.8	.0	2.3	0	.4%	.0%	1.0%	.0%
Caroline Informatique	2.6	.5	1.3	26	.3%	.1%	.6%	.1%
MacNeal-Schwendler	2.5	.0	2.4	0	.3%	.0%	1.0%	.0%
CATALPA groupe Missler	2.4	1.0	1.1	73	.3%	.3%	.5%	.2%
Control Data Systems	2.2	1.6	.1	47	.3%	.4%	.0%	.1%
ALS Design	2.1	.2	1.8	25	.3%	.0%	.8%	.1%
Harris EDA	2.1	.2	1.3	11	.3%	.0%	.5%	.0%
Zycad	2.1	1.2	.3	27	.3%	.3%	.1%	.1%
Visionics	1.9	.0	1.8	0	.2%	.0%	.8%	.0%
EME	1.9	.5	.9	103	.2%	.1%	.4%	.3%
Swanson Analysis	1.7	.0	1.5	0	.2%	.0%	.7%	.0%
GDS	1.5	.7	.7	25	.2%	.2%	.3%	.1%
ADRA Systems	1.5	.1	1.1	5	.2%	.0%	.5%	.0%
Siemens Nixdorf Info systeme	1.3	.4	.5	21	.2%	.1%	.2%	.1%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Investronica SA	1.3	.8	.3	43	.2%	.2%	.1%	.1%
Macao Systems	1.1	.6	.4	12	.1%	.2%	.2%	.0%
CAD Lab	1.0	.3	.5	23	.1%	.1%	.2%	.1%
PDA Engineering	1.0	.0	.9	0	.1%	.0%	.4%	.0%
CAD Centre	.9	.1	.6	4	.1%	.0%	.3%	.0%
Unisys	.9	.2	.4	9	.1%	.1%	.2%	.0%
Gerber Systems	.9	.4	.4	14	.1%	.1%	.2%	.0%
Vero International Software	.8	.0	.7	0	.1%	.0%	.3%	.0%
Nemetschek	.7	.2	.4	18	.1%	.1%	.2%	.1%
PAFEC	.7	.2	.4	10	.1%	.1%	.2%	.0%
Kreon	.7	.4	.2	13	.1%	.1%	.1%	.0%
Graphisoft Software Dev	.6	.0	.6	0	.1%	.0%	.3%	.0%
Graftek	.5	.2	.2	67	.1%	.1%	.1%	.2%
Other Companies	29.2	47.8	.0	12,443	3.8%	12.4%	.0%	39.3%
All Companies	774.4	386.7	231.2	31,673	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	654.9	353.6	165.8	29,465	84.6%	91.5%	71.7%	93.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	119.5	33.0	65.4	2,207	15.4%	8.5%	28.3%	7.0%
All Hardware Companies	290.3	250.0	.0	25,752	37.5%	64.6%	.0%	81.3%
All Turnkey & SW Companies	484.0	136.7	231.2	5,920	62.5%	35.4%	100.0%	18.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 7
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	73.5	48.6	12.5	1,341	14.5%	21.7%	7.8%	14.8%
Hewlett-Packard	53.5	37.9	5.4	1,477	10.6%	17.0%	3.3%	16.3%
Sun Microsystems	53.1	42.0	.0	2,074	10.5%	18.8%	.0%	22.9%
Computervision	53.0	12.1	15.8	732	10.5%	5.4%	9.9%	8.1%
Intergraph	41.9	16.9	13.3	517	8.3%	7.5%	8.3%	5.7%
Matra Datavision	41.8	14.0	23.5	693	8.3%	6.3%	14.7%	7.6%
Dassault*	21.5	.0	18.6	0	4.3%	.0%	11.6%	.0%
Silicon Graphics	18.3	16.1	.0	539	3.6%	7.2%	.0%	5.9%
Digital	17.8	13.8	.0	707	3.5%	6.2%	.0%	7.8%
Mentor Graphics	15.8	2.3	6.9	76	3.1%	1.0%	4.3%	.8%
Cadence	14.0	.0	10.0	0	2.8%	.0%	6.2%	.0%
Cisigraph	12.0	3.3	6.4	191	2.4%	1.5%	4.0%	2.1%
Parametric Technology	11.7	.0	9.6	0	2.3%	.0%	6.0%	.0%
SDRC	9.0	.0	6.2	0	1.8%	.0%	3.8%	.0%
Framasoft + CSI	7.1	.3	3.1	17	1.4%	.1%	2.0%	.2%
EDS Unigraphics	6.7	2.0	3.2	109	1.3%	.9%	2.0%	1.2%
COMPASS Design Automation	5.6	.0	4.5	0	1.1%	.0%	2.8%	.0%
Applicon	4.6	1.5	1.8	51	.9%	.7%	1.1%	.6%
ICL	4.2	2.4	1.4	120	.8%	1.1%	.9%	1.3%
Clemessy Geocity	3.5	1.9	.7	20	.7%	.9%	.4%	.2%
Racal-Redac	3.2	.5	1.4	18	.6%	.2%	.9%	.2%

(Continued)

Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
APIC Systemes	3.0	.0	2.0	0	.6%	.0%	1.3%	.0%
Synopsys	2.9	.0	2.0	0	.6%	.0%	1.3%	.0%
Star Informatic	2.8	.6	1.8	38	.6%	.3%	1.1%	.4%
Assigraph	2.6	.0	2.1	0	.5%	.0%	1.3%	.0%
ESRI	2.3	.0	1.8	0	.4%	.0%	1.1%	.0%
Harris EDA	1.9	.1	1.1	9	.4%	.1%	.7%	.1%
Viewlogic Systems	1.9	.0	1.3	0	.4%	.0%	.8%	.0%
Caroline Informatique	1.6	.3	.9	8	.3%	.1%	.5%	.1%
GDS	1.5	.7	.7	25	.3%	.3%	.4%	.3%
CATALPA groupe Missler	1.5	.6	.7	16	.3%	.3%	.4%	.2%
Zycad	1.4	.8	.2	20	.3%	.4%	.1%	.2%
Siemens Nixdorf Info systeme	1.2	.4	.5	20	.2%	.2%	.3%	.2%
Control Data Systems	1.2	.8	.1	30	.2%	.4%	.0%	.3%
ADRA Systems	1.1	.1	.7	5	.2%	.0%	.5%	.1%
Swanson Analysis	1.1	.0	1.0	0	.2%	.0%	.6%	.0%
Autodesk	1.0	.0	1.0	0	.2%	.0%	.6%	.0%
CAD Centre	.9	.1	.6	4	.2%	.0%	.4%	.0%
Gerber Systems	.9	.4	.4	14	.2%	.2%	.2%	.2%
Macao Systems	.9	.5	.3	10	.2%	.2%	.2%	.1%
PDA Engineering	.9	.0	.8	0	.2%	.0%	.5%	.0%
EME	.8	.2	.4	20	.2%	.1%	.2%	.2%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
CAD Lab	.8	.2	.4	13	.2%	.1%	.2%	.1%
MacNeal-Schwendler	.8	.0	.6	0	.1%	.0%	.4%	.0%
PAFEC	.7	.2	.3	10	.1%	.1%	.2%	.1%
Unisys	.7	.2	.3	6	.1%	.1%	.2%	.1%
Other Companies	.0	1.3	.0	36	.0%	.6%	.0%	.4%
All Companies	505.5	223.5	160.0	9,056	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	414.6	197.7	112.0	7,811	82.0%	88.5%	70.0%	86.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	90.9	25.8	48.0	1,245	18.0%	11.5%	30.0%	13.7%
All Hardware Companies	147.0	122.1	.0	5,169	29.1%	54.6%	.0%	57.1%
All Turnkey & SW Companies	358.5	101.4	160.0	3,887	70.9%	45.4%	100.0%	42.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 8
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	33.7	19.4	6.8	579	42.5%	35.8%	65.2%	48.1%
Digital	23.5	18.3	.0	0	29.7%	33.8%	.0%	.0%
Dassault*	13.6	.0	11.9	0	17.1%	.0%	114.1%	.0%
MacNeal-Schwendler	1.8	.0	1.8	0	2.2%	.0%	16.7%	.0%
Control Data Systems	.9	.7	.0	15	1.2%	1.3%	.1%	1.3%
Framasoft + CSI	.8	.0	.4	0	1.0%	.0%	3.7%	.0%
Other Companies	3.9	15.6	.0	583	4.9%	28.7%	.0%	48.5%
All Companies	79.1	54.2	10.5	1,204	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	77.8	54.1	9.8	1,201	98.4%	99.7%	94.0%	99.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.3	.1	.6	3	1.6%	.3%	6.0%	.2%
All Hardware Companies	40.8	34.5	.0	597	51.6%	63.7%	.0%	49.6%
All Turnkey & SW Companies	38.3	19.7	10.5	607	48.4%	36.3%	100.0%	50.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 9
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	24.6	19.1	.0	241	38.0%	45.4%	.0%	32.9%
Sun Microsystems	14.0	11.6	.0	258	21.6%	27.6%	.0%	35.2%
IBM	7.0	4.1	1.5	80	10.8%	9.7%	18.5%	10.9%
Dassault*	5.2	.0	4.5	0	8.0%	.0%	54.1%	.0%
Intergraph	4.5	1.8	1.3	51	6.9%	4.2%	16.2%	7.0%
Silicon Graphics	3.2	2.7	.0	34	5.0%	6.5%	.0%	4.7%
ESRI	2.2	.0	1.7	0	3.5%	.0%	20.8%	.0%
EDS Unigraphics	1.7	.5	.8	18	2.6%	1.2%	9.4%	2.5%
Cisigraph	1.3	.4	.7	9	2.1%	.9%	8.6%	1.2%
Cadence	1.0	.0	.7	0	1.5%	.0%	8.5%	.0%
Zycad	.7	.4	.1	8	1.1%	1.0%	1.0%	1.0%
Hewlett-Packard	.7	.5	.0	10	1.0%	1.3%	.0%	1.4%
Other Companies	.0	.7	.0	16	.0%	1.6%	.0%	2.2%
All Companies	64.7	42.0	8.3	733	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	63.3	41.6	7.5	723	97.8%	99.1%	90.7%	98.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.4	.4	.8	10	2.2%	.9%	9.3%	1.4%
All Hardware Companies	43.4	34.8	.0	561	67.0%	82.9%	.0%	76.6%
All Turnkey & SW Companies	21.3	7.2	8.3	172	33.0%	17.1%	100.0%	23.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 10
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Autodesk	18.9	.0	18.9	0	15.1%	.0%	35.9%	.0%
IBM	14.2	11.1	2.9	3,087	11.3%	16.6%	5.5%	14.9%
Apple Computer	9.0	9.0	.0	1,901	7.2%	13.5%	.0%	9.2%
Serbi	7.0	.9	6.1	273	5.6%	1.3%	11.7%	1.3%
Digital	6.5	6.2	.0	1,974	5.2%	9.2%	.0%	9.5%
Intergraph	5.1	1.6	2.6	252	4.1%	2.3%	4.9%	1.2%
BATISOFT	3.4	1.2	1.0	227	2.7%	1.8%	1.8%	1.1%
Datagraphic	3.1	1.5	1.3	55	2.5%	2.3%	2.4%	.3%
Altium*	3.1	.0	2.9	0	2.5%	.0%	5.5%	.0%
Hewlett-Packard	2.5	2.1	.2	680	2.0%	3.2%	.3%	3.3%
ALS Design	2.1	.2	1.8	25	1.6%	.2%	3.5%	.1%
Visionics	1.9	.0	1.8	0	1.5%	.0%	3.5%	.0%
Investronica SA	1.3	.8	.3	43	1.0%	1.2%	.6%	.2%
ESRI	1.1	.0	1.1	0	.9%	.0%	2.1%	.0%
EME	1.1	.3	.5	83	.9%	.5%	1.0%	.4%
Viewlogic Systems	1.0	.0	1.0	0	.8%	.0%	1.9%	.0%
Caroline Informatique	1.0	.2	.5	18	.8%	.3%	.9%	.1%
CATALPA groupe Missler	1.0	.4	.4	57	.8%	.6%	.8%	.3%
Computervision	1.0	.0	1.0	25	.8%	.0%	1.8%	.1%
Matra Datavision	.8	.4	.5	92	.7%	.6%	.9%	.4%
Vero International Software	.8	.0	.7	0	.6%	.0%	1.3%	.0%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Kreon	.7	.4	.2	13	.5%	.6%	.3%	.1%
Graphisoft Software Dev	.6	.0	.6	0	.5%	.0%	1.2%	.0%
Parametric Technology	.6	.0	.5	0	.5%	.0%	1.0%	.0%
Nemetschek	.6	.2	.4	16	.5%	.3%	.7%	.1%
Racal-Redac	.5	.0	.3	0	.4%	.0%	.6%	.0%
Other Companies	33.0	30.2	2.7	11,807	26.4%	45.1%	5.1%	57.1%
All Companies	125.0	67.0	52.5	20,680	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	99.1	60.2	36.5	19,730	79.3%	89.9%	69.5%	95.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	25.9	6.8	16.0	950	20.7%	10.1%	30.5%	4.6%
All Hardware Companies	59.1	58.5	.0	19,425	47.3%	87.4%	.0%	93.9%
All Turnkey & SW Companies	65.9	8.4	52.5	1,255	52.7%	12.6%	100.0%	6.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 11
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	96.6	57.0	21.2	2,679	21.8%	25.4%	16.5%	17.9%
Computervision	48.4	10.9	15.0	674	10.9%	4.8%	11.7%	4.5%
Digital	46.4	36.8	.0	1,657	10.5%	16.4%	.0%	11.1%
Matra Datavision	42.2	14.2	23.7	778	9.5%	6.4%	18.5%	5.2%
Dassault*	37.9	.0	32.9	0	8.5%	.0%	25.7%	.0%
Hewlett-Packard	37.7	25.7	4.4	1,281	8.5%	11.5%	3.4%	8.6%
Sun Microsystems	23.5	18.8	.0	771	5.3%	8.4%	.0%	5.2%
Silicon Graphics	18.9	16.6	.0	502	4.3%	7.4%	.0%	3.4%
Cisigraph	13.4	3.6	7.1	200	3.0%	1.6%	5.5%	1.3%
Parametric Technology	12.3	.0	10.1	0	2.8%	.0%	7.9%	.0%
SDRC	9.1	.0	6.2	0	2.1%	.0%	4.8%	.0%
EDS Unigraphics	8.4	2.5	4.0	127	1.9%	1.1%	3.1%	.9%
Autodesk	7.9	.0	7.9	0	1.8%	.0%	6.2%	.0%
Framasoft + CSI	7.8	.3	3.5	17	1.8%	.1%	2.7%	.1%
Intergraph	5.3	1.9	1.7	74	1.2%	.8%	1.3%	.5%
Serbi	5.1	.6	4.5	200	1.2%	.3%	3.5%	1.3%
Applicon	4.6	1.5	1.8	51	1.0%	.7%	1.4%	.3%
Apple Computer	3.3	3.3	.0	700	.8%	1.5%	.0%	4.7%
Caroline Informatique	2.6	.5	1.3	26	.6%	.2%	1.0%	.2%
CATALPA groupe Missler	2.4	1.0	1.1	73	.5%	.5%	.8%	.5%
Altium*	2.4	.0	2.3	0	.5%	.0%	1.8%	.0%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
MacNeal-Schwendler	2.4	.0	2.3	0	.5%	.0%	1.8%	.0%
Control Data Systems	2.1	1.5	.1	44	.5%	.7%	.1%	.3%
ICL	1.7	1.0	.6	49	.4%	.4%	.5%	.3%
Swanson Analysis	1.7	.0	1.5	0	.4%	.0%	1.2%	.0%
ADRA Systems	1.5	.1	1.1	5	.3%	.0%	.8%	.0%
Investronica SA	1.3	.8	.3	43	.3%	.4%	.3%	.3%
CAD Lab	1.0	.3	.5	23	.2%	.1%	.4%	.2%
PDA Engineering	1.0	.0	.9	0	.2%	.0%	.7%	.0%
Gerber Systems	.9	.4	.4	14	.2%	.2%	.3%	.1%
Vero International Software	.8	.0	.7	0	.2%	.0%	.5%	.0%
Kreon	.7	.4	.2	13	.2%	.2%	.1%	.1%
EME	.6	.1	.3	31	.1%	.1%	.2%	.2%
Graftek	.5	.2	.2	67	.1%	.1%	.2%	.4%
Other Companies	.0	23.6	.0	4,791	.0%	10.5%	.0%	32.1%
All Companies	443.8	224.2	128.4	14,939	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	362.0	200.8	83.3	13,439	81.6%	89.6%	64.9%	90.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	81.7	23.4	45.1	1,500	18.4%	10.4%	35.1%	10.0%
All Hardware Companies	148.8	128.0	.0	10,917	33.5%	57.1%	.0%	73.1%
All Turnkey & SW Companies	295.0	96.2	128.4	4,022	66.5%	42.9%	100.0%	26.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 12
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	15.0	11.8	1.5	1,317	18.5%	27.8%	5.8%	20.2%
Intergraph	12.8	4.8	4.1	239	15.7%	11.4%	15.4%	3.7%
Autodesk	8.5	.0	8.5	0	10.5%	.0%	32.5%	.0%
Apple Computer	5.0	5.0	.0	1,048	6.1%	11.7%	.0%	16.1%
Computervision	4.5	1.0	1.3	65	5.5%	2.4%	5.0%	1.0%
Digital	4.1	3.5	.0	603	5.0%	8.2%	.0%	9.3%
BATISOFT	3.4	1.2	1.0	227	4.2%	2.9%	3.7%	3.5%
Datagraphic	3.1	1.5	1.3	55	3.9%	3.6%	4.8%	.8%
Hewlett-Packard	3.1	2.7	.0	185	3.8%	6.3%	.0%	2.8%
Assigraph	2.8	.0	2.3	0	3.4%	.0%	8.6%	.0%
Dassault*	2.4	.0	2.1	0	3.0%	.0%	7.9%	.0%
Star Informatic	1.3	.3	.8	24	1.6%	.7%	3.1%	.4%
Macao Systems	1.1	.6	.4	12	1.3%	1.4%	1.5%	.2%
Serbi	1.0	.1	.8	37	1.2%	.3%	3.2%	.6%
Sun Microsystems	.9	.7	.0	35	1.1%	1.7%	.0%	.5%
GDS	.8	.4	.4	13	1.0%	.9%	1.4%	.2%
CAD Centre	.8	.1	.5	4	1.0%	.2%	2.0%	.1%
Nemetschek	.7	.2	.4	18	.9%	.5%	1.7%	.3%
Graphisoft Software Dev	.6	.0	.6	0	.8%	.0%	2.4%	.0%

(Continued)

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Table 12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Silicon Graphics	.6	.5	.0	17	.7%	1.2%	.0%	.3%
Other Companies	7.2	7.7	.0	2,575	8.9%	18.0%	.0%	39.5%
All Companies	81.3	42.6	26.3	6,511	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	65.2	38.2	17.6	6,098	80.1%	89.7%	66.7%	93.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	16.2	4.4	8.8	413	19.9%	10.3%	33.3%	6.3%
All Hardware Companies	30.6	28.8	.0	5,691	37.6%	67.6%	.0%	87.4%
All Turnkey & SW Companies	50.7	13.8	26.3	820	62.4%	32.4%	100.0%	12.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 13
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	31.7	13.4	9.9	507	36.3%	31.5%	38.1%	15.9%
Sun Microsystems	9.6	7.8	.0	248	11.0%	18.3%	.0%	7.8%
ESRI	5.7	.0	4.6	0	6.5%	.0%	17.6%	.0%
IBM	5.7	4.9	.2	314	6.5%	11.5%	.8%	9.8%
Digital	4.0	3.0	.0	174	4.6%	7.0%	.0%	5.5%
Clemessy Geocity	3.5	1.9	.7	20	4.0%	4.5%	2.7%	.6%
APIC Systemes	3.0	.0	2.0	0	3.4%	.0%	7.7%	.0%
ICL	2.5	1.4	.9	71	2.8%	3.4%	3.3%	2.2%
Hewlett-Packard	2.3	1.9	.0	106	2.6%	4.5%	.0%	3.3%
Autodesk	2.2	.0	2.2	0	2.5%	.0%	8.4%	.0%
Star Informatic	1.3	.3	.8	18	1.5%	.6%	3.2%	.6%
Siemens Nixdorf Info systeme	1.3	.4	.5	21	1.4%	1.0%	1.8%	.6%
Unisys	.9	.2	.4	9	1.1%	.5%	1.5%	.3%
GDS	.7	.3	.3	11	.8%	.8%	1.2%	.4%
EME	.6	.2	.3	44	.7%	.4%	1.1%	1.4%
Other Companies	11.0	6.0	2.9	1,576	12.6%	14.0%	10.9%	49.4%
All Companies	87.4	42.6	26.1	3,191	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	75.0	38.2	20.7	3,014	85.8%	89.8%	79.4%	94.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	12.4	4.3	5.4	177	14.2%	10.2%	20.6%	5.5%
All Hardware Companies	26.0	22.4	.0	2,441	29.7%	52.6%	.0%	76.5%
All Turnkey & SW Companies	61.4	20.2	26.1	749	70.3%	47.4%	100.0%	23.5%

Source: Dataquest (July 1994)

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Table 14
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	33.1	26.2	.0	1,278	20.5%	33.9%	.0%	18.2%
Digital	17.8	14.0	.0	487	11.0%	18.1%	.0%	6.9%
Mentor Graphics	15.8	2.3	6.9	76	9.7%	2.9%	13.7%	1.1%
Cadence	15.0	.0	10.7	0	9.2%	.0%	21.2%	.0%
Hewlett-Packard	13.5	10.3	1.1	594	8.3%	13.3%	2.2%	8.4%
IBM	11.1	9.4	.8	777	6.8%	12.2%	1.5%	11.0%
COMPASS Design Automation	5.6	.0	4.5	0	3.5%	.0%	9.0%	.0%
Racal-Redac	3.7	.5	1.7	18	2.3%	.6%	3.4%	.3%
Synopsys	2.9	.0	2.0	0	1.8%	.0%	4.0%	.0%
Viewlogic Systems	2.9	.0	2.3	0	1.8%	.0%	4.6%	.0%
ALS Design	2.1	.2	1.8	25	1.3%	.2%	3.6%	.4%
Harris EDA	2.1	.2	1.3	11	1.3%	.2%	2.5%	.2%
Zycad	2.1	1.2	.3	27	1.3%	1.6%	.5%	.4%
Visionics	1.9	.0	1.8	0	1.2%	.0%	3.6%	.0%
Intergraph	1.7	.0	1.5	1	1.0%	.0%	3.0%	.0%
Silicon Graphics	1.6	1.4	.0	46	1.0%	1.8%	.0%	.6%
Autodesk	1.2	.0	1.2	0	.7%	.0%	2.4%	.0%
Computervision	1.1	.3	.3	16	.7%	.3%	.6%	.2%
Serbi	.9	.1	.8	36	.6%	.1%	1.6%	.5%

(Continued)

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Table 14 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
EME	.8	.2	.4	29	.5%	.2%	.7%	.4%
Other Companies	22.2	10.6	9.0	3,500	13.7%	13.7%	17.8%	49.8%
All Companies	161.9	77.3	50.5	7,032	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	152.7	76.4	44.2	6,914	94.3%	98.8%	87.6%	98.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	9.2	1.0	6.3	118	5.7%	1.2%	12.4%	1.7%
All Hardware Companies	85.0	70.8	.0	6,703	52.5%	91.5%	.0%	95.3%
All Turnkey & SW Companies	76.9	6.6	50.5	330	47.5%	8.5%	100.0%	4.7%

Source: Dataquest (July 1994)

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Table 15
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: France
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	20.1	15.8	.0	821	19.9%	33.5%	.0%	17.8%
Digital	10.8	8.5	.0	335	10.7%	17.9%	.0%	7.3%
Cadence	8.9	.0	6.4	0	8.8%	.0%	19.2%	.0%
Hewlett-Packard	8.6	6.2	1.1	379	8.6%	13.0%	3.3%	8.2%
Mentor Graphics	8.4	1.2	3.7	40	8.3%	2.5%	11.1%	.9%
IBM	5.7	5.4	.0	527	5.6%	11.3%	.0%	11.4%
COMPASS Design Automation	3.4	.0	2.7	0	3.3%	.0%	8.2%	.0%
Synopsys	2.9	.0	2.0	0	2.9%	.0%	6.2%	.0%
Viewlogic Systems	2.9	.0	2.3	0	2.9%	.0%	7.0%	.0%
Zycad	2.1	1.2	.3	27	2.1%	2.6%	.8%	.6%
ALS Design	1.6	.1	1.4	19	1.6%	.2%	4.2%	.4%
Silicon Graphics	1.5	1.4	.0	43	1.5%	2.9%	.0%	.9%
Autodesk	1.0	.0	1.0	0	1.0%	.0%	3.0%	.0%
Intergraph	.9	.0	.8	0	.9%	.0%	2.5%	.0%
Racal-Redac	.9	.1	.4	5	.9%	.3%	1.2%	.1%
Serbi	.9	.1	.8	36	.9%	.2%	2.4%	.8%

(Continued)

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Table 15 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Visionics	.5	.0	.5	0	.5%	.0%	1.6%	.0%
Other Companies	17.5	6.7	8.4	2,277	17.4%	14.2%	25.4%	49.3%
All Companies	100.8	47.3	33.0	4,617	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	96.4	46.9	29.6	4,550	95.7%	99.1%	89.7%	98.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	4.4	.4	3.4	66	4.3%	.9%	10.3%	1.4%
All Hardware Companies	52.4	43.5	.0	4,417	52.0%	92.0%	.0%	95.7%
All Turnkey & SW Companies	48.4	3.8	33.0	199	48.0%	8.0%	100.0%	4.3%

Source: Dataquest (July 1994)

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Table 16
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	10.3	8.2	.0	342	35.1%	54.5%	.0%	63.2%
Cadence	5.3	.0	3.8	0	18.1%	.0%	49.1%	.0%
Digital	3.8	2.9	.0	55	12.8%	19.6%	.0%	10.2%
Mentor Graphics	2.9	.4	1.3	14	9.7%	2.7%	16.3%	2.5%
IBM	2.3	2.1	.0	64	7.7%	14.0%	.0%	11.9%
COMPASS Design Automation	2.2	.0	1.8	0	7.6%	.0%	23.4%	.0%
Hewlett-Packard	1.5	1.2	.0	56	5.0%	8.3%	.0%	10.4%
Other Companies	.6	.1	.4	9	2.0%	.6%	4.9%	1.6%
All Companies	29.4	15.0	7.7	542	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	29.0	15.0	7.4	542	98.6%	100.0%	95.2%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.4	.0	.4	0	1.4%	.0%	4.8%	.0%
All Hardware Companies	17.9	14.6	.0	528	61.0%	97.2%	.0%	97.5%
All Turnkey & SW Companies	11.5	.4	7.7	14	39.0%	2.8%	100.0%	2.5%

Source: Dataquest (July 1994)

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Table 17
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: France
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Mentor Graphics	4.6	.7	2.0	22	14.4%	4.3%	20.5%	1.2%
Hewlett-Packard	3.4	2.9	.0	158	10.8%	19.2%	.0%	8.4%
Digital	3.3	2.6	.0	97	10.4%	17.3%	.0%	5.2%
IBM	3.1	2.0	.8	185	9.9%	13.1%	7.9%	9.9%
Racal-Redac	2.8	.3	1.3	13	8.8%	2.1%	13.4%	.7%
Sun Microsystems	2.8	2.2	.0	114	8.8%	14.6%	.0%	6.1%
Harris EDA	1.6	.1	1.0	8	5.1%	.9%	9.9%	.4%
Visionics	1.4	.0	1.3	0	4.4%	.0%	13.5%	.0%
Computervision	.8	.2	.2	12	2.5%	1.3%	2.4%	.6%
Cadence	.8	.0	.6	0	2.5%	.0%	5.7%	.0%
EME	.8	.2	.4	29	2.4%	1.2%	3.8%	1.6%
Intergraph	.6	.0	.6	0	2.0%	.1%	5.8%	.0%
ALS Design	.5	.0	.5	6	1.6%	.3%	4.6%	.3%
Other Companies	4.2	3.8	.2	1,214	13.1%	25.1%	2.3%	64.8%
All Companies	31.8	15.1	9.8	1,874	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	27.3	14.5	7.3	1,822	86.1%	96.4%	74.7%	97.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	4.4	.6	2.5	52	13.9%	3.6%	25.3%	2.8%
All Hardware Companies	14.6	12.7	.0	1,758	46.1%	84.4%	.0%	93.8%
All Turnkey & SW Companies	17.1	2.4	9.8	117	53.9%	15.6%	100.0%	6.2%

Source: Dataquest (July 1994)

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Software

CAD/CAM/CAE and GIS Europe Overview Market Share Update

Market Statistics

1994

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Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9404
Publication Date: July 11, 1994

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Note: All tables show estimated data.

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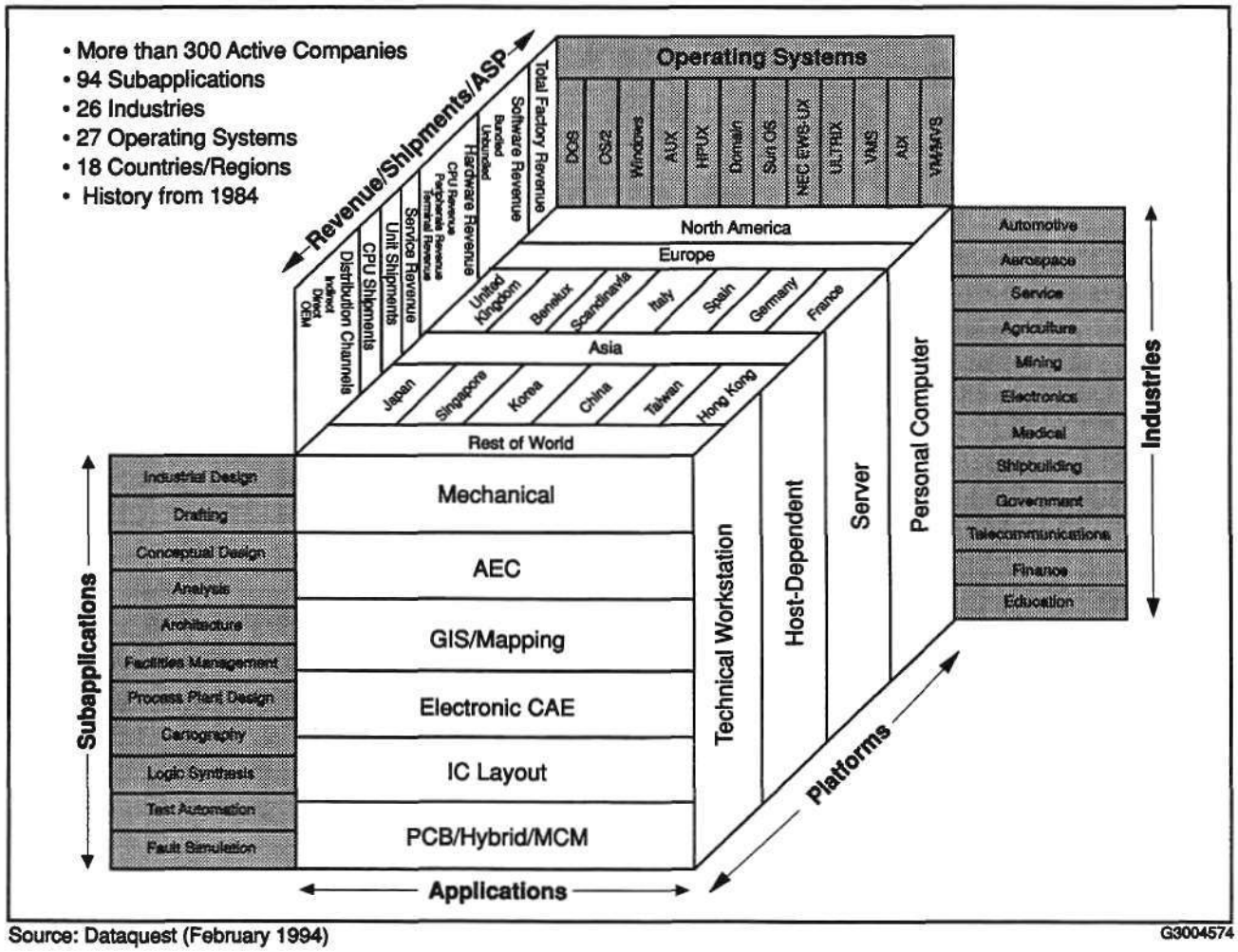
CAD/CAM/CAE and GIS Europe Overview Market Share Update

Introduction

CAD/CAM/CAE/GIS systems have dramatically changed the methods by which designers and production managers originate and implement products. CAD and CAE systems allow designers to create, draft, analyze, test, and manipulate products on a screen in two and three dimensions. As CAD/CAM/CAE/GIS systems continue to decrease in cost, they become more available and cost justifiable to new users.

In order to provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure 1.

Figure 1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (February 1994)

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Table 1
CAD/CAM/CAE/GIS 1992-1993 Market Summary

	Software Revenue 1992 ($M)	Software Revenue 1993 ($M)	Growth Rate (%)	Total Revenue 1992 ($M)	Total Revenue 1993 ($M)	Growth Rate (%)	Hardware Unit Shipments 1992	Hardware Unit Shipments 1993	Growth Rate (%)
Application									
Mechanical	2,170.4	2,294.7	5.7	7,988.2	7,862.7	-1.6	302,347	303,364	0.3
AEC	746.9	794.1	6.3	2,356.5	2,444.0	3.7	178,629	198,075	10.9
GIS/Mapping	580.1	662.2	14.2	2,005.6	2,179.1	8.7	86,513	102,624	18.6
Electronic CAE	741.5	797.1	7.5	2,086.4	2,271.7	8.9	94,176	99,129	5.3
IC Layout	212.7	203.0	-4.6	628.4	676.4	7.6	9,771	13,049	33.5
PCB/Hybrid/MCM	265.9	271.2	2.0	870.9	900.2	3.4	35,110	38,030	8.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
Region									
North America	1,562.5	1,754.6	12.3	5,253.5	5,690.7	8.3	286,939	325,318	13.4
Europe	1,693.8	1,608.9	-5.0	5,755.5	5,432.7	-5.6	231,062	240,603	4.1
Asia	1,352.7	1,534.4	13.4	4,601.2	4,830.6	5.0	169,839	163,620	-3.7
Rest of World	108.5	124.3	14.6	325.9	380.2	16.7	18,706	24,730	32.2
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
In Local Currencies									
Europe (ECU)	1,301.8	1,378.2	5.9	4,423.7	4,653.7	5.2			
Asia (yen)	170,895	170,093	-0.5	581,318	535,468	-7.9			
Platform									
Technical Workstation	3,060.1	3,312.8	8.3	9,640.0	10,458.3	8.5	173,705	194,848	12.2
Host-Dependent	360.2	306.1	-15.0	2,436.6	1,754.7	-28.0	34,524	28,573	-17.2
Server	140.0	176.2	25.9	906.3	1,056.8	16.6	11,566	13,381	15.7
Personal Computer	1,157.1	1,227.1	6.1	2,953.2	3,064.4	3.8	486,751	517,469	6.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8

Source: Dataquest (July 1994)

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A companion article analyzing major shifts in the 1993 market was published in our *Dataquest Perspective*, dated June 27, 1994.

Table 1 summarizes the performance in various segments of the CAD/CAM/CAE/GIS markets in 1993 versus 1992. With the devaluation of the dollar against the yen (¥126.34/$ in 1992 versus ¥110.85/$ in 1993) and the appreciation of the dollar against the ECU (ECU 0.7686/$ in 1992 versus ECU 0.8566/$ in 1993), actual growth is not as it appears when denominated in U.S. dollars. With 75 percent of the Asian market in Japan, denominating in yen gives a rough indication of real growth in the Asian market, which was a negative 7.9 percent.

About This Document

This document contains Dataquest's detailed market share information on the CAD/CAM/CAE/GIS industry. We no longer publish worldwide all-application market statistics for the entire CAD/CAM/CAE/GIS industry. This data is available by calling Suzanne Snygg at (408) 437-8241. The category "Other Companies" is the aggregation of small companies. More detailed data on these markets may be requested through our Client Inquiry service.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

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Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic Computer-Aided Engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of products). Schematic capture and simulation are examples of electronic CAE applications.
- IC Layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/Hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe. Market share data is available for each of these countries.

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong. Market share data is available for each of these countries.

Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed

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by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

Metrics

The following paragraphs define measurements.

- Total factory revenue is defined as the amount of money received by a manufacturer for its goods and services measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue). Total factory revenue is the sum of software revenue, hardware revenue, and service revenue.
- Unit shipment is defined as the number of seats delivered (number of possible simultaneous users of product delivered) excluding OEM shipments.

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- Hardware revenue is revenue derived from sales of CPUs (including operating systems), terminals (for host-dependent systems), and peripherals.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled application software.
- Service revenue is defined as all revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
  - Maintenance fees for hardware and software
  - Management and operations services—help desk, education and training, disaster recovery, vaulting, and configuration management.
  - Service bureau—project work, including construction of database, data conversion, product design, analysis, or manufacturing.
  - Application development—design and development of customized software applications or the modification, enhancement, or customization of existing software applications, adding new functionality.
  - Consulting revenue—assessment of CAD/CAM/CAE/GIS business and information technology needs and the formulation of a plan based on needs identification.
  - Implementation and integration services—planning, implementation, migration, and integration of software products (software network support and integration, account integration management, data center design, and construction).

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year and second quarter of the subsequent year, we survey all participants in each industry. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contacts at large companies. (Dataquest maintains a large contact database on all sources of information.) The following are examples of the job titles of people contacted for information:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning

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- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE/GIS marketing programs
- Market research analyst

The Audit Process

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks
- Articles in both the general and trade press
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice; Dataquest also checks with multiple sources at one company to cross-check data on that company.

Dataquest analysts have many years of experience in how to apply the above tools to get the most accurate information possible on a particular company (such as what to use when and what industry averages are). We believe that the estimates presented here are the most accurate and meaningful generally available today. It is the CAD/CAM/CAE/GIS group's policy to continually update our market information for any year, based on any new data received, in order to arrive at the most accurate market representation possible.

Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

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Publishing Schedule

We publish both market share and forecasting twice each year, allowing for timely distribution of data and thorough analysis and forecasting. Our annual delivery schedule is as follows:

- Market share data is available January 31. All tables will be published and distributed to clients by March 31.
- Forecasting from the market share tables provides a five-year forecast period, available after March 31. The books will be shipped by May 31.
- Final updated market share tables, based on additional data collection and analysis, will be completed by May 31. At this point, the market share database is frozen and will not be changed until the end of the year. For the next six months, supplementary market data will be based on this final market data. Books will be shipped by July 31.
- We provide complete final forecast tables by July 31. These tables take into consideration changes in the market share during the previous six months. Books will be shipped by September 30.

Database Changes

Tables 2 through 5 show changes made to the database since last year's market share update. PC clone manufacturers are no longer tracked individually. We continue to show PC sales by IBM, Hewlett-Packard, and Digital, which also sell other platforms. The 1993 sales of GeoVision Systems to SHL Systemhouse, Computervision-GIS to Unisys, Racal-Redac to Zuken, Chronologic to Viewlogic, ASG to Softdesk, CDC's mechanical software product to ICEM Technologies, PDA to MacNeal-Schwendler, and Logic Modeling Corporation to Synopsys; the merger of Sysdeco and SysScan; and the change of GDS to Convergent Group will be recognized in market reporting for 1994.

Table 2
Companies Renamed

Company Name	Renamed to:
Alper Systems	Sysdeco Ltd.
Areon	Kreon
CADAM	Altium
Catalpa	Catalpa groupe Missler
Geotrace Technologies	Cadlynx
Logic Control	Logic Systems Designers
RIB/RZB	RIB Bausoftware
Sener Sistemas Marinos	Sener Inginiera y Sistemas
STI Strassle	Strassle Informationssysteme
Test Systems Strategies	Summitt

Source: Dataquest (July 1994)

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Table 3
Companies (or CAD Portions Thereof) Sold/Merged

Company Name	Acquired by, Merged with, Technology Sold to:
ANACAD & Electrical Eng. Software	ANACAD-EES
Aries Technology	MacNeal-Schwendler
CAD Language Systems	Compass Design Automation
CAD/CAM Group	Data I/O
Comdisco	Cadence
DAT Standard info ssystemes	ISD Software
EEsof	Hewlett-Packard
Expertest	Sunrise Test
Fides Industrielle Automation	Strassle
HP Cade	Hewlett-Packard
Inca	Zycad
Infocel	Understanding Systems
PiE Design	Quickturn Design Systems
Quad Design Technology	Viewlogic
Wisdom Systems	ICAD

Source: Dataquest (July 1994)

Table 4
Companies Deleted

Company Removed from Database:
European
Asicom
Club Informatico SA
DATAID Technologies
DECISA
Micrograph
Olivetti*
Research Machines*
North American
Bechtel
CADLYNX
Compaq*
Dell Computer*
Engineering Systems Corporation
GeoQuest
Mega CADD
NCR Microelectronics
Object Design
Objectivity
Ontos
Quicklogic
The CAD Group
Ultimap

*We no longer follow individual PC clone makers.
Source: Dataquest (July 1994)

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Table 5
Companies Added

Company Added to Database:
European
APIC Systemes
ISD Software
SPEED
Ultimate Technology
North American
AT&T
Aptix
ARC SYS
EAGLE Point
Earth Resource Mapping
Graftek
Graphic Data Systems (GDS)
Model Technology
Systems Science Inc.
Tactics Int'l Ltd.
VLSI Libraries
Asian
Adam Net
Kozo
Okura
Tachnodia
TECHSPERT
Toshiba Engineering
Yokogawa Digital Computer

Source: Dataquest (July 1994)

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Table 6
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	910.5	607.9	156.9	39,718	16.8%	22.2%	9.7%	16.5%
Hewlett-Packard	477.2	344.1	45.0	18,445	8.8%	12.6%	2.8%	7.7%
Digital	455.2	359.2	.0	18,490	8.4%	13.1%	.0%	7.7%
Intergraph	338.4	128.8	113.2	5,443	6.2%	4.7%	7.0%	2.3%
Computervision	313.0	70.6	96.4	4,341	5.8%	2.6%	6.0%	1.8%
Sun Microsystems	274.2	218.7	.0	9,578	5.0%	8.0%	.0%	4.0%
Siemens Nixdorf Info systeme	211.8	85.9	63.4	6,025	3.9%	3.1%	3.9%	2.5%
Autodesk	132.2	.0	132.2	0	2.4%	.0%	8.2%	.0%
Silicon Graphics	119.4	104.5	.0	3,184	2.2%	3.8%	.0%	1.3%
Dassault*	92.9	.0	80.7	0	1.7%	.0%	5.0%	.0%
Mentor Graphics	91.8	13.0	40.2	439	1.7%	.5%	2.5%	.2%
Matra Datavision	77.5	26.1	43.6	1,427	1.4%	1.0%	2.7%	.6%
Nemetschek	73.4	22.2	44.7	1,793	1.4%	.8%	2.8%	.7%
EDS Unigraphics	70.0	20.8	33.2	1,062	1.3%	.8%	2.1%	.4%
Cadence	65.1	.0	46.6	0	1.2%	.0%	2.9%	.0%
IEZ	54.0	18.2	27.8	1,295	1.0%	.7%	1.7%	.5%
SDRC	51.3	.0	35.0	0	.9%	.0%	2.2%	.0%
Parametric Technology	49.3	.0	40.4	0	.9%	.0%	2.5%	.0%
Control Data Systems	46.4	24.0	9.3	656	.9%	.9%	.6%	.3%
ESRI	44.6	.0	36.0	0	.8%	.0%	2.2%	.0%
Applicon	38.5	12.7	15.0	424	.7%	.5%	.9%	.2%
Landmark Graphics	37.1	7.8	14.9	95	.7%	.3%	.9%	.0%

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ICL	36.6	21.4	12.6	1,052	.7%	.8%	.8%	.4%
Apple Computer	35.9	36.0	.0	7,564	.7%	1.3%	.0%	3.1%
Straessle Informationssysteme	33.1	4.6	20.8	480	.6%	.2%	1.3%	.2%
Wiechers Datentechnik	32.0	8.5	17.1	648	.6%	.3%	1.1%	.3%
Data Technology/DATECH*	31.9	7.5	21.1	7,003	.6%	.3%	1.3%	2.9%
ASCAD/ASCAM	28.2	16.7	8.7	436	.5%	.6%	.5%	.2%
Racal-Redac	26.4	3.3	12.2	135	.5%	.1%	.8%	.1%
Synopsys	25.4	.0	17.5	0	.5%	.0%	1.1%	.0%
CAD Lab	24.7	7.6	11.4	580	.5%	.3%	.7%	.2%
Sysdeco Ltd.	23.7	11.9	5.9	207	.4%	.4%	.4%	.1%
Investronica SA	23.6	14.8	6.2	808	.4%	.5%	.4%	.3%
Smallworld Systems	23.2	1.1	13.8	43	.4%	.0%	.9%	.0%
MacNeal-Schwendler	22.6	.0	21.6	0	.4%	.0%	1.3%	.0%
Marcus Computer Systeme	22.1	11.3	7.6	400	.4%	.4%	.5%	.2%
Cisigraph	21.3	5.8	11.3	319	.4%	.2%	.7%	.1%
Han Dataport	21.1	6.0	10.9	647	.4%	.2%	.7%	.3%
ISD Software	21.1	4.3	13.6	682	.4%	.2%	.8%	.3%
Cimatron	20.3	9.0	9.2	686	.4%	.3%	.6%	.3%
Altium*	20.1	.0	19.0	0	.4%	.0%	1.2%	.0%
Radan Computational	17.9	6.1	9.0	360	.3%	.2%	.6%	.1%
Isicad CAD/CAM Systeme	17.2	5.4	7.9	261	.3%	.2%	.5%	.1%
Digital Kienzle	16.4	8.2	4.6	248	.3%	.3%	.3%	.1%

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
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Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Engineering Computer Services*	15.7	6.2	5.5	427	.3%	.2%	.3%	.2%
Ziegler Informatics	15.2	.0	15.2	0	.3%	.0%	.9%	.0%
Delcam International	14.8	5.1	6.4	191	.3%	.2%	.4%	.1%
Soft-Tech Software Technologies	14.7	1.9	11.4	948	.3%	.1%	.7%	.4%
ABB Industria*	13.7	6.0	6.6	510	.3%	.2%	.4%	.2%
Tebis	13.3	3.5	2.0	89	.2%	.1%	.1%	.0%
Microway	13.2	7.9	4.0	145	.2%	.3%	.2%	.1%
Technische Computer Systeme	13.1	2.5	9.3	247	.2%	.1%	.6%	.1%
ItalCad	12.7	3.6	5.3	280	.2%	.1%	.3%	.1%
PDA Engineering	12.6	.0	11.8	0	.2%	.0%	.7%	.0%
PAFEC	12.0	3.8	6.5	155	.2%	.1%	.4%	.1%
GDS	11.6	5.4	5.1	186	.2%	.2%	.3%	.1%
Star Informatic	11.5	2.4	7.4	182	.2%	.1%	.5%	.1%
Viewlogic Systems	11.5	.0	9.3	0	.2%	.0%	.6%	.0%
Exapt	10.9	5.2	3.8	210	.2%	.2%	.2%	.1%
COMPASS Design Automation	10.8	.0	8.7	0	.2%	.0%	.5%	.0%
Harris EDA	10.4	.9	6.4	60	.2%	.0%	.4%	.0%
Laser-Scan	9.5	2.8	4.2	58	.2%	.1%	.3%	.0%
RIB/Bausoftware	9.4	.8	7.7	67	.2%	.0%	.5%	.0%
Logic Modeling Corp.	9.3	.0	8.1	0	.2%	.0%	.5%	.0%
Framasoft + CSI	9.0	.3	4.0	20	.2%	.0%	.3%	.0%
CAD Centre	8.9	.8	5.8	44	.2%	.0%	.4%	.0%

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

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Aucotec	8.8	2.4	4.4	348	.2%	.1%	.3%	.1%
Swanson Analysis	8.7	.0	7.8	0	.2%	.0%	.5%	.0%
Unisys	8.6	1.9	3.5	84	.2%	.1%	.2%	.0%
CAD Distribution	8.6	.3	7.5	45	.2%	.0%	.5%	.0%
Sysscan	8.5	3.4	2.5	88	.2%	.1%	.2%	.0%
CIMTEK*	8.2	2.8	4.4	75	.2%	.1%	.3%	.0%
Cimlinc	8.2	.3	4.1	19	.2%	.0%	.3%	.0%
Kockums Computer Systems	8.0	2.1	1.4	370	.1%	.1%	.1%	.2%
RoboCAD Solutions	7.8	.0	6.2	0	.1%	.0%	.4%	.0%
Hochtief	7.4	1.3	3.5	91	.1%	.0%	.2%	.0%
Serbi	7.0	.9	6.1	273	.1%	.0%	.4%	.1%
Moss Systems	6.7	.9	2.9	71	.1%	.0%	.2%	.0%
Sagantec	6.7	.0	6.1	0	.1%	.0%	.4%	.0%
Kohns & Poppenhaeger	6.6	3.0	2.6	76	.1%	.1%	.2%	.0%
Auto-Trol	6.3	2.2	2.5	78	.1%	.1%	.2%	.0%
Genasys II	6.2	.6	4.4	26	.1%	.0%	.3%	.0%
Complansoft CAD	6.2	3.1	3.1	148	.1%	.1%	.2%	.1%
APIC Systemes	5.9	.0	4.0	0	.1%	.0%	.2%	.0%
debis Systemhaus	5.9	1.3	3.8	39	.1%	.0%	.2%	.0%
ADRA Systems	5.7	.3	4.1	20	.1%	.0%	.3%	.0%
Zycad	5.4	3.1	.7	78	.1%	.1%	.0%	.0%
Gerber Systems	5.4	2.5	2.3	87	.1%	.1%	.1%	.0%

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
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Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Analogy	5.3	.0	4.3	0	.1%	.0%	.3%	.0%
mb Programme	5.3	2.2	2.2	120	.1%	.1%	.1%	.0%
Ground Modelling Systems	5.2	2.5	2.2	450	.1%	.1%	.1%	.2%
Quickturn Design Systems	5.1	1.5	2.5	31	.1%	.1%	.2%	.0%
Graphisoft Software Dev	4.9	.0	4.9	0	.1%	.0%	.3%	.0%
BATISOFT	4.8	1.8	1.4	322	.1%	.1%	.1%	.1%
Clemessy Geocity	4.5	2.5	.9	25	.1%	.1%	.1%	.0%
Triplan	4.3	1.7	2.2	64	.1%	.1%	.1%	.0%
Aspen Technology	4.3	.0	2.8	0	.1%	.0%	.2%	.0%
Kloeckner-Moeller	4.2	.9	3.0	42	.1%	.0%	.2%	.0%
LSI Logic	4.2	.3	3.3	8	.1%	.0%	.2%	.0%
Softronics	4.2	.9	3.4	322	.1%	.0%	.2%	.1%
Computer Services Consultants	4.2	.0	4.2	0	.1%	.0%	.3%	.0%
Altera	4.0	.0	3.5	0	.1%	.0%	.2%	.0%
Alias Research	4.0	.0	3.7	0	.1%	.0%	.2%	.0%
Cadtronic*	3.9	1.9	2.0	117	.1%	.1%	.1%	.0%
ANACAD EES	3.9	.0	3.8	0	.1%	.0%	.2%	.0%
Gable CAD Systems	3.9	2.8	.6	44	.1%	.1%	.0%	.0%
FHECOR*	3.7	.0	3.7	0	.1%	.0%	.2%	.0%
Micrografx	3.6	.0	3.6	0	.1%	.0%	.2%	.0%
Datagraphic	3.6	1.7	1.4	63	.1%	.1%	.1%	.0%
MARC	3.5	.0	3.4	0	.1%	.0%	.2%	.0%

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
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Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
FEA	3.3	.7	.9	196	.1%	.0%	.1%	.1%
GeoVision Systems	3.3	.2	1.8	6	.1%	.0%	.1%	.0%
Sener Inginiera y Sistemaus	3.2	.0	3.2	0	.1%	.0%	.2%	.0%
Xilinx	3.2	.0	2.8	0	.1%	.0%	.2%	.0%
Whessoe Computing Systems	3.2	.0	3.2	0	.1%	.0%	.2%	.0%
ISKA	3.0	1.3	1.2	54	.1%	.0%	.1%	.0%
Visionics	2.9	.0	2.8	0	.1%	.0%	.2%	.0%
Assigraph	2.8	.0	2.3	0	.1%	.0%	.1%	.0%
CATALPA groupe Missler	2.8	1.2	1.2	84	.1%	.0%	.1%	.0%
Caroline Informatique	2.7	.5	1.4	27	.0%	.0%	.1%	.0%
Geometria GIS Systems House	2.6	.2	.1	14	.0%	.0%	.0%	.0%
Zuken	2.6	.8	1.2	15	.0%	.0%	.1%	.0%
CAD-UL	2.6	.0	2.6	0	.0%	.0%	.2%	.0%
Mechanical Dynamics	2.5	.0	2.0	0	.0%	.0%	.1%	.0%
Orcad	2.5	.0	2.5	0	.0%	.0%	.2%	.0%
MCS	2.5	.1	2.1	14	.0%	.0%	.1%	.0%
Anilam Electronics	2.5	.5	1.8	0	.0%	.0%	.1%	.0%
ALS Design	2.4	.2	2.2	30	.0%	.0%	.1%	.0%
ICAD	2.4	.0	2.0	0	.0%	.0%	.1%	.0%
Lamp Software	2.4	.6	1.7	166	.0%	.0%	.1%	.1%
Vero International Software	2.4	.0	2.2	0	.0%	.0%	.1%	.0%
ERDAS	2.3	.5	1.6	41	.0%	.0%	.1%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Genrad	2.3	.4	1.5	26	.0%	.0%	.1%	.0%
Superdraft	2.3	1.0	1.0	164	.0%	.0%	.1%	.1%
Teradyne	2.2	.3	1.1	8	.0%	.0%	.1%	.0%
Synercom	2.2	.0	.9	0	.0%	.0%	.1%	.0%
Microsim	2.2	.0	2.1	0	.0%	.0%	.1%	.0%
BETRONEX	2.2	.1	2.1	42	.0%	.0%	.1%	.0%
Elstree Computing	2.1	.9	1.1	62	.0%	.0%	.1%	.0%
MapInfo	2.1	.0	1.8	0	.0%	.0%	.1%	.0%
Rasna Corporation	2.1	.0	1.9	0	.0%	.0%	.1%	.0%
EME	2.0	.5	.9	107	.0%	.0%	.1%	.0%
IKOS Systems	2.0	1.5	.5	25	.0%	.1%	.0%	.0%
FEGS	2.0	.0	.8	0	.0%	.0%	.0%	.0%
Enghouse Systems Ltd.	1.9	.1	1.7	9	.0%	.0%	.1%	.0%
ISDATA	1.8	.0	1.6	0	.0%	.0%	.1%	.0%
CAMTEK	1.8	.4	1.2	159	.0%	.0%	.1%	.1%
Pathtrace Engineering Systems	1.8	.4	1.0	46	.0%	.0%	.1%	.0%
Summitt	1.8	.0	1.6	0	.0%	.0%	.1%	.0%
Logic System Designers*	1.7	.7	.7	42	.0%	.0%	.0%	.0%
ETAK	1.7	.1	1.6	3	.0%	.0%	.1%	.0%
Sinus Software	1.7	.9	.6	40	.0%	.0%	.0%	.0%
MEDESIGN	1.7	.5	.6	18	.0%	.0%	.0%	.0%
Aplein*	1.7	1.6	.1	20	.0%	.1%	.0%	.0%

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Ascent Logic Corp	1.6	.0	1.3	0	.0%	.0%	.1%	.0%
Moda CAD	1.6	.3	1.1	15	.0%	.0%	.1%	.0%
Macao Systems	1.6	.8	.6	16	.0%	.0%	.0%	.0%
CAD-Capture	1.5	.3	.3	12	.0%	.0%	.0%	.0%
Graftek	1.5	.7	.6	192	.0%	.0%	.0%	.1%
Soft*	1.5	.0	1.1	0	.0%	.0%	.1%	.0%
PADS Software	1.5	.0	1.3	0	.0%	.0%	.1%	.0%
CADKEY	1.4	.0	1.3	0	.0%	.0%	.1%	.0%
ACTEL	1.4	.0	1.3	0	.0%	.0%	.1%	.0%
Point Control	1.4	.0	1.1	0	.0%	.0%	.1%	.0%
Dynamic Graphics	1.4	.0	.9	0	.0%	.0%	.1%	.0%
ULTImate Technology	1.4	.0	1.4	0	.0%	.0%	.1%	.0%
Data I/O	1.3	.0	1.3	0	.0%	.0%	.1%	.0%
Scientific & Engineering SW	1.3	.0	1.3	0	.0%	.0%	.1%	.0%
DELTA CAD*	1.2	.3	1.0	20	.0%	.0%	.1%	.0%
i-Logix	1.2	.0	1.1	0	.0%	.0%	.1%	.0%
Engineering Mechanics	1.2	.1	1.1	6	.0%	.0%	.1%	.0%
Aucos elektronische Gerate	1.2	.4	.8	127	.0%	.0%	.0%	.1%
Mucke Software	1.2	.5	.5	25	.0%	.0%	.0%	.0%
Contract Data Research	1.2	.0	.3	0	.0%	.0%	.0%	.0%
ARKTEC	1.1	.1	.9	44	.0%	.0%	.1%	.0%
CAD TECH Iberica*	1.1	.6	.4	32	.0%	.0%	.0%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sigma Design	1.1	.2	.8	21	.0%	.0%	.1%	.0%
CAMAX Systems Inc.	1.1	.1	.7	10	.0%	.0%	.0%	.0%
Softdesk	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
CADSI	1.0	.1	.8	7	.0%	.0%	.0%	.0%
Cascade Design Automation	1.0	.0	.8	0	.0%	.0%	.0%	.0%
Foresight Resources	1.0	.0	.9	0	.0%	.0%	.1%	.0%
Computational Mechanics	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
Speed	.9	.0	.9	0	.0%	.0%	.1%	.0%
Kreon	.9	.5	.2	17	.0%	.0%	.0%	.0%
DAPCO	.9	.0	.4	0	.0%	.0%	.0%	.0%
Other Companies	205.9	350.4	.0	96,226	3.8%	12.8%	.0%	40.0%
All Companies	5,432.7	2,736.5	1,608.9	240,603	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	4,222.8	2,339.4	1,033.7	209,552	77.7%	85.5%	64.3%	87.1%
All Asian-Based Companies	2.9	.9	1.4	18	.1%	.0%	.1%	.0%
All European-Based Companies	1,207.0	396.2	573.8	31,034	22.2%	14.5%	35.7%	12.9%
All Hardware Companies	1,884.6	1,645.5	2.5	190,123	34.7%	60.1%	.2%	79.0%
All Turnkey & SW Companies	3,548.1	1,091.1	1,606.4	50,480	65.3%	39.9%	99.8%	21.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 7
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	523.2	357.0	81.3	9,988	15.0%	22.7%	7.6%	15.7%
Hewlett-Packard	450.4	321.5	43.6	12,520	12.9%	20.4%	4.1%	19.7%
Computervision	306.5	70.0	91.2	4,227	8.8%	4.4%	8.5%	6.7%
Intergraph	278.8	108.1	89.1	3,584	8.0%	6.9%	8.3%	5.6%
Sun Microsystems	219.2	173.1	.0	8,567	6.3%	11.0%	.0%	13.5%
Siemens Nixdorf Info systeme	188.5	66.9	61.6	2,980	5.4%	4.2%	5.8%	4.7%
Digital	113.7	87.7	.0	4,476	3.3%	5.6%	.0%	7.0%
Silicon Graphics	101.6	89.3	.0	2,993	2.9%	5.7%	.0%	4.7%
Mentor Graphics	91.8	13.0	40.2	439	2.6%	.8%	3.8%	.7%
Matra Datavision	76.0	25.5	42.7	1,260	2.2%	1.6%	4.0%	2.0%
Cadence	60.8	.0	43.5	0	1.7%	.0%	4.1%	.0%
EDS Unigraphics	56.0	16.5	26.7	911	1.6%	1.0%	2.5%	1.4%
IBZ	54.0	18.2	27.8	1,295	1.5%	1.2%	2.6%	2.0%
SDRC	50.8	.0	34.7	0	1.5%	.0%	3.2%	.0%
Dassault*	49.6	.0	42.9	0	1.4%	.0%	4.0%	.0%
Parametric Technology	46.8	.0	38.4	0	1.3%	.0%	3.6%	.0%
Applicon	38.5	12.7	15.0	424	1.1%	.8%	1.4%	.7%
ICL	36.6	21.4	12.6	1,052	1.1%	1.4%	1.2%	1.7%
Straessle Informationssysteme	33.1	4.6	20.8	480	.9%	.3%	2.0%	.8%
Control Data Systems	28.5	13.8	7.8	446	.8%	.9%	.7%	.7%
ASCAD/ASCAM	27.3	16.1	8.5	413	.8%	1.0%	.8%	.6%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Synopsys	25.4	.0	17.5	0	.7%	.0%	1.6%	.0%
Sysdeco Ltd.	23.7	11.9	5.9	207	.7%	.8%	.6%	.3%
Smallworld Systems	23.2	1.1	13.8	43	.7%	.1%	1.3%	.1%
Racal-Redac	22.8	3.3	10.1	135	.7%	.2%	.9%	.2%
Landmark Graphics	22.4	4.6	9.0	57	.6%	.3%	.8%	.1%
Marcus Computer Systeme	22.1	11.3	7.6	400	.6%	.7%	.7%	.6%
CAD Lab	19.3	5.9	8.9	315	.6%	.4%	.8%	.5%
Cisigraph	19.2	5.2	10.1	305	.5%	.3%	.9%	.5%
ISD Software	18.5	4.3	11.0	682	.5%	.3%	1.0%	1.1%
Han Dataport	17.9	4.9	9.2	521	.5%	.3%	.9%	.8%
ESRI	17.8	.0	13.7	0	.5%	.0%	1.3%	.0%
Radan Computational	17.8	6.1	8.9	343	.5%	.4%	.8%	.5%
Digital Kienzle	16.4	8.2	4.6	248	.5%	.5%	.4%	.4%
Nemetschek	15.4	4.7	9.4	182	.4%	.3%	.9%	.3%
Isicad CAD/CAM Systeme	15.4	5.4	6.1	261	.4%	.3%	.6%	.4%
Delcam International	14.2	4.9	6.2	173	.4%	.3%	.6%	.3%
Wiechers Datentechnik	14.1	4.9	6.3	340	.4%	.3%	.6%	.5%
ItalCad	12.7	3.6	5.3	280	.4%	.2%	.5%	.4%
GDS	11.6	5.4	5.1	186	.3%	.3%	.5%	.3%
PDA Engineering	11.3	.0	10.6	0	.3%	.0%	1.0%	.0%
Star Informatic	11.2	2.2	7.2	154	.3%	.1%	.7%	.2%

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cimatron	11.2	4.9	5.1	228	.3%	.3%	.5%	.4%
PAFEC	10.8	3.8	5.4	155	.3%	.2%	.5%	.2%
COMPASS Design Automation	10.8	.0	8.7	0	.3%	.0%	.8%	.0%
Microway	9.4	5.7	2.9	93	.3%	.4%	.3%	.1%
Harris EDA	9.2	.7	5.5	41	.3%	.0%	.5%	.1%
Logic Modeling Corp.	9.2	.0	8.0	0	.3%	.0%	.7%	.0%
Laser-Scan	9.0	2.5	4.1	55	.3%	.2%	.4%	.1%
CAD Centre	8.9	.8	5.8	44	.3%	.0%	.5%	.1%
Framasoft + CSI	8.1	.3	3.6	20	.2%	.0%	.3%	.0%
Kockums Computer Systems	8.0	2.1	1.4	370	.2%	.1%	.1%	.6%
Technische Computer Systeme	7.9	1.6	5.2	86	.2%	.1%	.5%	.1%
Cimlinc	7.7	.3	3.9	18	.2%	.0%	.4%	.0%
CIMTEK*	7.6	2.7	4.0	67	.2%	.2%	.4%	.1%
Viewlogic Systems	7.6	.0	5.3	0	.2%	.0%	.5%	.0%
Engineering Computer Services*	7.5	2.9	2.5	100	.2%	.2%	.2%	.2%
MacNeal-Schwendler	6.8	.0	5.7	0	.2%	.0%	.5%	.0%
Moss Systems	6.7	.9	2.9	71	.2%	.1%	.3%	.1%
Sagantec	6.7	.0	6.1	0	.2%	.0%	.6%	.0%
Autodesk	6.6	.0	6.6	0	.2%	.0%	.6%	.0%
Kohns & Poppenhaeger	6.6	3.0	2.6	76	.2%	.2%	.2%	.1%
Auto-Trol	6.3	2.2	2.5	78	.2%	.1%	.2%	.1%

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Complansoft CAD	6.2	3.1	3.1	148	.2%	.2%	.3%	.2%
Unisys	6.1	1.4	2.5	58	.2%	.1%	.2%	.1%
APIC Systemes	5.9	.0	4.0	0	.2%	.0%	.4%	.0%
Genasys II	5.6	.6	3.9	12	.2%	.0%	.4%	.0%
Swanson Analysis	5.4	.0	4.9	0	.2%	.0%	.5%	.0%
Gerber Systems	5.4	2.5	2.3	87	.2%	.2%	.2%	.1%
Analogy	5.2	.0	4.2	0	.1%	.0%	.4%	.0%
Quickturn Design Systems	5.1	1.5	2.5	31	.1%	.1%	.2%	.0%
debis Systemhaus	4.6	1.0	3.0	22	.1%	.1%	.3%	.0%
Sysscan	4.5	1.5	1.6	56	.1%	.1%	.2%	.1%
Clemessy Geocity	4.5	2.5	.9	25	.1%	.2%	.1%	.0%
Triplan	4.3	1.7	2.2	64	.1%	.1%	.2%	.1%
ADRA Systems	4.1	.3	2.8	20	.1%	.0%	.3%	.0%
Alias Research	4.0	.0	3.7	0	.1%	.0%	.3%	.0%
LSI Logic	4.0	.3	3.1	7	.1%	.0%	.3%	.0%
Gable CAD Systems	3.9	2.8	.6	44	.1%	.2%	.1%	.1%
Data Technology/DATECH*	3.8	.0	3.5	0	.1%	.0%	.3%	.0%
Zycad	3.6	2.1	.4	53	.1%	.1%	.0%	.1%
ANACAD EES	3.5	.0	3.4	0	.1%	.0%	.3%	.0%
Exapt	3.3	1.6	1.2	112	.1%	.1%	.1%	.2%
Sener Inginiera y Sistemaus	3.2	.0	3.2	0	.1%	.0%	.3%	.0%

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Aspen Technology	3.2	.0	2.1	0	.1%	.0%	.2%	.0%
ISKA	3.0	1.3	1.2	54	.1%	.1%	.1%	.1%
RIB/Bausoftware	2.8	.2	2.3	14	.1%	.0%	.2%	.0%
GeoVision Systems	2.8	.2	1.5	6	.1%	.0%	.1%	.0%
MARC	2.6	.0	2.5	0	.1%	.0%	.2%	.0%
Zuken	2.6	.8	1.2	15	.1%	.0%	.1%	.0%
Assigraph	2.6	.0	2.1	0	.1%	.0%	.2%	.0%
ICAD	2.4	.0	2.0	0	.1%	.0%	.2%	.0%
Aucotec	2.2	.4	1.1	42	.1%	.0%	.1%	.1%
Gerrad	2.1	.3	1.4	21	.1%	.0%	.1%	.0%
FEGS	2.0	.0	.8	0	.1%	.0%	.1%	.0%
Mechanical Dynamics	1.8	.0	1.5	0	.1%	.0%	.1%	.0%
ERDAS	1.7	.4	1.2	10	.0%	.0%	.1%	.0%
Geometria GIS Systems House	1.7	.1	.1	3	.0%	.0%	.0%	.0%
Sinus Software	1.7	.9	.6	40	.0%	.1%	.1%	.1%
Summitt	1.7	.0	1.5	0	.0%	.0%	.1%	.0%
Caroline Informatique	1.7	.3	.9	9	.0%	.0%	.1%	.0%
MEDESIGN	1.7	.5	.6	18	.0%	.0%	.1%	.0%
Rasna Corporation	1.7	.0	1.5	0	.0%	.0%	.1%	.0%
Aplein*	1.7	1.6	.1	20	.0%	.1%	.0%	.0%
CATALPA groupe Missler	1.7	.7	.8	19	.0%	.0%	.1%	.0%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Synercom	1.7	.0	.7	0	.0%	.0%	.1%	.0%
Teradyne	1.6	.2	.6	6	.0%	.0%	.1%	.0%
Dynamic Graphics	1.3	.0	.9	0	.0%	.0%	.1%	.0%
Scientific & Engineering SW	1.3	.0	1.3	0	.0%	.0%	.1%	.0%
MCS	1.3	.0	1.1	3	.0%	.0%	.1%	.0%
FEA	1.3	.3	.3	19	.0%	.0%	.0%	.0%
i-Logix	1.2	.0	1.1	0	.0%	.0%	.1%	.0%
Graftek	1.2	.5	.5	124	.0%	.0%	.0%	.2%
Ascent Logic Corp	1.2	.0	.9	0	.0%	.0%	.1%	.0%
Macao Systems	1.2	.6	.4	13	.0%	.0%	.0%	.0%
CAMAX Systems Inc.	1.1	.1	.7	10	.0%	.0%	.1%	.0%
Xilinx	1.0	.0	.8	0	.0%	.0%	.1%	.0%
Cascade Design Automation	1.0	.0	.8	0	.0%	.0%	.1%	.0%
Sigma Design	1.0	.2	.7	14	.0%	.0%	.1%	.0%
Speed	.9	.0	.9	0	.0%	.0%	.1%	.0%
DAPCO	.9	.0	.4	0	.0%	.0%	.0%	.0%
EME	.9	.2	.4	22	.0%	.0%	.0%	.0%
CADSI	.8	.1	.6	3	.0%	.0%	.1%	.0%
CAD TECH Iberica*	.8	.4	.3	17	.0%	.0%	.0%	.0%
Engineering Mechanics	.7	.1	.6	6	.0%	.0%	.1%	.0%
Lamp Software	.6	.2	.4	54	.0%	.0%	.0%	.1%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
FHECOR*	.6	.0	.6	0	.0%	.0%	.1%	.0%
CAD-UL	.5	.0	.5	0	.0%	.0%	.0%	.0%
ISDATA	.5	.0	.5	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	3,483.2	1,574.3	1,068.6	63,549	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2,629.8	1,292.9	684.6	49,730	75.5%	82.1%	64.1%	78.3%
All Asian-Based Companies	2.9	.9	1.4	18	.1%	.1%	.1%	.0%
All European-Based Companies	850.5	280.6	382.6	13,801	24.4%	17.8%	35.8%	21.7%
All Hardware Companies	919.7	774.3	2.5	31,618	26.4%	49.2%	.2%	49.8%
All Turnkey & SW Companies	2,563.5	800.0	1,066.1	31,931	73.6%	50.8%	99.8%	50.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 8
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	227.9	131.6	46.2	3,918	40.9%	34.6%	60.7%	44.1%
Digital	144.9	112.4	.0	0	26.0%	29.5%	.0%	.0%
Dassault*	31.3	.0	27.6	0	5.6%	.0%	36.3%	.0%
Control Data Systems	16.2	9.2	1.4	192	2.9%	2.4%	1.8%	2.2%
MacNeal-Schwendler	15.8	.0	15.8	0	2.8%	.0%	20.8%	.0%
Exapt	7.6	3.6	2.7	98	1.4%	1.0%	3.5%	1.1%
Siemens Nixdorf Info systeme	6.3	2.8	1.7	98	1.1%	.7%	2.3%	1.1%
PDA Engineering	1.3	.0	1.2	0	.2%	.0%	1.5%	.0%
Aspen Technology	1.1	.0	.7	0	.2%	.0%	.9%	.0%
Swanson Analysis	1.0	.0	.8	0	.2%	.0%	1.0%	.0%
Framasoft + CSI	.9	.0	.4	0	.2%	.0%	.6%	.0%
MARC	.9	.0	.8	0	.2%	.0%	1.1%	.0%
debis Systemhaus	.6	.1	.4	2	.1%	.0%	.6%	.0%
Synercom	.6	.0	.2	0	.1%	.0%	.3%	.0%
Mechanical Dynamics	.5	.0	.4	0	.1%	.0%	.6%	.0%
SDRC	.5	.0	.4	0	.1%	.0%	.5%	.0%
Other Companies	95.7	120.1	.0	4,494	17.2%	31.5%	.0%	50.6%
All Companies	557.5	380.7	76.0	8,886	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	539.7	373.6	69.4	8,680	96.8%	98.1%	91.3%	97.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	17.7	7.2	6.6	207	3.2%	1.9%	8.7%	2.3%
All Hardware Companies	278.9	238.3	.0	4,615	50.0%	62.6%	.0%	51.9%
All Turnkey & SW Companies	278.6	142.5	76.0	4,271	50.0%	37.4%	100.0%	48.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 9
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	155.5	120.2	.0	1,517	40.9%	49.9%	.0%	36.9%
Sun Microsystems	54.9	45.6	.0	1,011	14.4%	18.9%	.0%	24.6%
IBM	48.5	28.5	10.3	561	12.7%	11.8%	19.2%	13.6%
Intergraph	28.6	11.4	8.6	339	7.5%	4.7%	16.0%	8.2%
Silicon Graphics	17.8	15.2	.0	191	4.7%	6.3%	.0%	4.6%
ESRI	17.6	.0	13.6	0	4.6%	.0%	25.2%	.0%
Landmark Graphics	14.8	3.1	5.9	38	3.9%	1.3%	10.9%	.9%
EDS Unigraphics	14.0	4.3	6.5	151	3.7%	1.8%	12.1%	3.7%
Dassault*	12.0	.0	10.3	0	3.1%	.0%	19.1%	.0%
Hewlett-Packard	5.3	4.4	.0	82	1.4%	1.8%	.0%	2.0%
Cadence	4.3	.0	3.1	0	1.1%	.0%	5.7%	.0%
Sysscan	4.0	1.9	.8	32	1.1%	.8%	1.6%	.8%
Cisigraph	2.1	.6	1.1	14	.6%	.2%	2.1%	.3%
Unisys	2.1	.5	.9	11	.5%	.2%	1.6%	.3%
IKOS Systems	2.0	1.5	.5	25	.5%	.6%	1.0%	.6%
Han Dataport	2.0	.9	.8	57	.5%	.4%	1.4%	1.4%
Control Data Systems	1.8	1.0	.2	18	.5%	.4%	.4%	.4%
Zycad	1.8	1.0	.2	25	.5%	.4%	.4%	.6%
Computervision	1.5	.6	.2	16	.4%	.2%	.3%	.4%

(Continued)

Table 9 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Teradyne	.7	.2	.4	2	.2%	.1%	.8%	.0%
Other Companies	.0	.2	.0	23	.0%	.1%	.0%	.6%
All Companies	380.6	240.8	53.7	4,116	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	372.2	237.5	50.7	4,013	97.8%	98.6%	94.3%	97.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	8.4	3.3	3.1	103	2.2%	1.4%	5.7%	2.5%
All Hardware Companies	241.7	192.6	.0	2,957	63.5%	80.0%	.0%	71.8%
All Turnkey & SW Companies	138.9	48.2	53.7	1,159	36.5%	20.0%	100.0%	28.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 10
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Autodesk	125.6	.0	125.6	0	12.4%	.0%	30.6%	.0%
IBM	111.0	90.9	19.0	25,250	11.0%	16.8%	4.6%	15.4%
Nemetschek	58.0	17.5	35.3	1,611	5.7%	3.2%	8.6%	1.0%
Digital	41.1	39.0	.0	12,497	4.1%	7.2%	.0%	7.6%
Apple Computer	35.9	36.0	.0	7,564	3.6%	6.6%	.0%	4.6%
Intergraph	31.0	9.3	15.5	1,519	3.1%	1.7%	3.8%	.9%
Data Technology/DATECH*	28.1	7.5	17.7	7,003	2.8%	1.4%	4.3%	4.3%
Investronica SA	23.6	14.8	6.2	808	2.3%	2.7%	1.5%	.5%
Hewlett-Packard	21.5	18.2	1.4	5,844	2.1%	3.4%	.3%	3.6%
Altium*	20.1	.0	19.0	0	2.0%	.0%	4.6%	.0%
Wiechers Datentechnik	18.0	3.6	10.8	309	1.8%	.7%	2.6%	.2%
Siemens Nixdorf Info systeme	17.1	16.2	.0	2,948	1.7%	3.0%	.0%	1.8%
Ziegler Informatics	15.2	.0	15.2	0	1.5%	.0%	3.7%	.0%
Soft-Tech Software Technologies	14.7	1.9	11.4	948	1.5%	.3%	2.8%	.6%
ABB Industria*	13.7	6.0	6.6	510	1.4%	1.1%	1.6%	.3%
Tebis	13.3	3.5	2.0	89	1.3%	.6%	.5%	.1%
Cimatron	9.1	4.0	4.2	458	.9%	.7%	1.0%	.3%
ESRI	8.9	.0	8.5	0	.9%	.0%	2.1%	.0%
Engineering Computer Services*	8.3	3.4	3.0	327	.8%	.6%	.7%	.2%
CAD Distribution	8.2	.2	7.1	44	.8%	.0%	1.7%	.0%
RoboCAD Solutions	7.8	.0	6.2	0	.8%	.0%	1.5%	.0%
Hochtief	7.3	1.2	3.5	90	.7%	.2%	.8%	.1%
Serbi	7.0	.9	6.1	273	.7%	.2%	1.5%	.2%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
RIB/Bausoftware	6.6	.6	5.4	52	.7%	.1%	1.3%	.0%
Aucotec	6.6	2.0	3.3	306	.7%	.4%	.8%	.2%
CAD Lab	5.4	1.7	2.5	266	.5%	.3%	.6%	.2%
mb Programme	5.3	2.2	2.2	120	.5%	.4%	.5%	.1%
Technische Computer Systeme	5.3	.9	4.0	161	.5%	.2%	1.0%	.1%
Ground Modelling Systems	5.2	2.5	2.2	450	.5%	.5%	.5%	.3%
Computervision	5.0	.0	5.0	98	.5%	.0%	1.2%	.1%
Graphisoft Software Dev	4.9	.0	4.9	0	.5%	.0%	1.2%	.0%
BATISOFT	4.8	1.8	1.4	322	.5%	.3%	.3%	.2%
Kloeckner-Moeller	4.2	.9	3.0	42	.4%	.2%	.7%	.0%
Softronics	4.2	.9	3.4	322	.4%	.2%	.8%	.2%
Computer Services Consultants	4.2	.0	4.2	0	.4%	.0%	1.0%	.0%
Altera	4.0	.0	3.5	0	.4%	.0%	.9%	.0%
Viewlogic Systems	4.0	.0	4.0	0	.4%	.0%	1.0%	.0%
Cadtronic*	3.9	1.9	2.0	117	.4%	.4%	.5%	.1%
Microway	3.8	2.2	1.1	52	.4%	.4%	.3%	.0%
Micrografx	3.6	.0	3.6	0	.4%	.0%	.9%	.0%
Racal-Redac	3.6	.0	2.1	0	.4%	.0%	.5%	.0%
Datagraphic	3.6	1.7	1.4	63	.4%	.3%	.3%	.0%
FHECOR*	3.1	.0	3.1	0	.3%	.0%	.8%	.0%
Visionics	2.9	.0	2.8	0	.3%	.0%	.7%	.0%
ISD Software	2.6	.0	2.6	0	.3%	.0%	.6%	.0%
Orcad	2.5	.0	2.5	0	.3%	.0%	.6%	.0%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Anilam Electronics	2.5	.5	1.8	0	.2%	.1%	.4%	.0%
Parametric Technology	2.5	.0	2.0	0	.2%	.0%	.5%	.0%
Whessoe Computing Systems	2.5	.0	2.5	0	.2%	.0%	.6%	.0%
ALS Design	2.4	.2	2.1	30	.2%	.0%	.5%	.0%
Vero International Software	2.4	.0	2.2	0	.2%	.0%	.5%	.0%
Swanson Analysis	2.4	.0	2.1	0	.2%	.0%	.5%	.0%
Superdraft	2.3	1.0	1.0	164	.2%	.2%	.3%	.1%
Xilinx	2.2	.0	2.0	0	.2%	.0%	.5%	.0%
BETRONEX	2.2	.1	2.1	42	.2%	.0%	.5%	.0%
Elstree Computing	2.1	.9	1.1	62	.2%	.2%	.3%	.0%
CAD-UL	2.1	.0	2.1	0	.2%	.0%	.5%	.0%
MapInfo	2.0	.0	1.8	0	.2%	.0%	.4%	.0%
Microsim	1.9	.0	1.8	0	.2%	.0%	.4%	.0%
Isicad CAD/CAM Systeme	1.8	.0	1.8	0	.2%	.0%	.4%	.0%
Pathtrace Engineering Systems	1.8	.4	1.0	46	.2%	.1%	.2%	.0%
FEA	1.8	.4	.4	176	.2%	.1%	.1%	.1%
CAMTEK	1.7	.4	1.2	157	.2%	.1%	.3%	.1%
Lamp Software	1.6	.3	1.3	110	.2%	.1%	.3%	.1%
ADRA Systems	1.6	.0	1.3	0	.2%	.0%	.3%	.0%
Moda CAD	1.6	.3	1.1	15	.2%	.1%	.3%	.0%
Matra Datavision	1.5	.7	.8	167	.2%	.1%	.2%	.1%
Enghouse Systems Ltd.	1.5	.0	1.3	6	.1%	.0%	.3%	.0%
CADKEY	1.4	.0	1.3	0	.1%	.0%	.3%	.0%

(Continued)

Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ULTImate Technology	1.4	.0	1.4	0	.1%	.0%	.3%	.0%
Soft*	1.4	.0	1.0	0	.1%	.0%	.2%	.0%
PADS Software	1.4	.0	1.2	0	.1%	.0%	.3%	.0%
ETAK	1.3	.1	1.3	2	.1%	.0%	.3%	.0%
Point Control	1.3	.0	1.0	0	.1%	.0%	.2%	.0%
Han Dataport	1.3	.2	.9	69	.1%	.0%	.2%	.0%
DELTA CAD*	1.2	.3	1.0	20	.1%	.0%	.2%	.0%
CAD-Capture	1.2	.2	.2	10	.1%	.0%	.1%	.0%
ISDATA	1.2	.0	1.1	0	.1%	.0%	.3%	.0%
Logic System Designers*	1.2	.4	.6	37	.1%	.1%	.1%	.0%
MCS	1.2	.0	1.0	10	.1%	.0%	.2%	.0%
Data I/O	1.2	.0	1.2	0	.1%	.0%	.3%	.0%
Aucos elektronische Gerate	1.2	.4	.8	127	.1%	.1%	.2%	.1%
Mucke Software	1.2	.5	.5	25	.1%	.1%	.1%	.0%
Contract Data Research	1.2	.0	.3	0	.1%	.0%	.1%	.0%
EME	1.2	.3	.5	85	.1%	.1%	.1%	.1%
PAFEC	1.1	.0	1.1	0	.1%	.0%	.3%	.0%
CATALPA groupe Missler	1.1	.5	.5	65	.1%	.1%	.1%	.0%
Caroline Informatique	1.0	.2	.5	19	.1%	.0%	.1%	.0%
Harris EDA	1.0	.1	.8	13	.1%	.0%	.2%	.0%
ARKTEC	1.0	.1	.8	41	.1%	.0%	.2%	.0%
Foresight Resources	1.0	.0	.9	0	.1%	.0%	.2%	.0%
Softdesk	1.0	.0	.9	0	.1%	.0%	.2%	.0%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ACTEL	.9	.0	.8	0	.1%	.0%	.2%	.0%
Geometria GIS Systems House	.9	.1	.0	10	.1%	.0%	.0%	.0%
Kreon	.9	.5	.2	17	.1%	.1%	.1%	.0%
ASCAD/ASCAM	.9	.5	.3	23	.1%	.1%	.1%	.0%
debis Systemhaus	.7	.2	.4	15	.1%	.0%	.1%	.0%
Genasys II	.6	.0	.4	14	.1%	.0%	.1%	.0%
Delcam International	.6	.2	.3	18	.1%	.0%	.1%	.0%
ERDAS	.6	.1	.4	30	.1%	.0%	.1%	.0%
Other Companies	185.2	236.9	.0	91,872	18.3%	43.8%	.0%	56.0%
All Companies	1,011.5	540.8	410.6	164,051	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	681.2	435.6	229.1	147,128	67.3%	80.5%	55.8%	89.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	330.3	105.2	181.6	16,923	32.7%	19.5%	44.2%	10.3%
All Hardware Companies	444.3	440.3	.0	150,932	43.9%	81.4%	.0%	92.0%
All Turnkey & SW Companies	567.2	100.5	410.6	13,119	56.1%	18.6%	100.0%	8.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 11
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	635.9	381.0	136.4	18,754	22.1%	25.6%	17.4%	18.6%
Hewlett-Packard	306.6	208.6	35.8	10,409	10.7%	14.0%	4.6%	10.3%
Computervision	278.9	62.8	86.3	3,847	9.7%	4.2%	11.0%	3.8%
Digital	274.7	217.8	.0	9,804	9.6%	14.6%	.0%	9.7%
Silicon Graphics	105.2	92.1	.0	2,789	3.7%	6.2%	.0%	2.8%
Sun Microsystems	86.7	69.5	.0	2,848	3.0%	4.7%	.0%	2.8%
Dassault*	85.1	.0	73.9	0	3.0%	.0%	9.5%	.0%
Matra Datavision	76.7	25.9	43.1	1,414	2.7%	1.7%	5.5%	1.4%
EDS Unigraphics	70.0	20.8	33.2	1,062	2.4%	1.4%	4.2%	1.1%
Siemens Nixdorf Info systeme	62.9	30.9	12.0	2,924	2.2%	2.1%	1.5%	2.9%
Intergraph	62.7	22.7	19.9	877	2.2%	1.5%	2.5%	.9%
Autodesk	52.9	.0	52.9	0	1.8%	.0%	6.8%	.0%
SDRC	51.3	.0	35.0	0	1.8%	.0%	4.5%	.0%
Parametric Technology	49.3	.0	40.4	0	1.7%	.0%	5.2%	.0%
Control Data Systems	45.3	23.1	9.3	622	1.6%	1.6%	1.2%	.6%
Applicon	38.5	12.7	15.0	424	1.3%	.9%	1.9%	.4%
ASCAD/ASCAM	28.2	16.7	8.7	436	1.0%	1.1%	1.1%	.4%
CAD Lab	24.7	7.6	11.4	580	.9%	.5%	1.5%	.6%
Straessle Informationssysteme	23.6	3.9	14.3	405	.8%	.3%	1.8%	.4%
Investronica SA	23.6	14.8	6.2	808	.8%	1.0%	.8%	.8%
Marcus Computer Systeme	22.1	11.3	7.6	400	.8%	.8%	1.0%	.4%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
MacNeal-Schwendler	21.8	.0	20.8	0	.8%	.0%	2.7%	.0%
Cisigraph	21.3	5.8	11.3	319	.7%	.4%	1.4%	.3%
ISD Software	20.6	4.3	13.0	682	.7%	.3%	1.7%	.7%
Cimatron	20.3	9.0	9.2	686	.7%	.6%	1.2%	.7%
Data Technology/DATECH*	19.3	5.0	12.4	962	.7%	.3%	1.6%	1.0%
Wiechers Datentechnik	18.1	3.9	10.5	324	.6%	.3%	1.3%	.3%
Digital Kienzle	16.4	8.2	4.6	248	.6%	.5%	.6%	.2%
Radan Computational	16.1	5.5	8.1	324	.6%	.4%	1.0%	.3%
Engineering Computer Services*	15.7	6.2	5.5	427	.5%	.4%	.7%	.4%
Altium*	15.6	.0	14.8	0	.5%	.0%	1.9%	.0%
Delcam International	14.8	5.1	6.4	191	.5%	.3%	.8%	.2%
Tebis	13.3	3.5	2.0	89	.5%	.2%	.3%	.1%
Apple Computer	12.6	12.6	.0	2,646	.4%	.8%	.0%	2.6%
PDA Engineering	12.6	.0	11.8	0	.4%	.0%	1.5%	.0%
Isicad CAD/CAM Systeme	11.5	4.0	4.6	195	.4%	.3%	.6%	.2%
Exapt	10.9	5.2	3.8	210	.4%	.4%	.5%	.2%
ICL	10.0	5.8	3.4	287	.3%	.4%	.4%	.3%
Framasoft + CSI	9.0	.3	4.0	20	.3%	.0%	.5%	.0%
Swanson Analysis	8.7	.0	7.8	0	.3%	.0%	1.0%	.0%
PAFEC	8.6	2.6	4.9	107	.3%	.2%	.6%	.1%
Han Dataport	8.4	2.3	4.3	255	.3%	.2%	.6%	.3%

(Continued)

Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ItalCad	8.4	2.4	3.5	185	.3%	.2%	.5%	.2%
CIMTEK*	8.2	2.8	4.4	75	.3%	.2%	.6%	.1%
Cimlinc	8.2	.3	4.1	19	.3%	.0%	.5%	.0%
Ziegler Informatics	6.0	.0	6.0	0	.2%	.0%	.8%	.0%
ADRA Systems	5.7	.3	4.1	20	.2%	.0%	.5%	.0%
Gerber Systems	5.4	2.5	2.3	87	.2%	.2%	.3%	.1%
Serbi	5.1	.6	4.5	200	.2%	.0%	.6%	.2%
ABB Industria*	5.1	2.2	2.4	189	.2%	.2%	.3%	.2%
Auto-Trol	4.5	1.5	1.8	55	.2%	.1%	.2%	.1%
CAD Distribution	4.1	.1	3.6	22	.1%	.0%	.5%	.0%
Alias Research	4.0	.0	3.7	0	.1%	.0%	.5%	.0%
Technische Computer Systeme	3.9	.8	2.8	74	.1%	.1%	.4%	.1%
MARC	3.5	.0	3.4	0	.1%	.0%	.4%	.0%
RoboCAD Solutions	3.3	.0	2.6	0	.1%	.0%	.3%	.0%
FEA	3.3	.7	.9	196	.1%	.0%	.1%	.2%
Whessoe Computing Systems	3.2	.0	3.2	0	.1%	.0%	.4%	.0%
debis Systemhaus	3.1	.7	2.0	22	.1%	.0%	.3%	.0%
CATALPA groupe Missler	2.8	1.2	1.2	84	.1%	.1%	.2%	.1%
Kloeckner-Moeller	2.8	.6	1.9	0	.1%	.0%	.2%	.0%
Caroline Informatique	2.7	.5	1.4	27	.1%	.0%	.2%	.0%
Mechanical Dynamics	2.5	.0	2.0	0	.1%	.0%	.3%	.0%

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
MCS	2.5	.1	2.1	14	.1%	.0%	.3%	.0%
Anilam Electronics	2.5	.5	1.8	0	.1%	.0%	.2%	.0%
Vero International Software	2.4	.0	2.2	0	.1%	.0%	.3%	.0%
Superdraft	2.3	1.0	1.0	164	.1%	.1%	.1%	.2%
ICAD	2.3	.0	1.9	0	.1%	.0%	.2%	.0%
ISKA	2.1	.9	.9	39	.1%	.1%	.1%	.0%
Rasna Corporation	2.1	.0	1.9	0	.1%	.0%	.2%	.0%
FEGS	2.0	.0	.8	0	.1%	.0%	.1%	.0%
CAMTEK	1.8	.4	1.2	159	.1%	.0%	.2%	.2%
Pathtrace Engineering Systems	1.8	.4	1.0	46	.1%	.0%	.1%	.0%
Logic System Designers*	1.7	.7	.7	42	.1%	.0%	.1%	.0%
Softronics	1.6	.3	1.3	123	.1%	.0%	.2%	.1%
Micrografx	1.5	.0	1.5	0	.1%	.0%	.2%	.0%
Graftek	1.5	.7	.6	192	.1%	.0%	.1%	.2%
Point Control	1.4	.0	1.1	0	.0%	.0%	.1%	.0%
Engineering Mechanics	1.2	.1	1.1	6	.0%	.0%	.1%	.0%
CAD TECH Iberica*	1.1	.6	.4	32	.0%	.0%	.0%	.0%
Moda CAD	1.1	.2	.8	10	.0%	.0%	.1%	.0%
CAMAX Systems Inc.	1.1	.1	.7	10	.0%	.0%	.1%	.0%
CADSI	1.0	.1	.8	7	.0%	.0%	.1%	.0%
Cadtronic*	1.0	.6	.4	37	.0%	.0%	.0%	.0%

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Computational Mechanics	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
DELTA CAD*	.9	.2	.7	15	.0%	.0%	.1%	.0%
Kreon	.9	.5	.2	17	.0%	.0%	.0%	.0%
CAD-Capture	.8	.2	.1	6	.0%	.0%	.0%	.0%
Aplein*	.6	.6	.0	8	.0%	.0%	.0%	.0%
FHECOR*	.6	.0	.6	0	.0%	.0%	.1%	.0%
CAD Centre	.6	.0	.5	0	.0%	.0%	.1%	.0%
EME	.6	.1	.3	31	.0%	.0%	.0%	.0%
Other Companies	24.8	151.7	.0	32,055	.9%	10.2%	.0%	31.8%
All Companies	2,873.8	1,488.5	782.0	100,647	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2,347.1	1,296.5	546.8	85,647	81.7%	87.1%	69.9%	85.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	526.7	192.0	235.3	15,000	18.3%	12.9%	30.1%	14.9%
All Hardware Companies	910.1	790.0	.0	71,203	31.7%	53.1%	.0%	70.7%
All Turnkey & SW Companies	1,963.8	698.5	782.0	29,445	68.3%	46.9%	100.0%	29.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 12
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	128.4	101.2	13.0	11,360	14.3%	22.5%	4.1%	15.1%
Intergraph	126.7	47.9	40.1	2,363	14.2%	10.6%	12.8%	3.1%
Nemetschek	73.4	22.2	44.7	1,793	8.2%	4.9%	14.3%	2.4%
Autodesk	56.9	.0	56.9	0	6.4%	.0%	18.1%	.0%
IEZ	54.0	18.2	27.8	1,295	6.0%	4.0%	8.9%	1.7%
Hewlett-Packard	28.5	24.4	.0	1,692	3.2%	5.4%	.0%	2.2%
Computervision	25.7	5.9	7.6	374	2.9%	1.3%	2.4%	.5%
Digital	24.5	21.1	.0	3,621	2.7%	4.7%	.0%	4.8%
Apple Computer	20.4	20.4	.0	4,292	2.3%	4.5%	.0%	5.7%
Siemens Nixdorf Info systeme	20.0	10.8	2.9	932	2.2%	2.4%	.9%	1.2%
Soft-Tech Software Technologies	14.7	1.9	11.4	948	1.6%	.4%	3.6%	1.3%
Han Dataport	12.7	3.7	6.5	392	1.4%	.8%	2.1%	.5%
Microway	12.5	7.5	3.8	138	1.4%	1.7%	1.2%	.2%
Wiechers Datentechnik	12.3	4.3	5.5	296	1.4%	1.0%	1.8%	.4%
Data Technology/DATECH*	11.2	2.1	7.8	5,709	1.3%	.5%	2.5%	7.6%
CAD Centre	8.3	.8	5.3	44	.9%	.2%	1.7%	.1%
Kockums Computer Systems	8.0	2.1	1.4	370	.9%	.5%	.5%	.5%
Technische Computer Systeme	7.9	1.5	5.6	148	.9%	.3%	1.8%	.2%
Dassault*	7.8	.0	6.8	0	.9%	.0%	2.2%	.0%
Hochtief	7.4	1.3	3.5	91	.8%	.3%	1.1%	.1%
RIB/Bausoftware	7.4	.5	6.1	45	.8%	.1%	2.0%	.1%

(Continued)

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Table 12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
GDS	6.8	3.1	3.0	108	.8%	.7%	1.0%	.1%
Moss Systems	6.7	.9	2.9	71	.8%	.2%	.9%	.1%
Complansoft CAD	6.2	3.1	3.1	148	.7%	.7%	1.0%	.2%
Sun Microsystems	6.0	4.7	.0	225	.7%	1.0%	.0%	.3%
Isicad CAD/CAM Systeme	5.6	1.4	3.3	65	.6%	.3%	1.1%	.1%
mb Programme	5.3	2.2	2.2	120	.6%	.5%	.7%	.2%
ABB Industria*	5.1	2.2	2.4	189	.6%	.5%	.8%	.3%
Graphisoft Software Dev	4.9	.0	4.9	0	.5%	.0%	1.6%	.0%
BATISOFT	4.8	1.8	1.4	322	.5%	.4%	.4%	.4%
Star Informatic	4.3	.9	2.7	83	.5%	.2%	.9%	.1%
Aspen Technology	4.3	.0	2.8	0	.5%	.0%	.9%	.0%
Computer Services Consultants	4.2	.0	4.2	0	.5%	.0%	1.3%	.0%
RoboCAD Solutions	4.1	.0	3.2	0	.5%	.0%	1.0%	.0%
Gable CAD Systems	3.9	2.8	.6	44	.4%	.6%	.2%	.1%
ItalCad	3.8	1.1	1.6	84	.4%	.2%	.5%	.1%
Datagraphic	3.6	1.7	1.4	63	.4%	.4%	.5%	.1%
Triplan	3.5	1.4	1.7	52	.4%	.3%	.6%	.1%
CAD Distribution	3.4	.1	2.9	18	.4%	.0%	.9%	.0%
Silicon Graphics	3.2	2.8	.0	95	.4%	.6%	.0%	.1%
Sener Inginiera y Sistemaus	3.2	.0	3.2	0	.4%	.0%	1.0%	.0%
FHECOR*	3.1	.0	3.1	0	.3%	.0%	1.0%	.0%

(Continued)

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Table 12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cadtronic*	2.9	1.3	1.6	80	.3%	.3%	.5%	.1%
Assigraph	2.8	.0	2.3	0	.3%	.0%	.7%	.0%
Ziegler Informatics	2.4	.0	2.4	0	.3%	.0%	.8%	.0%
Ground Modelling Systems	2.3	1.2	.9	211	.3%	.3%	.3%	.3%
Lamp Software	2.2	.5	1.6	152	.2%	.1%	.5%	.2%
Elstree Computing	2.1	.9	1.1	62	.2%	.2%	.4%	.1%
Micrografx	2.1	.0	2.1	0	.2%	.0%	.7%	.0%
Auto-Trol	1.8	.6	.7	23	.2%	.1%	.2%	.0%
Radan Computational	1.8	.6	.9	36	.2%	.1%	.3%	.0%
Altium*	1.8	.0	1.7	0	.2%	.0%	.5%	.0%
Softronics	1.8	.4	1.4	135	.2%	.1%	.4%	.2%
Sinus Software	1.7	.9	.6	40	.2%	.2%	.2%	.1%
MEDESIGN	1.7	.5	.6	18	.2%	.1%	.2%	.0%
Macao Systems	1.6	.8	.6	16	.2%	.2%	.2%	.0%
Soft*	1.5	.0	1.1	0	.2%	.0%	.4%	.0%
Mucke Software	1.2	.5	.5	25	.1%	.1%	.1%	.0%
ARKTEC	1.1	.1	.9	44	.1%	.0%	.3%	.1%
CADKEY	1.1	.0	1.0	0	.1%	.0%	.3%	.0%
Sigma Design	1.1	.2	.8	21	.1%	.0%	.3%	.0%
Aplein*	1.0	1.0	.1	13	.1%	.2%	.0%	.0%
Serbi	1.0	.1	.8	37	.1%	.0%	.3%	.0%

(Continued)

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Table 12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Softdesk	.9	.0	.9	0	.1%	.0%	.3%	.0%
Matra Datavision	.8	.3	.4	13	.1%	.1%	.1%	.0%
PAFEC	.6	.2	.3	10	.1%	.0%	.1%	.0%
Other Companies	88.9	111.9	.0	36,678	9.9%	24.8%	.0%	48.8%
All Companies	895.1	450.4	313.4	75,229	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	564.7	348.2	137.1	65,231	63.1%	77.3%	43.8%	86.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	330.5	102.2	176.2	9,999	36.9%	22.7%	56.2%	13.3%
All Hardware Companies	281.6	268.0	.0	63,239	31.5%	59.5%	.0%	84.1%
All Turnkey & SW Companies	613.5	182.3	313.4	11,990	68.5%	40.5%	100.0%	15.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 13
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Intergraph	137.5	58.2	43.0	2,198	18.2%	17.1%	17.5%	8.7%
Siemens Nixdorf Info systeme	126.5	42.9	48.2	2,055	16.7%	12.6%	19.6%	8.1%
IBM	55.7	46.6	3.0	2,874	7.4%	13.7%	1.2%	11.3%
Digital	50.1	37.2	.0	2,176	6.6%	10.9%	.0%	8.6%
ESRI	44.6	.0	36.0	0	5.9%	.0%	14.6%	.0%
Sun Microsystems	39.0	31.8	.0	1,010	5.2%	9.3%	.0%	4.0%
Landmark Graphics	37.1	7.8	14.9	95	4.9%	2.3%	6.1%	.4%
Hewlett-Packard	30.0	25.6	.0	1,412	4.0%	7.5%	.0%	5.6%
ICL	26.0	15.2	9.0	749	3.4%	4.5%	3.7%	2.9%
Sysdeco Ltd.	23.7	11.9	5.9	207	3.1%	3.5%	2.4%	.8%
Smallworld Systems	23.2	1.1	13.8	43	3.1%	.3%	5.6%	.2%
Autodesk	14.5	.0	14.5	0	1.9%	.0%	5.9%	.0%
Laser-Scan	9.5	2.8	4.2	58	1.3%	.8%	1.7%	.2%
Straessle Informationssysteme	9.4	.7	6.5	75	1.2%	.2%	2.7%	.3%
Unisys	8.6	1.9	3.5	84	1.1%	.6%	1.4%	.3%
Sysscan	8.5	3.4	2.5	88	1.1%	1.0%	1.0%	.3%
Kohns & Poppenhaeger	6.6	3.0	2.6	76	.9%	.9%	1.1%	.3%
Genasys II	6.2	.6	4.4	26	.8%	.2%	1.8%	.1%
Star Informatic	6.0	1.2	3.8	81	.8%	.4%	1.6%	.3%
APIC Systemes	5.9	.0	4.0	0	.8%	.0%	1.6%	.0%
GDS	4.9	2.2	2.1	78	.6%	.7%	.9%	.3%

(Continued)

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Table 13 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Clemessy Geocity	4.5	2.5	.9	25	.6%	.7%	.4%	.1%
GeoVision Systems	3.3	.2	1.8	6	.4%	.1%	.7%	.0%
Ground Modelling Systems	2.9	1.3	1.3	239	.4%	.4%	.5%	.9%
PAFEC	2.7	.9	1.3	38	.4%	.3%	.5%	.2%
Geometria GIS Systems House	2.6	.2	.1	14	.3%	.1%	.0%	.1%
ERDAS	2.2	.5	1.5	39	.3%	.2%	.6%	.2%
Synercom	2.2	.0	.9	0	.3%	.0%	.4%	.0%
Computervision	2.2	.5	.6	26	.3%	.2%	.3%	.1%
MapInfo	2.1	.0	1.8	0	.3%	.0%	.7%	.0%
RIB/Bausoftware	2.0	.2	1.6	22	.3%	.1%	.6%	.1%
Ziegler Informatics	2.0	.0	2.0	0	.3%	.0%	.8%	.0%
Enghouse Systems Ltd.	1.9	.1	1.7	9	.3%	.0%	.7%	.0%
ABB Industria*	1.9	.8	.9	71	.3%	.2%	.4%	.3%
Silicon Graphics	1.9	1.6	.0	47	.2%	.5%	.0%	.2%
ETAK	1.7	.1	1.6	3	.2%	.0%	.7%	.0%
Dynamic Graphics	1.4	.0	.9	0	.2%	.0%	.4%	.0%
Contract Data Research	1.2	.0	.3	0	.2%	.0%	.1%	.0%
Apple Computer	.9	.9	.0	189	.1%	.3%	.0%	.7%
Triplan	.8	.3	.4	12	.1%	.1%	.2%	.0%
Control Data Systems	.7	.6	.0	22	.1%	.2%	.0%	.1%
DAPCO	.7	.0	.3	0	.1%	.0%	.1%	.0%

(Continued)

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Table 13 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Microway	.7	.4	.2	7	.1%	.1%	.1%	.0%
EME	.6	.2	.3	45	.1%	.1%	.1%	.2%
Softronics	.5	.1	.4	41	.1%	.0%	.2%	.2%
ItalCad	.5	.2	.2	11	.1%	.0%	.1%	.0%
Other Companies	36.7	34.1	2.0	11,133	4.9%	10.0%	.8%	43.8%
All Companies	755.8	339.9	246.0	25,397	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	486.4	250.0	135.2	21,094	64.4%	73.6%	55.0%	83.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	269.4	89.8	110.7	4,303	35.6%	26.4%	45.0%	16.9%
All Hardware Companies	198.4	170.2	.0	18,656	26.3%	50.1%	.0%	73.5%
All Turnkey & SW Companies	557.4	169.6	246.0	6,741	73.7%	49.9%	100.0%	26.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 14
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	142.5	112.7	.0	5,495	15.7%	24.6%	.0%	14.0%
Hewlett-Packard	112.1	85.5	9.1	4,931	12.3%	18.7%	3.4%	12.5%
Digital	105.9	83.1	.0	2,890	11.7%	18.2%	.0%	7.3%
Mentor Graphics	91.8	13.0	40.2	439	10.1%	2.8%	15.0%	1.1%
IBM	90.5	79.1	4.5	6,729	10.0%	17.3%	1.7%	17.1%
Cadence	65.1	.0	46.6	0	7.2%	.0%	17.4%	.0%
Racal-Redac	26.4	3.3	12.2	135	2.9%	.7%	4.5%	.3%
Synopsys	25.4	.0	17.5	0	2.8%	.0%	6.5%	.0%
Intergraph	11.5	.2	10.2	5	1.3%	.0%	3.8%	.0%
Viewlogic Systems	11.5	.0	9.3	0	1.3%	.0%	3.5%	.0%
COMPASS Design Automation	10.8	.0	8.7	0	1.2%	.0%	3.3%	.0%
Harris EDA	10.4	.9	6.4	60	1.1%	.2%	2.4%	.2%
Logic Modeling Corp.	9.3	.0	8.1	0	1.0%	.0%	3.0%	.0%
Silicon Graphics	9.0	7.9	.0	253	1.0%	1.7%	.0%	.6%
Aucotec	8.8	2.4	4.4	348	1.0%	.5%	1.6%	.9%
Autodesk	7.9	.0	7.9	0	.9%	.0%	3.0%	.0%
Sagantec	6.7	.0	6.1	0	.7%	.0%	2.3%	.0%
Computervision	6.3	1.5	1.8	93	.7%	.3%	.7%	.2%
Zycad	5.4	3.1	.7	78	.6%	.7%	.2%	.2%
Analogy	5.3	.0	4.3	0	.6%	.0%	1.6%	.0%
Quickturn Design Systems	5.1	1.5	2.5	31	.6%	.3%	.9%	.1%

(Continued)

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Table 14 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Ziegler Informatics	4.7	.0	4.7	0	.5%	.0%	1.8%	.0%
LSI Logic	4.2	.3	3.3	8	.5%	.1%	1.2%	.0%
Altera	4.0	.0	3.5	0	.4%	.0%	1.3%	.0%
ANACAD EES	3.9	.0	3.8	0	.4%	.0%	1.4%	.0%
Xilinx	3.2	.0	2.8	0	.4%	.0%	1.0%	.0%
Visionics	2.9	.0	2.8	0	.3%	.0%	1.0%	.0%
debis Systemhaus	2.8	.6	1.8	17	.3%	.1%	.7%	.0%
Altium*	2.7	.0	2.6	0	.3%	.0%	1.0%	.0%
Zuken	2.6	.8	1.2	15	.3%	.2%	.5%	.0%
CAD-UL	2.6	.0	2.6	0	.3%	.0%	1.0%	.0%
Orcad	2.5	.0	2.5	0	.3%	.0%	.9%	.0%
Siemens Nixdorf Info systeme	2.4	1.3	.4	114	.3%	.3%	.1%	.3%
ALS Design	2.4	.2	2.2	30	.3%	.0%	.8%	.1%
Genrad	2.3	.4	1.5	26	.3%	.1%	.6%	.1%
Teradyne	2.2	.3	1.1	8	.2%	.1%	.4%	.0%
Microsim	2.2	.0	2.1	0	.2%	.0%	.8%	.0%
BETRONEX	2.2	.1	2.1	42	.2%	.0%	.8%	.1%
Apple Computer	2.1	2.1	.0	436	.2%	.5%	.0%	1.1%
IKOS Systems	2.0	1.5	.5	25	.2%	.3%	.2%	.1%
ISDATA	1.8	.0	1.6	0	.2%	.0%	.6%	.0%
Summitt	1.8	.0	1.6	0	.2%	.0%	.6%	.0%

(Continued)

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Table 14 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Wiechers Datentechnik	1.7	.3	1.0	29	.2%	.1%	.4%	.1%
ABB Industria*	1.6	.7	.8	61	.2%	.2%	.3%	.2%
Ascent Logic Corp	1.6	.0	1.3	0	.2%	.0%	.5%	.0%
PADS Software	1.5	.0	1.3	0	.2%	.0%	.5%	.0%
Kloeckner-Moeller	1.4	.3	1.0	42	.2%	.1%	.4%	.1%
ACTEL	1.4	.0	1.3	0	.2%	.0%	.5%	.0%
Data Technology/DATECH*	1.4	.3	1.0	332	.2%	.1%	.4%	.8%
ULTImate Technology	1.4	.0	1.4	0	.2%	.0%	.5%	.0%
Data I/O	1.3	.0	1.3	0	.1%	.0%	.5%	.0%
Scientific & Engineering SW	1.3	.0	1.3	0	.1%	.0%	.5%	.0%
Technische Computer Systeme	1.3	.3	.9	25	.1%	.1%	.3%	.1%
Star Informatic	1.3	.2	.8	17	.1%	.1%	.3%	.0%
i-Logix	1.2	.0	1.1	0	.1%	.0%	.4%	.0%
Aucos elektronische Gerate	1.2	.4	.8	127	.1%	.1%	.3%	.3%
Cascade Design Automation	1.0	.0	.8	0	.1%	.0%	.3%	.0%
Serbi	.9	.1	.8	36	.1%	.0%	.3%	.1%
Speed	.9	.0	.9	0	.1%	.0%	.3%	.0%
CAD Distribution	.9	.0	.8	5	.1%	.0%	.3%	.0%
ISKA	.9	.4	.4	15	.1%	.1%	.1%	.0%
EME	.8	.2	.4	32	.1%	.0%	.1%	.1%
MacNeal-Schwendler	.8	.0	.8	0	.1%	.0%	.3%	.0%

(Continued)

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Table 14 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ICL	.6	.3	.2	16	.1%	.1%	.1%	.0%
Other Companies	55.6	52.6	1.8	16,361	6.1%	11.5%	.7%	41.6%
All Companies	908.0	457.8	267.6	39,330	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	824.7	444.7	214.6	37,580	90.8%	97.1%	80.2%	95.6%
All Asian-Based Companies	2.9	.9	1.4	18	.3%	.2%	.5%	.0%
All European-Based Companies	80.4	12.2	51.6	1,732	8.9%	2.7%	19.3%	4.4%
All Hardware Companies	494.5	417.2	2.5	37,026	54.5%	91.1%	.9%	94.1%
All Turnkey & SW Companies	413.5	40.6	265.0	2,304	45.5%	8.9%	99.1%	5.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 15
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	86.2	68.1	.0	3,531	15.1%	24.2%	.0%	13.5%
Hewlett-Packard	71.6	51.2	9.1	3,151	12.6%	18.2%	5.1%	12.1%
Digital	63.8	50.2	.0	1,986	11.2%	17.8%	.0%	7.6%
IBM	50.4	47.4	.0	4,663	8.8%	16.8%	.0%	17.9%
Mentor Graphics	48.6	6.9	21.3	232	8.5%	2.5%	11.9%	.9%
Cadence	38.6	.0	27.6	0	6.8%	.0%	15.5%	.0%
Synopsys	25.4	.0	17.5	0	4.5%	.0%	9.8%	.0%
Viewlogic Systems	11.5	.0	9.3	0	2.0%	.0%	5.2%	.0%
Logic Modeling Corp.	9.3	.0	8.1	0	1.6%	.0%	4.5%	.0%
Aucotec	8.8	2.4	4.4	348	1.5%	.9%	2.5%	1.3%
Silicon Graphics	8.6	7.5	.0	239	1.5%	2.7%	.0%	.9%
Racal-Redac	7.4	1.1	3.3	44	1.3%	.4%	1.8%	.2%
Autodesk	6.6	.0	6.6	0	1.2%	.0%	3.7%	.0%
COMPASS Design Automation	6.5	.0	5.2	0	1.1%	.0%	2.9%	.0%
Intergraph	6.4	.1	5.6	3	1.1%	.0%	3.2%	.0%
Zycad	5.4	3.1	.7	78	.9%	1.1%	.4%	.3%
Analogy	5.3	.0	4.3	0	.9%	.0%	2.4%	.0%
Quickturn Design Systems	5.1	1.5	2.5	31	.9%	.5%	1.4%	.1%
Altera	4.0	.0	3.5	0	.7%	.0%	2.0%	.0%
ANACAD EES	3.9	.0	3.8	0	.7%	.0%	2.1%	.0%
Harris EDA	3.8	.4	2.4	27	.7%	.1%	1.4%	.1%
LSI Logic	3.8	.3	3.0	7	.7%	.1%	1.7%	.0%

(Continued)

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Table 15 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Xilinx	3.2	.0	2.8	0	.6%	.0%	1.5%	.0%
debis Systemhaus	2.8	.6	1.8	17	.5%	.2%	1.0%	.1%
Ziegler Informatics	2.5	.0	2.5	0	.4%	.0%	1.4%	.0%
Siemens Nixdorf Info systeme	2.4	1.3	.4	114	.4%	.5%	.2%	.4%
Genrad	2.3	.4	1.5	26	.4%	.1%	.9%	.1%
Teradyne	2.2	.3	1.1	8	.4%	.1%	.6%	.0%
Microsim	2.2	.0	2.1	0	.4%	.0%	1.2%	.0%
IKOS Systems	2.0	1.5	.5	25	.4%	.5%	.3%	.1%
Apple Computer	1.9	1.9	.0	392	.3%	.7%	.0%	1.5%
ISDATA	1.8	.0	1.6	0	.3%	.0%	.9%	.0%
Summitt	1.8	.0	1.6	0	.3%	.0%	.9%	.0%
Orcad	1.8	.0	1.8	0	.3%	.0%	1.0%	.0%
Wiechers Datentechnik	1.7	.3	1.0	29	.3%	.1%	.6%	.1%
Computervision	1.7	.4	.5	25	.3%	.1%	.3%	.1%
Ascent Logic Corp	1.6	.0	1.3	0	.3%	.0%	.7%	.0%
ALS Design	1.6	.1	1.4	19	.3%	.0%	.8%	.1%
Kloeckner-Moeller	1.4	.3	1.0	42	.3%	.1%	.6%	.2%
ACTEL	1.4	.0	1.3	0	.3%	.0%	.7%	.0%
Zuken	1.4	.4	.7	8	.2%	.1%	.4%	.0%
Data I/O	1.3	.0	1.3	0	.2%	.0%	.7%	.0%
Scientific & Engineering SW	1.3	.0	1.3	0	.2%	.0%	.7%	.0%
Technische Computer Systeme	1.3	.3	.9	25	.2%	.1%	.5%	.1%

(Continued)

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Table 15 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Star Informatic	1.3	.2	.8	17	.2%	.1%	.5%	.1%
i-Logix	1.2	.0	1.1	0	.2%	.0%	.6%	.0%
ABB Industria*	1.2	.5	.6	46	.2%	.2%	.3%	.2%
Aucos elektronische Gerate	1.2	.4	.8	127	.2%	.1%	.4%	.5%
Serbi	.9	.1	.8	36	.2%	.0%	.4%	.1%
Speed	.9	.0	.9	0	.2%	.0%	.5%	.0%
CAD Distribution	.9	.0	.8	5	.2%	.0%	.4%	.0%
ISKA	.9	.4	.4	15	.1%	.1%	.2%	.1%
Visionics	.8	.0	.8	0	.1%	.0%	.4%	.0%
MacNeal-Schwendler	.8	.0	.8	0	.1%	.0%	.4%	.0%
Data Technology/DATECH*	.8	.3	.5	318	.1%	.1%	.3%	1.2%
Other Companies	35.3	31.8	2.9	10,436	6.2%	11.3%	1.6%	40.0%
All Companies	570.2	281.6	178.7	26,095	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	524.6	271.9	150.9	24,546	92.0%	96.5%	84.5%	94.1%
All Asian-Based Companies	1.4	.4	.7	8	.2%	.1%	.4%	.0%
All European-Based Companies	44.2	9.3	27.1	1,541	7.7%	3.3%	15.2%	5.9%
All Hardware Companies	304.4	256.5	2.5	24,425	53.4%	91.1%	1.4%	93.6%
All Turnkey & SW Companies	265.8	25.1	176.2	1,670	46.6%	8.9%	98.6%	6.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 16
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	44.3	35.1	.0	1,472	29.2%	42.4%	.0%	50.1%
Cadence	23.1	.0	16.5	0	15.2%	.0%	46.1%	.0%
Digital	22.4	17.4	.0	327	14.8%	21.1%	.0%	11.1%
IBM	18.2	16.7	.0	516	12.0%	20.2%	.0%	17.6%
Mentor Graphics	16.6	2.4	7.3	80	11.0%	2.9%	20.4%	2.7%
Hewlett-Packard	12.1	10.3	.0	467	8.0%	12.4%	.0%	15.9%
Sagantec	6.7	.0	6.1	0	4.4%	.0%	17.0%	.0%
COMPASS Design Automation	4.3	.0	3.5	0	2.8%	.0%	9.7%	.0%
Intergraph	.8	.0	.7	0	.5%	.0%	2.0%	.0%
Cascade Design Automation	.8	.0	.6	0	.5%	.0%	1.7%	.0%
Other Companies	1.8	.7	.8	68	1.2%	.8%	2.2%	2.3%
All Companies	151.7	82.8	35.8	2,937	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	145.0	82.8	29.7	2,937	95.6%	100.0%	83.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	6.7	.0	6.1	0	4.4%	.0%	17.0%	.0%
All Hardware Companies	97.9	80.4	.0	2,857	64.6%	97.1%	.0%	97.3%
All Turnkey & SW Companies	53.8	2.4	35.8	80	35.4%	2.9%	100.0%	2.7%

Source: Dataquest (July 1994)

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Table 17
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Hewlett-Packard	28.4	24.1	.0	1,314	15.2%	25.8%	.0%	12.8%
Mentor Graphics	26.6	3.8	11.7	127	14.3%	4.0%	22.0%	1.2%
IBM	21.9	15.0	4.5	1,550	11.8%	16.1%	8.5%	15.0%
Digital	19.7	15.5	.0	577	10.6%	16.5%	.0%	5.6%
Racal-Redac	19.0	2.2	8.9	91	10.2%	2.4%	16.8%	.9%
Sun Microsystems	12.0	9.5	.0	492	6.4%	10.1%	.0%	4.8%
Harris EDA	6.6	.5	3.9	33	3.5%	.5%	7.4%	.3%
Computervision	4.6	1.1	1.4	68	2.5%	1.1%	2.5%	.7%
Intergraph	4.4	.1	3.9	2	2.3%	.1%	7.3%	.0%
Cadence	3.4	.0	2.4	0	1.8%	.0%	4.6%	.0%
Altium*	2.7	.0	2.6	0	1.5%	.0%	4.9%	.0%
CAD-UL	2.6	.0	2.6	0	1.4%	.0%	4.8%	.0%
Ziegler Informatics	2.2	.0	2.2	0	1.2%	.0%	4.1%	.0%
BETRONEX	2.2	.1	2.1	42	1.2%	.1%	3.9%	.4%
Visionics	2.1	.0	2.0	0	1.1%	.0%	3.7%	.0%
ULTImate Technology	1.4	.0	1.4	0	.7%	.0%	2.6%	.0%
Autodesk	1.3	.0	1.3	0	.7%	.0%	2.5%	.0%
Zuken	1.2	.3	.6	7	.6%	.4%	1.1%	.1%
PADS Software	1.1	.0	1.0	0	.6%	.0%	1.8%	.0%
ALS Design	.9	.1	.8	11	.5%	.1%	1.4%	.1%
EME	.8	.2	.4	32	.5%	.2%	.7%	.3%

(Continued)

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Table 17 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Orcad	.8	.0	.8	0	.4%	.0%	1.4%	.0%
Data Technology/DATECH*	.6	.0	.5	14	.3%	.0%	1.0%	.1%
ICL	.6	.3	.2	16	.3%	.4%	.4%	.2%
Other Companies	18.5	20.1	.0	5,857	9.9%	21.6%	.0%	56.9%
All Companies	186.1	93.4	53.1	10,298	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	155.0	90.1	33.9	10,097	83.3%	96.4%	64.0%	98.0%
All Asian-Based Companies	1.5	.5	.7	10	.8%	.5%	1.4%	.1%
All European-Based Companies	29.6	2.9	18.4	192	15.9%	3.1%	34.7%	1.9%
All Hardware Companies	92.2	80.3	.0	9,745	49.5%	86.0%	.0%	94.6%
All Turnkey & SW Companies	93.9	13.1	53.1	554	50.5%	14.0%	100.0%	5.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Software

CAD/CAM/CAE and GIS Benelux Market Share Update

Market Statistics

1994

Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9403
Publication Date: July 4, 1994

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Note: All tables show estimated data.

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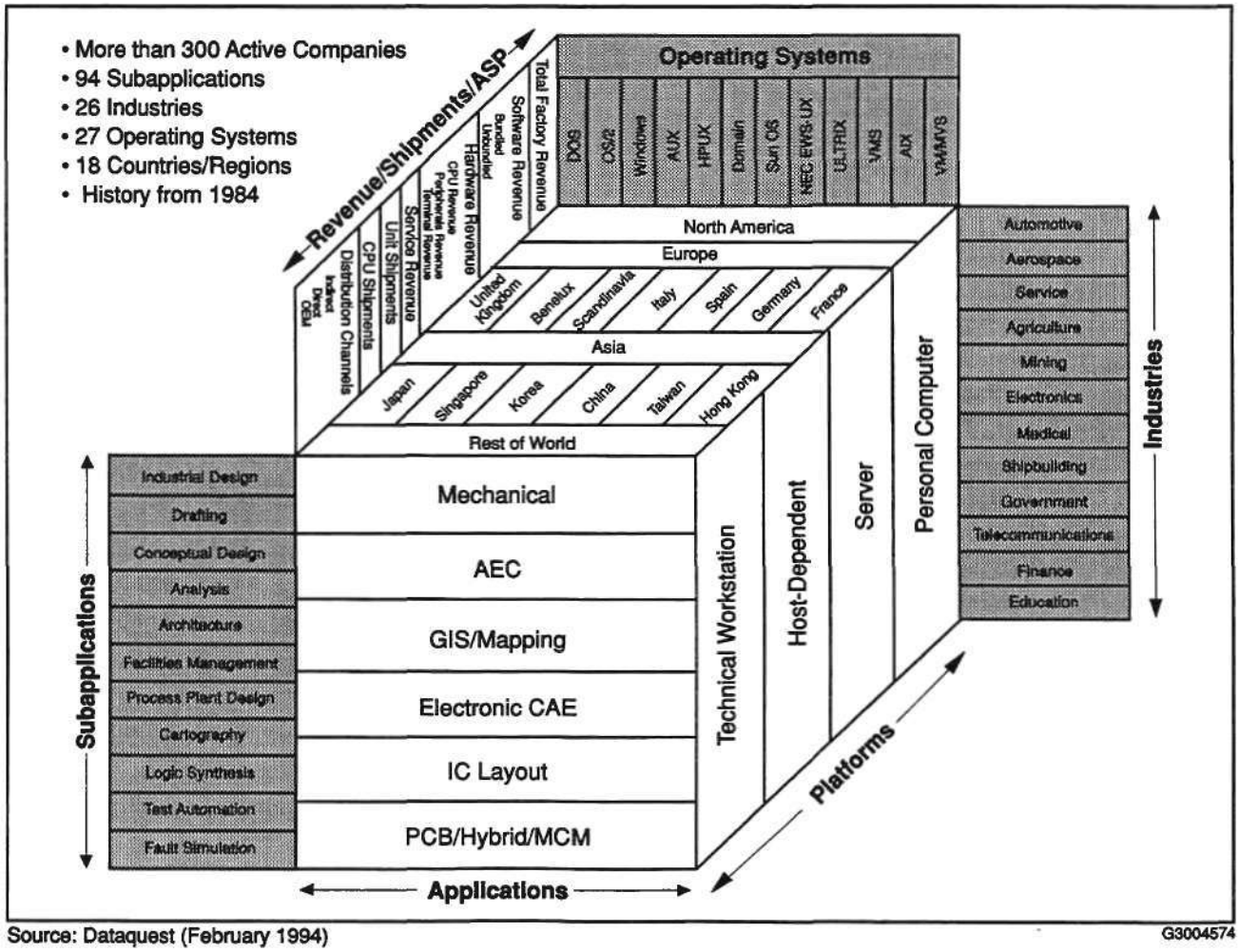
CAD/CAM/CAE and GIS Benelux Market Share Update

Introduction

CAD/CAM/CAE/GIS systems have dramatically changed the methods by which designers and production managers originate and implement products. CAD and CAE systems allow designers to create, draft, analyze, test, and manipulate products on a screen in two and three dimensions. As CAD/CAM/CAE/GIS systems continue to decrease in cost, they become more available and cost justifiable to new users.

In order to provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure 1.

Figure 1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (February 1994)

G3004574

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Table 1
CAD/CAM/CAE/GIS 1992-1993 Market Summary

	Software Revenue 1992 ($M)	Software Revenue 1993 ($M)	Growth Rate (%)	Total Revenue 1992 ($M)	Total Revenue 1993 ($M)	Growth Rate (%)	Hardware Unit Shipments 1992	Hardware Unit Shipments 1993	Growth Rate (%)
Application									
Mechanical	2,170.4	2,294.7	5.7	7,988.2	7,862.7	-1.6	302,347	303,364	0.3
AEC	746.9	794.1	6.3	2,356.5	2,444.0	3.7	178,629	198,075	10.9
GIS/Mapping	580.1	662.2	14.2	2,005.6	2,179.1	8.7	86,513	102,624	18.6
Electronic CAE	741.5	797.1	7.5	2,086.4	2,271.7	8.9	94,176	99,129	5.3
IC Layout	212.7	203.0	-4.6	628.4	676.4	7.6	9,771	13,049	33.5
PCB/Hybrid/MCM	265.9	271.2	2.0	870.9	900.2	3.4	35,110	38,030	8.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
Region									
North America	1,562.5	1,754.6	12.3	5,253.5	5,690.7	8.3	286,939	325,318	13.4
Europe	1,693.8	1,608.9	-5.0	5,755.5	5,432.7	-5.6	231,062	240,603	4.1
Asia	1,352.7	1,534.4	13.4	4,601.2	4,830.6	5.0	169,839	163,620	-3.7
Rest of World	108.5	124.3	14.6	325.9	380.2	16.7	18,706	24,730	32.2
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
In Local Currencies									
Europe (ECU)	1,301.8	1,378.2	5.9	4,423.7	4,653.7	5.2			
Asia (yen)	170,895	170,093	-0.5	581,318	535,468	-7.9			
Platform									
Technical Workstation	3,060.1	3,312.8	8.3	9,640.0	10,458.3	8.5	173,705	194,848	12.2
Host-Dependent	360.2	306.1	-15.0	2,436.6	1,754.7	-28.0	34,524	28,573	-17.2
Server	140.0	176.2	25.9	906.3	1,056.8	16.6	11,566	13,381	15.7
Personal Computer	1,157.1	1,227.1	6.1	2,953.2	3,064.4	3.8	486,751	517,469	6.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8

Source: Dataquest (July 1994)

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A companion article analyzing major shifts in the 1993 market was published in our *Dataquest Perspective*, dated June 27, 1994.

Table 1 summarizes the performance in various segments of the CAD/CAM/CAE/GIS markets in 1993 versus 1992. With the devaluation of the dollar against the yen (¥126.34/$ in 1992 versus ¥110.85/$ in 1993) and the appreciation of the dollar against the ECU (ECU 0.7686/$ in 1992 versus ECU 0.8566/$ in 1993), actual growth is not as it appears when denominated in U.S. dollars. With 75 percent of the Asian market in Japan, denominating in yen gives a rough indication of real growth in the Asian market, which was a negative 7.9 percent.

About This Document

This document contains Dataquest's detailed market share information on the CAD/CAM/CAE/GIS industry. We no longer publish worldwide all-application market statistics for the entire CAD/CAM/CAE/GIS industry. This data is available by calling Suzanne Snygg at (408) 437-8241. The category "Other Companies" is the aggregation of small companies. More detailed data on these markets may be requested through our Client Inquiry service.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

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Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic Computer-Aided Engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of products). Schematic capture and simulation are examples of electronic CAE applications.
- IC Layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/Hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe. Market share data is available for each of these countries.

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong. Market share data is available for each of these countries.

Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed

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by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

Metrics

The following paragraphs define measurements.

- Total factory revenue is defined as the amount of money received by a manufacturer for its goods and services measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue). Total factory revenue is the sum of software revenue, hardware revenue, and service revenue.
- Unit shipment is defined as the number of seats delivered (number of possible simultaneous users of product delivered) excluding OEM shipments.

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- Hardware revenue is revenue derived from sales of CPUs (including operating systems), terminals (for host-dependent systems), and peripherals.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled application software.
- Service revenue is defined as all revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
  - Maintenance fees for hardware and software
  - Management and operations services—help desk, education and training, disaster recovery, vaulting, and configuration management.
  - Service bureau—project work, including construction of database, data conversion, product design, analysis, or manufacturing.
  - Application development—design and development of customized software applications or the modification, enhancement, or customization of existing software applications, adding new functionality.
  - Consulting revenue—assessment of CAD/CAM/CAE/GIS business and information technology needs and the formulation of a plan based on needs identification.
  - Implementation and integration services—planning, implementation, migration, and integration of software products (software network support and integration, account integration management, data center design, and construction).

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year and second quarter of the subsequent year, we survey all participants in each industry. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contacts at large companies. (Dataquest maintains a large contact database on all sources of information.) The following are examples of the job titles of people contacted for information:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning

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- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE/GIS marketing programs
- Market research analyst

The Audit Process

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks
- Articles in both the general and trade press
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice; Dataquest also checks with multiple sources at one company to cross-check data on that company.

Dataquest analysts have many years of experience in how to apply the above tools to get the most accurate information possible on a particular company (such as what to use when and what industry averages are). We believe that the estimates presented here are the most accurate and meaningful generally available today. It is the CAD/CAM/CAE/GIS group's policy to continually update our market information for any year, based on any new data received, in order to arrive at the most accurate market representation possible.

Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

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Publishing Schedule

We publish both market share and forecasting twice each year, allowing for timely distribution of data and thorough analysis and forecasting. Our annual delivery schedule is as follows:

- Market share data is available January 31. All tables will be published and distributed to clients by March 31.
- Forecasting from the market share tables provides a five-year forecast period, available after March 31. The books will be shipped by May 31.
- Final updated market share tables, based on additional data collection and analysis, will be completed by May 31. At this point, the market share database is frozen and will not be changed until the end of the year. For the next six months, supplementary market data will be based on this final market data. Books will be shipped by July 31.
- We provide complete final forecast tables by July 31. These tables take into consideration changes in the market share during the previous six months. Books will be shipped by September 30.

Database Changes

Tables 2 through 5 show changes made to the database since last year's market share update. PC clone manufacturers are no longer tracked individually. We continue to show PC sales by IBM, Hewlett-Packard, and Digital, which also sell other platforms. The 1993 sales of GeoVision Systems to SHL Systemhouse, Computervision-GIS to Unisys, Racal-Redac to Zuken, Chronologic to Viewlogic, ASG to Softdesk, CDC's mechanical software product to ICEM Technologies, PDA to MacNeal-Schwendler, and Logic Modeling Corporation to Synopsys; the merger of Sysdeco and SysScan; and the change of GDS to Convergent Group will be recognized in market reporting for 1994.

Table 2
Companies Renamed

Company Name	Renamed to:
Alper Systems	Sysdeco Ltd.
Areon	Kreon
CADAM	Altium
Catalpa	Catalpa groupe Missler
Geotrace Technologies	Cadlynx
Logic Control	Logic Systems Designers
RIB/RZB	RIB Bausoftware
Sener Sistemas Marinos	Sener Inginiera y Sistemas
STI Strassle	Strassle Informationssysteme
Test Systems Strategies	Summitt

Source: Dataquest (July 1994)

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Table 3
Companies (or CAD Portions Thereof) Sold/Merged

Company Name	Acquired by, Merged with, Technology Sold to:
ANACAD & Electrical Eng. Software	ANACAD-EES
Aries Technology	MacNeal-Schwendler
CAD Language Systems	Compass Design Automation
CAD/CAM Group	Data I/O
Comdisco	Cadence
DAT Standard info ssystemes	ISD Software
EEsof	Hewlett-Packard
Expertest	Sunrise Test
Fides Industrielle Automation	Strassle
HP Cade	Hewlett-Packard
Inca	Zycad
Infocel	Understanding Systems
PiE Design	Quickturn Design Systems
Quad Design Technology	Viewlogic
Wisdom Systems	ICAD

Source: Dataquest (July 1994)

Table 4
Companies Deleted

Company Removed from Database:
European
Asicom
Club Informatico SA
DATAID Technologies
DECISA
Micrograph
Olivetti*
Research Machines*
North American
Bechtel
CADLYNX
Compaq*
Dell Computer*
Engineering Systems Corporation
GeoQuest
Mega CADD
NCR Microelectronics
Object Design
Objectivity
Ontos
Quicklogic
The CAD Group
Ultimap

*We no longer follow individual PC clone makers.
Source: Dataquest (July 1994)

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Table 5
Companies Added

Company Added to Database:
European
APIC Systemes
ISD Software
SPEED
Ultimate Technology
North American
AT&T
Aptix
ARC SYS
EAGLE Point
Earth Resource Mapping
Graftek
Graphic Data Systems (GDS)
Model Technology
Systems Science Inc.
Tactics Int'l Ltd.
VLSI Libraries
Asian
Adam Net
Kozo
Okura
Tachnodia
TECHSPERT
Toshiba Engineering
Yokogawa Digital Computer

Source: Dataquest (July 1994)

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Table 6
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	47.3	37.3	.0	1,943	16.3%	24.4%	.0%	15.3%
IBM	40.2	27.7	6.4	1,899	13.8%	18.1%	7.9%	15.0%
Hewlett-Packard	31.6	22.9	2.9	1,223	10.8%	15.0%	3.6%	9.7%
Intergraph	27.7	10.5	9.3	455	9.5%	6.9%	11.4%	3.6%
Autodesk	10.2	.0	10.2	0	3.5%	.0%	12.6%	.0%
Sun Microsystems	10.2	8.1	.0	353	3.5%	5.3%	.0%	2.8%
Computervision	10.1	2.3	3.1	147	3.5%	1.5%	3.8%	1.2%
Silicon Graphics	9.6	8.4	.0	255	3.3%	5.5%	.0%	2.0%
Siemens Nixdorf Info systeme	6.4	2.4	2.2	145	2.2%	1.6%	2.7%	1.1%
ESRI	5.8	.0	4.6	0	2.0%	.0%	5.7%	.0%
EDS Unigraphics	5.3	1.6	2.5	80	1.8%	1.0%	3.1%	.6%
Star Informatic	5.0	1.0	3.2	76	1.7%	.7%	3.9%	.6%
Parametric Technology	4.9	.0	4.0	0	1.7%	.0%	5.0%	.0%
IEZ	4.0	1.4	2.1	96	1.4%	.9%	2.5%	.8%
Mentor Graphics	3.7	.5	1.6	18	1.3%	.3%	2.0%	.1%
Apple Computer	3.5	3.5	.0	737	1.2%	2.3%	.0%	5.8%
Smallworld Systems	2.1	.1	1.2	4	.7%	.1%	1.5%	.0%
Data Technology/DATECH*	1.9	.5	1.2	315	.6%	.3%	1.5%	2.5%
Hochtief	1.8	.3	.8	22	.6%	.2%	1.0%	.2%
Synopsys	1.7	.0	1.1	0	.6%	.0%	1.4%	.0%
Investronica SA	1.6	1.0	.4	54	.5%	.6%	.5%	.4%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Genasys II	1.6	.2	1.1	6	.5%	.1%	1.3%	.1%
SDRC	1.5	.0	1.1	0	.5%	.0%	1.3%	.0%
ASCAD/ASCAM	1.4	.8	.4	22	.5%	.5%	.5%	.2%
Control Data Systems	1.4	.7	.2	21	.5%	.5%	.3%	.2%
Cadence	1.3	.0	.9	0	.5%	.0%	1.1%	.0%
Matra Datavision	1.1	.4	.6	21	.4%	.2%	.8%	.2%
MacNeal-Schwendler	1.1	.0	1.1	0	.4%	.0%	1.3%	.0%
Sener Inginiera y Sistemaus	1.1	.0	1.1	0	.4%	.0%	1.3%	.0%
Viewlogic Systems	1.1	.0	.9	0	.4%	.0%	1.1%	.0%
Racal-Redac	1.1	.1	.5	5	.4%	.1%	.6%	.0%
GDS	.9	.4	.4	14	.3%	.3%	.5%	.1%
Altium*	.9	.0	.8	0	.3%	.0%	1.0%	.0%
Cisigraph	.9	.2	.5	13	.3%	.2%	.6%	.1%
Dassault*	.9	.0	.8	0	.3%	.0%	.9%	.0%
Straessle Informationssysteme	.9	.1	.6	7	.3%	.0%	.7%	.1%
ISD Software	.8	.2	.5	27	.3%	.1%	.6%	.2%
Sagantec	.8	.0	.8	0	.3%	.0%	.9%	.0%
RoboCAD Solutions	.8	.0	.6	0	.3%	.0%	.8%	.0%
Applicon	.8	.3	.3	8	.3%	.2%	.4%	.1%
ULTImate Technology	.7	.0	.7	0	.2%	.0%	.9%	.0%
Geometria GIS Systems House	.7	.1	.0	4	.2%	.0%	.0%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Gerber Systems	.6	.3	.3	10	.2%	.2%	.3%	.1%
Kockums Computer Systems	.6	.2	.1	28	.2%	.1%	.1%	.2%
BETRONEX	.6	.0	.6	7	.2%	.0%	.7%	.1%
Han Dataport	.6	.1	.3	17	.2%	.1%	.3%	.1%
Swanson Analysis	.6	.0	.5	0	.2%	.0%	.6%	.0%
Wiechers Datentechnik	.6	.1	.3	10	.2%	.1%	.4%	.1%
Other Companies	24.0	18.0	3.8	4,439	8.2%	11.8%	4.7%	35.1%
All Companies	291.1	153.0	81.3	12,665	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	252.4	142.9	60.8	11,749	86.7%	93.4%	74.8%	92.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	38.7	10.1	20.5	916	13.3%	6.6%	25.2%	7.2%
All Hardware Companies	124.2	106.3	.0	10,595	42.7%	69.5%	.0%	83.7%
All Turnkey & SW Companies	166.9	46.7	81.3	2,070	57.3%	30.5%	100.0%	16.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 7
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Hewlett-Packard	29.8	21.4	2.8	836	17.0%	25.9%	5.4%	24.8%
Intergraph	22.8	8.8	7.3	299	13.0%	10.7%	14.1%	8.9%
IBM	22.7	16.1	3.1	458	13.0%	19.5%	6.0%	13.6%
Digital	12.0	9.2	.0	470	6.8%	11.2%	.0%	14.0%
Computervision	9.9	2.3	2.9	137	5.6%	2.7%	5.7%	4.1%
Silicon Graphics	8.1	7.2	.0	239	4.6%	8.7%	.0%	7.1%
Sun Microsystems	8.0	6.3	.0	314	4.6%	7.7%	.0%	9.3%
Siemens Nixdorf Info systeme	5.9	2.0	2.1	95	3.4%	2.4%	4.1%	2.8%
Star Informatic	4.8	1.0	3.1	65	2.8%	1.2%	6.0%	1.9%
Parametric Technology	4.7	.0	3.8	0	2.7%	.0%	7.4%	.0%
EDS Unigraphics	4.2	1.2	2.0	68	2.4%	1.5%	3.9%	2.0%
IEZ	4.0	1.4	2.1	96	2.3%	1.6%	4.0%	2.9%
Mentor Graphics	3.7	.5	1.6	18	2.1%	.6%	3.1%	.5%
ESRI	2.3	.0	1.8	0	1.3%	.0%	3.4%	.0%
Smallworld Systems	2.1	.1	1.2	4	1.2%	.1%	2.4%	.1%
Synopsys	1.7	.0	1.1	0	.9%	.0%	2.2%	.0%
SDRC	1.5	.0	1.0	0	.9%	.0%	2.0%	.0%
Genasys II	1.4	.1	1.0	3	.8%	.2%	1.9%	.1%
ASCAD/ASCAM	1.4	.8	.4	21	.8%	1.0%	.8%	.6%
Cadence	1.2	.0	.9	0	.7%	.0%	1.7%	.0%
Matra Datavision	1.1	.4	.6	18	.6%	.4%	1.2%	.5%
Sener Inginiera y Sistemaus	1.1	.0	1.1	0	.6%	.0%	2.1%	.0%
GDS	.9	.4	.4	14	.5%	.5%	.8%	.4%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Racal-Redac	.9	.1	.4	5	.5%	.2%	.8%	.2%
Straessle Informationssysteme	.9	.1	.6	7	.5%	.1%	1.1%	.2%
Sagantec	.8	.0	.8	0	.5%	.0%	1.4%	.0%
Control Data Systems	.8	.4	.2	14	.5%	.5%	.4%	.4%
Applicon	.8	.3	.3	8	.4%	.3%	.6%	.3%
Cisigraph	.8	.2	.4	12	.4%	.3%	.8%	.4%
ISD Software	.7	.2	.4	27	.4%	.2%	.8%	.8%
Viewlogic Systems	.7	.0	.5	0	.4%	.0%	1.0%	.0%
Gerber Systems	.6	.3	.3	10	.3%	.3%	.5%	.3%
Kockums Computer Systems	.6	.2	.1	28	.3%	.2%	.2%	.8%
Autodesk	.5	.0	.5	0	.3%	.0%	1.0%	.0%
Other Companies	4.9	.5	3.0	15	2.8%	.6%	5.7%	.4%
All Companies	175.2	82.5	51.8	3,365	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	146.9	75.4	36.9	2,939	83.8%	91.4%	71.3%	87.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	28.4	7.1	14.9	427	16.2%	8.6%	28.7%	12.7%
All Hardware Companies	57.1	47.8	.0	1,967	32.6%	57.9%	.0%	58.4%
All Turnkey & SW Companies	118.1	34.7	51.8	1,398	67.4%	42.1%	100.0%	41.6%

Source: Dataquest (July 1994)

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Table 8
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	14.9	11.5	.0	0	44.3%	48.3%	.0%	.0%
IBM	10.2	5.9	2.1	175	30.3%	24.6%	61.4%	41.3%
MacNeal-Schwendler	.8	.0	.8	0	2.3%	.0%	23.1%	.0%
Other Companies	6.2	5.9	.0	222	18.6%	24.8%	.0%	52.4%
All Companies	33.6	23.9	3.4	424	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	33.1	23.7	3.2	416	98.5%	99.1%	95.3%	98.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.5	.2	.2	7	1.5%	.9%	4.7%	1.7%
All Hardware Companies	21.4	17.7	.0	226	63.7%	73.9%	.0%	53.3%
All Turnkey & SW Companies	12.2	6.2	3.4	198	36.3%	26.1%	100.0%	46.7%

Source: Dataquest (July 1994)

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Table 9
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	16.1	12.4	.0	156	53.8%	66.1%	.0%	53.6%
Intergraph	2.4	1.0	.7	29	7.9%	5.1%	16.8%	9.8%
ESRI	2.3	.0	1.8	0	7.6%	.0%	40.9%	.0%
Sun Microsystems	2.1	1.8	.0	39	7.1%	9.3%	.0%	13.3%
IBM	2.0	1.2	.4	24	6.7%	6.4%	9.8%	8.1%
Silicon Graphics	1.4	1.2	.0	15	4.8%	6.4%	.0%	5.2%
EDS Unigraphics	1.1	.3	.5	11	3.5%	1.7%	11.4%	3.9%
Other Companies	1.4	.4	.6	6	4.6%	2.1%	13.1%	2.0%
All Companies	29.9	18.8	4.3	292	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	29.6	18.7	4.2	289	99.2%	99.5%	97.7%	99.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.2	.1	.1	3	.8%	.5%	2.3%	.9%
All Hardware Companies	20.4	16.0	.0	224	68.3%	85.3%	.0%	76.8%
All Turnkey & SW Companies	9.5	2.8	4.3	68	31.7%	14.7%	100.0%	23.2%

Source: Dataquest (July 1994)

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Table 10
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Autodesk	9.7	.0	9.7	0	18.5%	.0%	44.4%	.0%
IBM	5.3	4.5	.8	1,243	10.2%	16.0%	3.7%	14.5%
Digital	4.3	4.1	.0	1,317	8.3%	14.8%	.0%	15.3%
Apple Computer	3.5	3.5	.0	737	6.7%	12.6%	.0%	8.6%
Intergraph	2.6	.8	1.3	127	4.9%	2.8%	5.9%	1.5%
Hochtief	1.7	.3	.8	22	3.3%	1.1%	3.8%	.3%
Data Technology/DATECH*	1.7	.5	1.0	315	3.2%	1.7%	4.8%	3.7%
Investronica SA	1.6	1.0	.4	54	3.0%	3.5%	1.9%	.6%
Hewlett-Packard	1.4	1.2	.1	382	2.7%	4.3%	.5%	4.4%
ESRI	1.2	.0	1.1	0	2.2%	.0%	5.0%	.0%
Altium*	.9	.0	.8	0	1.6%	.0%	3.7%	.0%
RoboCAD Solutions	.8	.0	.6	0	1.5%	.0%	2.9%	.0%
ULTImate Technology	.7	.0	.7	0	1.4%	.0%	3.3%	.0%
BETRONEX	.6	.0	.6	7	1.1%	.0%	2.7%	.1%
Wiechers Datentechnik	.5	.1	.3	9	1.0%	.4%	1.4%	.1%
Other Companies	11.4	11.2	.3	4,196	21.8%	40.2%	1.6%	48.9%
All Companies	52.4	27.8	21.8	8,585	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	42.8	25.1	16.5	8,105	81.7%	90.3%	75.5%	94.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	9.6	2.7	5.3	480	18.3%	9.7%	24.5%	5.6%
All Hardware Companies	25.2	24.9	.0	8,178	48.2%	89.4%	.0%	95.3%
All Turnkey & SW Companies	27.1	2.9	21.8	407	51.8%	10.6%	100.0%	4.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 11
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	26.8	21.3	.0	957	19.8%	27.5%	.0%	20.3%
IBM	24.0	14.5	5.1	740	17.8%	18.8%	16.1%	15.7%
Hewlett-Packard	19.3	13.1	2.3	656	14.3%	17.0%	7.2%	13.9%
Silicon Graphics	8.4	7.4	.0	223	6.2%	9.5%	.0%	4.7%
Computervision	8.1	1.8	2.5	117	6.0%	2.3%	8.0%	2.5%
EDS Unigraphics	5.3	1.6	2.5	80	3.9%	2.0%	7.9%	1.7%
Parametric Technology	4.9	.0	4.0	0	3.6%	.0%	12.8%	.0%
Autodesk	4.1	.0	4.1	0	3.0%	.0%	12.9%	.0%
Intergraph	4.1	1.5	1.3	57	3.0%	1.9%	4.1%	1.2%
Sun Microsystems	3.2	2.6	.0	105	2.4%	3.3%	.0%	2.2%
Investronica SA	1.6	1.0	.4	54	1.2%	1.3%	1.3%	1.1%
SDRC	1.5	.0	1.1	0	1.1%	.0%	3.3%	.0%
ASCAD/ASCAM	1.4	.8	.4	22	1.0%	1.1%	1.4%	.5%
Control Data Systems	1.3	.7	.2	20	1.0%	.9%	.7%	.4%
Siemens Nixdorf Info systeme	1.3	.6	.2	58	.9%	.8%	.8%	1.2%
Apple Computer	1.2	1.2	.0	250	.9%	1.5%	.0%	5.3%
Matra Datavision	1.1	.4	.6	21	.8%	.5%	2.0%	.4%
MacNeal-Schwendler	1.1	.0	1.0	0	.8%	.0%	3.3%	.0%
Data Technology/DATECH*	1.1	.3	.7	61	.8%	.4%	2.1%	1.3%
Cisigraph	.9	.2	.5	13	.6%	.3%	1.4%	.3%
ISD Software	.8	.2	.5	27	.6%	.2%	1.7%	.6%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Dassault*	.8	.0	.7	0	.6%	.0%	2.2%	.0%
Applicon	.8	.3	.3	8	.6%	.3%	1.0%	.2%
Gerber Systems	.6	.3	.3	10	.5%	.4%	.8%	.2%
Altium*	.6	.0	.6	0	.4%	.0%	1.7%	.0%
Swanson Analysis	.6	.0	.5	0	.4%	.0%	1.6%	.0%
Other Companies	6.1	6.7	.0	1,134	4.5%	8.6%	.0%	24.0%
All Companies	135.2	77.3	31.4	4,718	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	124.7	73.0	27.0	4,342	92.2%	94.4%	86.0%	92.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	10.5	4.4	4.4	376	7.8%	5.6%	14.0%	8.0%
All Hardware Companies	59.9	50.9	.0	3,676	44.3%	65.8%	.0%	77.9%
All Turnkey & SW Companies	75.3	26.4	31.4	1,042	55.7%	34.2%	100.0%	22.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 12
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	12.8	4.8	4.1	239	26.5%	21.1%	23.9%	6.9%
IBM	6.5	5.1	.7	574	13.4%	22.2%	3.8%	16.5%
Autodesk	4.4	.0	4.4	0	9.1%	.0%	25.8%	.0%
IEZ	4.0	1.4	2.1	96	8.3%	5.9%	12.2%	2.8%
Digital	2.6	2.2	.0	384	5.4%	9.7%	.0%	11.1%
Apple Computer	2.0	2.0	.0	426	4.2%	8.8%	.0%	12.3%
Computervision	1.8	.4	.5	26	3.7%	1.8%	3.2%	.8%
Hochtief	1.8	.3	.8	22	3.7%	1.4%	4.9%	.6%
Star Informatic	1.6	.4	1.0	30	3.3%	1.5%	6.1%	.9%
Hewlett-Packard	1.1	1.0	.0	66	2.3%	4.1%	.0%	1.9%
Sener Inginiera y Sistemaus	1.1	.0	1.1	0	2.3%	.0%	6.4%	.0%
Data Technology/DATECH*	.8	.1	.5	251	1.6%	.6%	3.1%	7.2%
Kockums Computer Systems	.6	.2	.1	28	1.3%	.7%	.6%	.8%
Other Companies	4.5	4.2	.1	1,262	9.3%	18.5%	.9%	36.3%
All Companies	48.4	22.9	17.0	3,473	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	37.3	20.3	10.6	3,183	77.1%	88.7%	62.6%	91.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	11.1	2.6	6.3	291	22.9%	11.3%	37.4%	8.4%
All Hardware Companies	14.6	13.8	.0	2,940	30.2%	59.9%	.0%	84.6%
All Turnkey & SW Companies	33.8	9.2	17.0	534	69.8%	40.1%	100.0%	15.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 13
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	9.9	4.2	3.1	158	17.9%	18.1%	16.0%	8.4%
Digital	7.1	5.2	.0	307	12.8%	22.5%	.0%	16.3%
ESRI	5.8	.0	4.6	0	10.4%	.0%	23.9%	.0%
Siemens Nixdorf Info systeme	5.1	1.7	1.9	82	9.2%	7.4%	9.9%	4.4%
IBM	4.2	3.2	.4	176	7.6%	13.8%	2.1%	9.4%
Star Informatic	3.4	.7	2.1	45	6.1%	2.9%	11.0%	2.4%
Hewlett-Packard	3.3	2.8	.0	156	6.0%	12.1%	.0%	8.3%
Smallworld Systems	2.1	.1	1.2	4	3.8%	.4%	6.4%	.2%
Sun Microsystems	1.6	1.3	.0	41	2.9%	5.6%	.0%	2.2%
Genasys II	1.6	.2	1.1	6	2.8%	.6%	5.6%	.3%
Autodesk	1.1	.0	1.1	0	2.0%	.0%	5.8%	.0%
Straessle Informationssysteme	.9	.1	.6	7	1.5%	.3%	3.0%	.4%
Geometria GIS Systems House	.7	.1	.0	4	1.2%	.2%	.2%	.2%
Other Companies	6.5	3.1	2.1	849	11.8%	13.2%	10.9%	45.2%
All Companies	55.2	23.3	19.4	1,877	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	42.5	20.5	13.1	1,715	77.0%	88.2%	67.5%	91.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	12.7	2.8	6.3	161	23.0%	11.8%	32.5%	8.6%
All Hardware Companies	17.1	14.2	.0	1,510	30.9%	61.2%	.0%	80.5%
All Turnkey & SW Companies	38.2	9.0	19.4	367	69.1%	38.8%	100.0%	19.5%

Source: Dataquest (July 1994)

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Table 14
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	10.8	8.5	.0	296	20.7%	29.0%	.0%	11.4%
Hewlett-Packard	7.9	6.0	.6	345	15.0%	20.4%	4.8%	13.3%
IBM	5.6	4.8	.3	409	10.7%	16.4%	2.4%	15.7%
Sun Microsystems	5.2	4.1	.0	199	9.9%	13.8%	.0%	7.6%
Mentor Graphics	3.7	.5	1.6	18	7.0%	1.8%	12.1%	.7%
Synopsys	1.7	.0	1.1	0	3.2%	.0%	8.5%	.0%
Cadence	1.3	.0	.9	0	2.5%	.0%	6.9%	.0%
Viewlogic Systems	1.1	.0	.9	0	2.1%	.0%	6.5%	.0%
Racal-Redac	1.1	.1	.5	5	2.0%	.4%	3.6%	.2%
Intergraph	1.0	.0	.9	0	1.8%	.1%	6.3%	.0%
Sagantec	.8	.0	.8	0	1.6%	.0%	5.6%	.0%
Silicon Graphics	.7	.6	.0	20	1.4%	2.2%	.0%	.8%
ULTImate Technology	.7	.0	.7	0	1.4%	.0%	5.3%	.0%
Autodesk	.6	.0	.6	0	1.2%	.0%	4.6%	.0%
BETRONEX	.6	.0	.6	7	1.1%	.0%	4.3%	.3%
Other Companies	6.9	4.0	2.3	1,194	13.2%	13.6%	17.2%	46.0%
All Companies	52.2	29.4	13.4	2,598	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	47.8	29.0	10.0	2,508	91.6%	98.6%	74.5%	96.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	4.4	.4	3.4	89	8.4%	1.4%	25.5%	3.4%
All Hardware Companies	32.6	27.4	.0	2,469	62.4%	93.2%	.0%	95.1%
All Turnkey & SW Companies	19.7	2.0	13.4	129	37.6%	6.8%	100.0%	4.9%

Source: Dataquest (July 1994)

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Table 15
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	6.5	5.2	.0	203	21.2%	30.3%	.0%	14.9%
Hewlett-Packard	5.0	3.6	.6	221	16.3%	21.1%	7.9%	16.2%
Sun Microsystems	3.1	2.5	.0	128	10.1%	14.5%	.0%	9.4%
IBM	2.8	2.7	.0	261	9.1%	15.6%	.0%	19.2%
Mentor Graphics	1.9	.3	.9	9	6.3%	1.6%	10.5%	.7%
Synopsys	1.7	.0	1.1	0	5.4%	.0%	14.1%	.0%
Viewlogic Systems	1.1	.0	.9	0	3.5%	.0%	10.7%	.0%
Cadence	.8	.0	.6	0	2.5%	.0%	6.8%	.0%
Silicon Graphics	.7	.6	.0	19	2.2%	3.5%	.0%	1.4%
Intergraph	.5	.0	.5	0	1.7%	.1%	5.8%	.0%
Autodesk	.5	.0	.5	0	1.7%	.0%	6.3%	.0%
Other Companies	4.1	1.6	2.1	421	13.4%	9.2%	25.4%	31.0%
All Companies	30.8	17.0	8.1	1,361	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	29.8	16.7	7.5	1,284	96.7%	98.4%	92.2%	94.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.0	.3	.6	77	3.3%	1.6%	7.8%	5.6%
All Hardware Companies	18.9	15.7	.0	1,265	61.2%	92.6%	.0%	92.9%
All Turnkey & SW Companies	12.0	1.3	8.1	97	38.8%	7.4%	100.0%	7.1%

Source: Dataquest (July 1994)

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Table 16
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	2.3	1.8	.0	33	27.7%	35.9%	.0%	20.9%
Sun Microsystems	1.6	1.3	.0	53	19.5%	25.5%	.0%	33.2%
IBM	1.2	1.1	.0	33	14.0%	21.4%	.0%	20.6%
Hewlett-Packard	.9	.7	.0	33	10.3%	14.4%	.0%	20.4%
Sagantec	.8	.0	.8	0	9.9%	.0%	45.5%	.0%
Mentor Graphics	.7	.1	.3	3	8.1%	1.8%	18.2%	2.0%
Other Companies	.2	.0	.1	4	2.3%	.6%	7.3%	2.6%
All Companies	8.3	5.0	1.7	160	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	7.4	5.0	.9	160	90.1%	100.0%	54.5%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.8	.0	.8	0	9.9%	.0%	45.5%	.0%
All Hardware Companies	6.0	4.9	.0	157	72.2%	98.2%	.0%	98.0%
All Turnkey & SW Companies	2.3	.1	1.7	3	27.8%	1.8%	100.0%	2.0%

Source: Dataquest (July 1994)

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Table 17
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Benelux
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	2.0	1.6	.0	59	15.3%	21.2%	.0%	5.5%
Hewlett-Packard	2.0	1.7	.0	92	15.1%	22.5%	.0%	8.6%
IBM	1.6	1.1	.3	114	12.1%	14.7%	8.7%	10.6%
Mentor Graphics	1.1	.2	.5	5	8.1%	2.0%	12.8%	.5%
Racal-Redac	.9	.1	.4	4	6.8%	1.5%	11.4%	.4%
ULTImate Technology	.7	.0	.7	0	5.4%	.0%	19.3%	.0%
BETRONEX	.6	.0	.6	7	4.5%	.1%	15.8%	.6%
Other Companies	2.6	2.4	.1	769	19.8%	32.3%	3.5%	71.4%
All Companies	13.1	7.5	3.7	1,076	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	10.6	7.3	1.6	1,064	80.7%	98.3%	44.6%	98.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	2.5	.1	2.0	12	19.3%	1.7%	55.4%	1.1%
All Hardware Companies	7.7	6.8	.0	1,047	58.8%	91.3%	.0%	97.3%
All Turnkey & SW Companies	5.4	.7	3.7	29	41.2%	8.7%	100.0%	2.7%

Source: Dataquest (July 1994)

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CAD/CAM/CAE and GIS Europe Overview Forecast

Market Statistics

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Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MS-9402
Publication Date: May 2, 1994

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Note: All tables show estimated data.

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CAD/CAM/CAE and GIS Europe Overview Forecast

Fluctuating exchange rates masked true market performance in the 1993 CAD/CAM/CAE and GIS market. Japanese CAD/CAM/CAE and GIS total revenue grew a surprising 3.3 percent from 1992 to 1993 when measured in U.S. dollars, contrary to what would be expected in the worst recession Japan has experienced in 50 years. However, the dollar depreciated against the yen at a rate of 12.3 percent so that when measured in yen, Japanese CAD/CAM/CAE and GIS total revenue declined 9.4 percent from 1992 to 1993.

In the meantime, European CAD/CAM/CAE and GIS total revenue declined 1.4 percent from 1992 to 1993 when measured in U.S. dollars. With the dollar appreciating 10.0 percent against the ECU, European CAD/CAM/CAE and GIS total revenue grew 9.9 percent from 1992 to 1993 when measured in ECU. Table 1 shows the dramatic impact that currency fluctuation has on the CAD/CAM/CAE and GIS.

The yen has been strengthening against the dollar for the past three years, changing in 1993 at a rate twice that of previous years. And the end is not in sight. In contrast, Hong Kong and Singapore had relatively stable currency during 1993, while the currencies in China, Korea, and Taiwan weakened against the dollar. In Europe, 1993 was a year for weakening of local currencies against the dollar after having currencies strengthened against the dollar in 1992.

The early indications are that currencies will follow the same pattern in each country for the coming year (see Table 2). Although Dataquest does not forecast currency exchange rates, we do forecast with the best information available. The exchange rate is calculated as the simple arithmetic mean of the 12 average monthly rates for each country. For the purpose of this forecast, Dataquest assumes the February exchange rate will apply for all future months of 1994.

Dataquest's forecast is based upon the early market share data, gathered primarily before the end of 1993. This data is being verified and updated and will be available May 31 as the Market Share Update. Dataquest will then perform an updated forecast to include country-level information and in-depth analysis. This Forecast Update will be available July 31.

This document contains Dataquest's detailed forecast information for the CAD/CAM/CAE and GIS industry. Included are the following:

- Five-year historical data
- Five-year forecast data

More detailed data is available through Dataquest's client inquiry service, which can provide custom analysis of the multidimensional database.

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Table 1
CAD/CAM/CAE and GIS Revenue Growth Comparison
(U.S. Dollars versus Local Currency for Both Europe and Japan)

	1992	1993	Forecast 1994	Growth (%) 1992-1993	Growth (%) 1993-1994
Europe (U.S.$ Million)					
Software Revenue	1,708.6	1,755.2	1,863	2.7	6.1
Hardware Revenue	2,778.1	2,628.5	2,624	-5.4	-0.2
Service Revenue	1,087.7	1,118.8	1,133	2.9	1.3
Total Factory Revenue	5,582.6	5,502.6	5,620	-1.4	2.1
ECU/U.S.$ Exchange Rate	*0.7686*	*0.8566*	*0.8879**	*11.4*	*3.7*
Europe (ECU Million)					
Software Revenue	1,313.2	1,503.5	1,654.0	14.5	10.0
Hardware Revenue	2,135.2	2,251.6	2,330	5.4	3.5
Service Revenue	836.0	958.4	1,006	14.6	5.0
Total Factory Revenue	4,290.8	4,713.5	4,990	9.9	5.9
Japan (U.S.$ Million)					
Software Revenue	1,316.5	1,435.1	1,514	9.0	5.5
Hardware Revenue	2,477.7	2,427.8	2,446	-2.0	0.7
Service Revenue	601.1	676.8	702	12.6	3.7
Total Factory Revenue	4,395.3	4,539.6	4,662	3.3	2.7
Yen/U.S.$ Exchange Rate	*126.34*	*110.85*	*106.54**	*-12.3*	*-3.9*
Japan (Yen Million)					
Software Revenue	166,328	159,076	161,314	-4.4	1.4
Hardware Revenue	313,036	269,117	260,569	-14.0	-3.2
Service Revenue	75,947	75,022	74,792	-1.2	-0.3
Total Factory Revenue	555,317	503,216	496,672	-9.4	-1.3
North America (U.S.$ Million)					
Software Revenue	1,629.3	1,804.5	2,008	10.8	11.3
Hardware Revenue	2,920.2	2,951.1	3,184	1.1	7.9
Service Revenue	931.8	1,039.0	1,133	11.5	9.0
Total Factory Revenue	5,482.4	5,794.6	6,325	5.7	9.1
Worldwide (U.S.$ Million)					
Software Revenue	4,835.9	5,189.2	5,614	7.3	8.2
Hardware Revenue	8,501.2	8,323.4	8,607	-2.1	3.4
Service Revenue	2,739.0	2,968.9	3,122	8.4	5.2
Total Factory Revenue	16,086.0	16,481.3	17,342	2.5	5.2

*1994 currency calculated by projecting February exchange rate to end of year.

Source: Dataquest (April 1994)

The CAD/CAM/CAE and GIS *Dataquest Perspective,* dated April 18, 1994, contains additional tables and analysis and is a companion piece to this book.

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Table 2
Exchange Rates

Country	Currency	Actual 1990	Actual 1991	Actual 1992	Actual 1993	Current 1994	Year-to-Year Change (Percent) 1990-1991	1991-1992	1992-1993	1993-1994
European Community	ECU		0.8079	0.7686	0.8566	0.8879	-	-5	11	4
Belgium	Franc	33.31	34.01	31.94	34.61	35.46	2	-6	8	2
France	Franc	5.4277	5.6183	5.2571	5.6641	5.8422	4	-6	8	3
Germany	Mark	1.6111	1.6523	1.5513	1.6543	1.7204	3	-6	7	4
Italy	Lira	1195.03	1235.03	1220.85	1575.05	1689.22	3	-1	29	7
Norway	Krone	6.2383	6.4641	6.1652	7.0972	7.4249	4	-5	15	5
Spain	Peseta	101.7	103.48	101.5	127.1	139.8	2	-2	25	10
United Kingdom	Pound	0.5599	0.5658	0.5652	0.6665	0.6698	1	0	18	1
Japan	Yen	144.05	134.59	126.34	110.85	106.54	-7	-6	-12	-4
Hong Kong	Dollar	7.79	7.7712	7.7399	7.7351	7.7244	0	0	0	0
Singapore	Dollar	1.8129	1.7277	1.6284	1.6155	1.5851	-5	-6	-1	-2
Taiwan	Dollar	26.64	26.49	24.93	26.15	26.45	-1	-6	5	1
Korea	Won	242.7	730.67	782.41	799.42	808.34	201	7	2	1
China	Renminbi	4.7912	5.334	5.5076	5.758	8.5616	11	3	5	49

Source: Dataquest (April 1994)

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A new forecasting process for each application is being used to improve revenue and unit shipment control by region and by platform. This new process may cause some mismatch in market share tables and forecast tables. Please use the forecast tables to understand the year-to-year changes. Use the market share tables to compare company-to-company performance.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is an underlying philosophy that says the best data and analyses come from a well-balanced program. This program includes the following: balance between primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from the more than 25 separate high-technology industries Dataquest covers; and balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macro environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at gross national product (GNP) growth, interest rate fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1994.

Figure 1 shows the CAD/CAM/CAE and GIS forecasting model. The overall forecasting process uses a combination of forecasting techniques such as time series and technological modeling. Market estimates and forecasts are derived using the following research techniques:

- "Bottom-up" aggregation—This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting—For each application segment tracked by the CAD/CAM/CAE and GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis—Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market model and a satisfied available market figure to assess the levels of penetration accurately. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Dataquest analysts also factor in the acceptance or ability for users to consume new technology.

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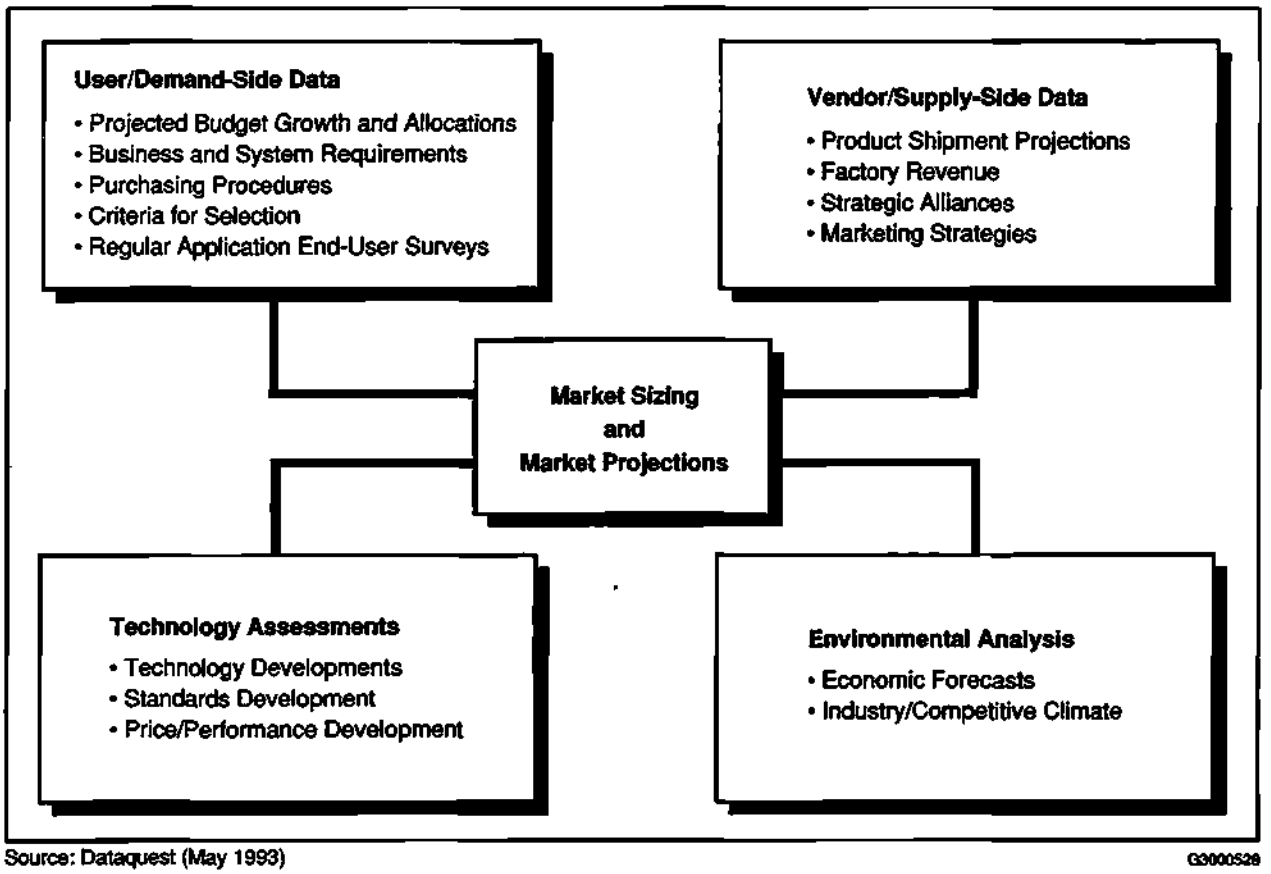
Figure 1
CAD/CAM/CAE and GIS Forecasting Model



Source: Dataquest (May 1993) G0000528

- Capacity-based analysis—This method involves identifying future shipment volume constraints. These constraints, or "ceilings," can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below the demand level.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and

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electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic computer-aided engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of ECAE applications are schematic capture and simulation.
- IC layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe (which includes Austria, Switzerland, and eastern Europe)

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong.

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Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

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Line Items

Line item definitions are as follows:

- Average selling price (ASP) is defined as the average price of a product, inclusive of any discounts.
- CPU revenue is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
- CPU shipment is defined as the number of CPUs delivered.
- CPU installed base is defined as the total number of CPUs in active, day-to-day use.
- Unit shipment is defined as the number of products delivered (that is, seats).
- Seats are defined as the number of possible simultaneous users.
- Installed seats are defined as the total number of seats in active, day-to-day use.
- Hardware revenue is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
- Peripherals revenue is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
- Terminal revenue is defined as revenue derived from the sale of terminals used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform, as terminal revenue is contained within CPU revenue for technical workstations and PCs.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
- Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue that a company may receive from products sold to another company for resale (OEM revenue).

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Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

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Technical Workstation

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- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

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Line Items

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- Average selling price (ASP) is defined as the average price of a product, inclusive of any discounts.
- CPU revenue is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
- CPU shipment is defined as the number of CPUs delivered.
- CPU installed base is defined as the total number of CPUs in active, day-to-day use.
- Unit shipment is defined as the number of products delivered (that is, seats).
- Seats are defined as the number of possible simultaneous users.
- Installed seats are defined as the total number of seats in active, day-to-day use.
- Hardware revenue is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
- Peripherals revenue is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
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- Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue that a company may receive from products sold to another company for resale (OEM revenue).

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Table 3
CAD/CAM/CAE/GIS History and Forecast

Application: All Applications
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	135,948	155,324	172,052	201,277	226,019	248,100	272,000	297,000	319,500	337,500	14	8
Unit Shipments or Seats	146,797	166,784	180,375	208,211	233,697	255,200	278,800	303,300	325,300	343,100	12	8
CPU Installed Base	392,933	512,227	624,156	732,649	819,717	896,600	982,800	1,082,700	1,180,700	1,262,100	20	9
Installed Seats	440,451	573,129	690,937	801,405	888,144	962,000	1,044,000	1,139,300	1,231,500	1,308,600	19	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	70.1	56.9	59.2	48.5	38.1	35.1	32.6	30.4	28.8	27.8	-14	-6
Hardware-Only ASP	8.8	8.4	9.0	8.4	7.9	7.4	7.3	7.2	7.2	7.3	-3	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2,444	2,506	2,812	2,786	2,629	2,624	2,683	2,773	2,886	3,004	2	3
CPU Revenue	1,945	2,041	2,338	2,384	2,290	2,310	2,387	2,493	2,615	2,738	4	4
Terminal Revenue	188	151	158	123	103	89	83	78	73	71	-14	-7
Peripheral Revenue (Turnkey)	311	315	317	280	235	225	213	202	198	195	-7	-4
Software Revenue	1,215	1,432	1,669	1,709	1,755	1,863	1,995	2,139	2,281	2,412	10	7
Bundled	671	751	849	763	717	714	723	724	728	735	2	0
Unbundled	544	682	820	945	1,038	1,149	1,273	1,416	1,553	1,678	18	10
Service Revenue	725	902	982	1,088	1,119	1,133	1,174	1,225	1,293	1,366	11	4
Total Factory Revenue	4,384	4,840	5,462	5,583	5,503	5,620	5,853	6,137	6,461	6,783	6	4
Increase over Prior Year (%)	14	10	13	2	-1	2	4	5	5	5		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (April 1994)

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Table 4
CAD/CAM/CAE/GIS History and Forecast

Application: All Applications
Region: Europe
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	41,505	49,082	60,242	70,491	76,510	81,300	87,600	95,100	103,400	112,400	17	8
Unit Shipments or Seats	41,505	49,082	60,242	70,491	76,511	81,300	87,600	95,100	103,400	112,400	17	8
CPU Installed Base	95,699	139,153	189,206	243,026	292,617	337,900	378,800	419,500	456,900	487,200	32	11
Installed Seats	94,969	139,153	189,206	243,026	292,617	337,900	378,800	419,500	456,900	487,200	32	11
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	55.2	47.8	49.9	45.6	38.0	36.0	33.8	32.0	30.9	29.9	-9	-5
Hardware-Only ASP	18.4	20.9	19.7	19.4	19.1	18.7	18.2	17.7	17.2	16.7	1	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,234	1,378	1,579	1,702	1,596	1,606	1,632	1,687	1,769	1,858	7	3
CPU Revenue	1,040	1,184	1,373	1,504	1,427	1,448	1,486	1,550	1,636	1,728	8	4
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	194	195	206	197	170	157	146	137	132	130	-3	-5
Software Revenue	739	919	1,102	1,155	1,160	1,209	1,279	1,360	1,449	1,540	12	6
Bundled	467	552	628	601	542	532	534	531	531	534	4	-0
Unbundled	272	367	474	554	617	677	745	829	917	1,006	23	10
Service Revenue	476	627	662	837	868	886	915	955	1,010	1,068	16	4
Total Factory Revenue	2,449	2,925	3,343	3,694	3,624	3,701	3,826	4,003	4,227	4,466	10	4
Increase over Prior Year (%)	37	19	14	11	-2	2	3	5	6	6		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (April 1994)

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Table 3
CAD/CAM/CAE/GIS History and Forecast

Application: All Applications
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	135,948	155,324	172,052	201,277	226,019	248,100	272,000	297,000	319,500	337,500	14	8
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CPU Installed Base	392,933	512,227	624,156	732,649	819,717	896,600	982,800	1,082,700	1,180,700	1,262,100	20	9
Installed Seats	440,451	573,129	690,937	801,405	888,144	962,000	1,044,000	1,139,300	1,231,500	1,308,600	19	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	70.1	56.9	59.2	48.5	38.1	35.1	32.6	30.4	28.8	27.8	-14	-6
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REVENUE DATA (Millions of U.S. Dollars)												
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CPU Revenue	1,945	2,041	2,338	2,384	2,290	2,310	2,387	2,493	2,615	2,738	4	4
Terminal Revenue	188	151	158	123	103	89	83	78	73	71	-14	-7
Peripheral Revenue (Turnkey)	311	315	317	280	235	225	213	202	198	195	-7	-4
Software Revenue	1,215	1,432	1,669	1,709	1,755	1,863	1,995	2,139	2,281	2,412	10	7
Bundled	671	751	849	763	717	714	723	724	728	735	2	0
Unbundled	544	682	820	945	1,038	1,149	1,273	1,416	1,553	1,678	18	10
Service Revenue	725	902	982	1,088	1,119	1,133	1,174	1,225	1,293	1,366	11	4
Total Factory Revenue	4,384	4,840	5,462	5,583	5,503	5,620	5,853	6,137	6,461	6,783	6	4
Increase over Prior Year (%)	14	10	13	2	-1	2	4	5	5	5		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (April 1994)

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Table 4
CAD/CAM/CAE/GIS History and Forecast

Application: All Applications
Region: Europe
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	41,505	49,082	60,242	70,491	76,510	81,300	87,600	95,100	103,400	112,400	17	8
Unit Shipments or Seats	41,505	49,082	60,242	70,491	76,511	81,300	87,600	95,100	103,400	112,400	17	8
CPU Installed Base	95,699	139,153	189,206	243,026	292,617	337,900	378,800	419,500	456,900	487,200	32	11
Installed Seats	94,969	139,153	189,206	243,026	292,617	337,900	378,800	419,500	456,900	487,200	32	11
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	55.2	47.8	49.9	45.6	38.0	36.0	33.8	32.0	30.9	29.9	-9	-5
Hardware-Only ASP	18.4	20.9	19.7	19.4	19.1	18.7	18.2	17.7	17.2	16.7	1	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,234	1,378	1,579	1,702	1,596	1,606	1,632	1,687	1,769	1,858	7	3
CPU Revenue	1,040	1,184	1,373	1,504	1,427	1,448	1,486	1,550	1,636	1,728	8	4
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	194	195	206	197	170	157	146	137	132	130	-3	-5
Software Revenue	739	919	1,102	1,155	1,160	1,209	1,279	1,360	1,449	1,540	12	6
Bundled	467	552	628	601	542	532	534	531	531	534	4	-0
Unbundled	272	367	474	554	617	677	745	829	917	1,006	23	10
Service Revenue	476	627	662	837	868	886	915	955	1,010	1,068	16	4
Total Factory Revenue	2,449	2,925	3,343	3,694	3,624	3,701	3,826	4,003	4,227	4,466	10	4
Increase over Prior Year (%)	37	19	14	11	-2	2	3	5	6	6		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (April 1994)

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Table 5
CAD/CAM/CAE/GIS History and Forecast

Application: All Applications
Region: Europe
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	3,324	4,873	2,438	1,297	1,242	1,100	1,100	1,100	1,100	1,200	-22	-1
Unit Shipments or Seats	14,173	16,332	10,761	8,231	8,920	8,200	7,900	7,400	6,900	6,800	-11	-5
CPU Installed Base	14,680	18,327	19,583	19,049	17,996	16,800	15,300	13,700	12,800	11,700	5	-8
Installed Seats	64,543	79,228	86,365	87,805	86,422	82,100	76,500	70,300	63,600	58,100	8	-8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	386.4	239.6	428.6	482.5	400.7	366.2	337.7	310.1	284.0	260.9	1	-8
Hardware-Only ASP	133.4	106.0	214.3	307.0	327.9	335.6	326.6	315.1	303.4	291.7	25	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	714	665	670	455	399	346	323	298	277	267	-14	-8
CPU Revenue	456	453	462	307	274	238	221	204	188	181	-12	-8
Terminal Revenue	188	151	158	123	103	89	83	78	73	71	-14	-7
Peripheral Revenue (Turnkey)	69	61	49	25	21	19	18	17	15	15	-26	-7
Software Revenue	224	224	170	110	92	83	76	69	63	60	-20	-8
Bundled	172	170	127	81	70	64	60	54	49	46	-20	-8
Unbundled	52	54	43	29	22	19	17	15	14	14	-19	-9
Service Revenue	209	232	212	149	129	116	109	101	94	91	-11	-7
Total Factory Revenue	1,147	1,121	1,052	713	621	545	508	468	433	417	-14	-8
Increase over Prior Year (%)	-17	-2	-6	-32	-13	-12	-7	-8	-7	-4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (April 1994)

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Table 6
CAD/CAM/CAE/GIS History and Forecast

Application: All Applications
Region: Europe
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	2,751	3,462	4,526	4,600	5,300	6,100	6,900	7,700	NA	11
Unit Shipments or Seats	NA	NA	2,751	3,462	4,526	4,600	5,300	6,100	6,900	7,700	NA	11
CPU Installed Base	NA	NA	2,751	6,213	10,532	14,600	18,500	22,600	25,800	28,900	NA	22
Installed Seats	NA	NA	2,751	6,213	10,532	14,600	18,500	22,600	25,800	28,900	NA	22
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	107.5	73.6	59.6	55.9	52.7	50.2	48.7	47.7	NA	-4
Hardware-Only ASP	NA	NA	43.1	44.1	37.3	36.7	36.5	36.2	36.0	35.6	NA	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	150	162	169	161	174	190	210	228	NA	6
CPU Revenue	NA	NA	128	145	150	141	155	172	191	209	NA	7
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	22	17	19	20	19	19	19	18	NA	-1
Software Revenue	NA	NA	71	54	73	85	98	110	124	135	NA	13
Bundled	NA	NA	59	39	57	66	74	80	87	92	NA	10
Unbundled	NA	NA	12	15	16	19	24	30	36	43	NA	22
Service Revenue	NA	NA	68	61	75	77	86	95	105	116	NA	9
Total Factory Revenue	NA	NA	289	277	317	323	358	396	439	479	NA	9
Increase over Prior Year (%)	NA	NA	NA	-4	14	2	11	11	11	9		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (April 1994)

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Table 7
CAD/CAM/CAE/GIS History and Forecast

Application: All Applications
Region: Europe
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	91,118	101,370	106,621	126,027	143,741	161,000	177,900	194,700	208,000	216,300	12	9
Unit Shipments or Seats	91,118	101,370	106,621	126,027	143,741	161,000	177,900	194,700	208,000	216,300	12	9
CPU Installed Base	282,554	354,747	412,615	464,361	498,573	527,300	570,200	627,000	685,200	734,300	15	8
Installed Seats	280,939	354,747	412,615	464,361	498,573	527,300	570,200	627,000	685,200	734,300	15	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	28.3	26.1	18.3	14.7	9.6	9.2	8.8	8.5	8.3	8.2	-24	-3
Hardware-Only ASP	4.7	3.9	3.4	3.3	3.0	2.9	2.9	2.9	2.9	2.8	-11	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	496	463	413	468	464	512	554	597	631	651	-2	7
CPU Revenue	448	404	374	428	439	484	525	567	600	619	-1	7
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	48	59	39	40	25	28	29	30	31	32	-15	5
Software Revenue	252	289	326	390	430	485	543	600	646	677	14	9
Bundled	32	29	35	41	48	52	56	59	62	63	10	6
Unbundled	220	260	291	348	383	434	487	541	584	615	15	10
Service Revenue	39	42	40	41	46	54	64	74	84	92	4	15
Total Factory Revenue	788	794	778	898	941	1,051	1,161	1,271	1,361	1,420	5	9
Increase over Prior Year (%)	18	1	-2	15	5	12	10	10	7	4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (April 1994)

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Table 8
CAD/CAM/CAE/GIS History and Forecast

Application: Mechanical
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	58,848	63,322	74,144	86,669	90,972	95,800	102,400	109,900	115,300	120,000	12	6
Unit Shipments or Seats	67,006	71,626	80,353	92,444	97,794	102,400	108,800	115,900	120,800	125,400	10	5
CPU Installed Base	165,509	214,600	264,502	313,544	348,778	375,800	402,800	433,600	462,400	484,000	20	7
Installed Seats	202,911	260,668	314,825	365,710	401,593	427,500	452,700	481,300	507,000	526,300	19	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	75.2	59.7	63.8	54.3	45.1	41.8	39.1	36.8	35.1	34.0	-12	-5
Hardware-Only ASP	10.0	10.7	11.7	10.1	9.6	9.6	9.5	9.5	9.7	9.8	-1	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,384	1,374	1,623	1,564	1,439	1,428	1,430	1,443	1,465	1,499	1	1
CPU Revenue	1,066	1,089	1,316	1,291	1,195	1,198	1,214	1,241	1,273	1,313	3	2
Terminal Revenue	138	106	117	94	86	81	76	72	69	67	-11	-5
Peripheral Revenue (Turnkey)	180	179	190	179	158	149	140	130	124	119	-3	-6
Software Revenue	614	725	899	879	872	913	969	1,029	1,084	1,139	9	5
Bundled	380	438	545	453	436	434	435	427	420	414	4	-1
Unbundled	234	287	354	426	436	478	534	602	664	725	17	11
Service Revenue	421	514	592	629	620	623	637	651	674	702	10	3
Total Factory Revenue	2,419	2,613	3,114	3,072	2,932	2,964	3,036	3,123	3,223	3,340	5	3
Increase over Prior Year (%)	13	8	19	-1	-5	1	2	3	3	4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 9
CAD/CAM/CAE/GIS History and Forecast

Application: AEC
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	37,324	48,428	51,628	61,534	76,372	89,300	101,300	112,900	123,600	131,100	20	11
Unit Shipments or Seats	38,402	49,691	52,626	62,193	76,855	89,500	101,500	113,100	123,800	131,200	19	11
CPU Installed Base	97,685	138,242	175,126	211,727	246,045	280,700	322,100	368,800	414,400	453,000	26	13
Installed Seats	102,625	144,481	182,130	218,921	252,961	286,900	327,300	373,000	417,600	455,300	25	12
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	55.2	44.9	42.4	34.4	23.4	21.6	20.2	19.1	18.4	18.2	-19	-5
Hardware-Only ASP	5.5	4.4	4.9	4.3	4.2	3.9	3.7	3.6	3.6	3.5	-7	-4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	364	392	446	459	440	461	487	518	554	586	5	6
CPU Revenue	298	332	379	397	398	423	449	479	514	544	8	6
Terminal Revenue	16	14	20	12	9	4	3	3	2	2	-13	-28
Peripheral Revenue (Turnkey)	51	45	47	50	34	34	34	36	38	40	-10	4
Software Revenue	185	225	280	335	367	403	441	481	522	556	19	9
Bundled	86	95	117	152	127	127	133	140	147	155	10	4
Unbundled	99	130	163	183	240	276	309	342	375	400	25	11
Service Revenue	89	110	125	151	161	166	174	185	201	219	16	6
Total Factory Revenue	638	726	850	944	968	1,029	1,101	1,184	1,277	1,361	11	7
Increase over Prior Year (%)	18	14	17	11	3	6	7	7	8	7		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (April 1994)

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Table 10
CAD/CAM/CAE/GIS History and Forecast

Application: GIS/Mapping
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	9,414	13,457	13,860	19,972	25,521	28,800	33,400	38,800	45,100	51,400	28	15
Unit Shipments or Seats	10,524	14,956	14,675	20,382	25,760	28,900	33,600	38,900	45,100	51,500	25	15
CPU Installed Base	22,023	34,019	45,131	60,080	76,956	93,400	111,400	130,800	152,200	174,000	37	18
Installed Seats	25,597	39,165	50,964	66,021	82,654	98,600	115,800	134,300	154,600	175,600	34	16
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	80.0	62.4	70.3	52.0	37.1	33.8	31.1	29.0	27.8	26.9	-17	-6
Hardware-Only ASP	14.5	12.5	11.7	11.6	9.7	8.4	8.0	7.7	7.4	7.1	-10	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	278	336	352	374	362	354	373	396	427	461	7	5
CPU Revenue	223	281	287	326	327	320	340	364	395	429	10	6
Terminal Revenue	17	14	10	10	3	2	2	1	1	1	-32	-26
Peripheral Revenue (Turnkey)	39	41	54	38	32	32	31	30	31	31	-5	-1
Software Revenue	137	181	187	213	236	261	291	323	357	394	15	11
Bundled	90	116	119	112	120	125	133	139	145	150	7	5
Unbundled	47	64	68	102	117	136	158	184	212	243	25	16
Service Revenue	81	112	117	149	167	177	193	212	231	252	20	9
Total Factory Revenue	496	628	656	736	765	791	856	930	1,015	1,107	11	8
Increase over Prior Year (%)	33	27	4	12	4	3	8	9	9	9		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (April 1994)

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Table 11
CAD/CAM/CAE/GIS History and Forecast

Application: Electronic Design Automation
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	30,362	30,118	32,420	33,101	33,154	34,200	34,900	35,300	35,500	35,000	2	1
Unit Shipments or Seats	30,865	30,510	32,721	33,193	33,288	34,300	34,900	35,400	35,600	35,100	2	1
CPU Installed Base	107,716	125,366	139,397	147,297	147,938	146,700	146,500	149,500	151,700	151,200	8	0
Installed Seats	109,318	128,815	143,018	150,753	150,936	149,000	148,300	150,700	152,300	151,400	8	0
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	59.0	53.0	49.1	45.5	36.4	33.9	33.5	33.1	32.7	32.3	-11	-2
Hardware-Only ASP	9.7	10.2	9.9	10.3	10.8	10.6	10.9	11.5	12.2	12.9	3	4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	418	404	392	390	387	381	394	416	441	458	-2	3
CPU Revenue	358	339	355	371	371	370	385	408	433	452	1	4
Terminal Revenue	18	17	11	6	4	2	2	2	2	2	-29	-19
Peripheral Revenue (Turnkey)	42	48	26	13	12	10	8	7	6	5	-28	-15
Software Revenue	280	303	303	282	280	286	295	306	318	324	0	3
Bundled	115	102	68	47	34	27	22	19	16	14	-26	-16
Unbundled	165	201	235	235	245	260	273	288	302	310	10	5
Service Revenue	133	165	148	158	172	168	171	178	187	193	6	2
Total Factory Revenue	831	872	843	830	838	835	859	901	945	975	0	3
Increase over Prior Year (%)	5	5	-3	-2	1	-0	3	5	5	3		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (April 1994)

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Table 12
CAD/CAM/CAE/GIS History and Forecast

Application: Electronic CAE
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	17,541	18,356	21,509	20,545	21,385	22,300	22,800	23,200	23,400	23,200	5	2
Unit Shipments or Seats	17,771	18,545	21,692	20,541	21,356	22,300	22,800	23,200	23,400	23,200	5	2
CPU Installed Base	52,203	64,769	78,228	86,875	90,585	91,400	92,500	95,200	97,500	98,100	15	2
Installed Seats	52,118	65,927	79,544	88,122	91,654	92,300	93,100	95,600	97,700	98,100	15	1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	53.8	50.0	41.2	37.8	29.6	30.1	29.9	29.8	29.5	29.2	-14	-0
Hardware-Only ASP	8.7	9.6	8.9	10.3	10.5	10.2	10.5	11.1	11.8	12.5	5	4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	223	229	225	235	236	238	248	264	281	296	1	5
CPU Revenue	180	187	204	222	225	228	240	258	275	290	6	5
Terminal Revenue	8	10	7	5	3	2	1	1	1	1	-23	-15
Peripheral Revenue (Turnkey)	35	33	14	8	9	8	6	6	5	5	-30	-12
Software Revenue	157	177	187	176	180	186	190	197	202	205	3	3
Bundled	65	54	35	27	19	16	13	11	9	8	-26	-15
Unbundled	92	123	152	150	161	170	177	186	193	196	15	4
Service Revenue	70	90	80	90	99	99	102	107	112	116	9	3
Total Factory Revenue	449	496	491	502	515	523	540	568	595	616	3	4
Increase over Prior Year (%)	14	10	-1	2	3	1	3	5	5	4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (April 1994)

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Table 13
CAD/CAM/CAE/GIS History and Forecast

Application: IC Layout
Region: Europe
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	2,250	1,531	2,159	2,605	3,064	3,000	3,100	3,300	3,500	3,500	8	3
Unit Shipments or Seats	2,235	1,490	2,147	2,607	3,068	3,000	3,100	3,300	3,500	3,500	8	3
CPU Installed Base	7,437	8,214	9,240	10,361	11,802	13,300	14,400	15,600	16,500	16,900	12	7
Installed Seats	7,605	8,399	9,427	10,588	11,949	13,400	14,400	15,600	16,400	16,700	12	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	53.0	55.0	48.5	51.9	44.3	43.2	42.3	40.6	39.9	39.8	-4	-2
Hardware-Only ASP	23.1	31.6	25.9	22.8	23.4	24.0	24.9	25.9	26.9	27.9	0	4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	52	48	56	60	72	73	78	85	93	98	9	6
CPU Revenue	46	42	52	60	72	73	78	85	93	97	12	6
Terminal Revenue	4	3	1	0	0	0	0	0	0	0	-58	-100
Peripheral Revenue (Turnkey)	2	2	3	0	0	0	0	0	0	0	-33	-19
Software Revenue	30	31	37	39	42	44	47	51	56	59	9	7
Bundled	5	6	8	3	2	1	1	1	1	1	-25	-16
Unbundled	25	25	29	36	40	42	46	50	55	58	13	8
Service Revenue	17	22	26	22	29	30	32	35	39	41	14	7
Total Factory Revenue	99	101	118	121	143	147	156	171	188	198	10	7
Increase over Prior Year (%)	6	1	18	2	18	3	6	9	10	5		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (April 1994)

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Table 14
CAD/CAM/CAE/GIS History and Forecast

Application: PCB/Hybrid/MCM
Region: Europe
Platform: **All Platforms**

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	10,571	10,231	8,751	9,952	8,704	8,900	8,900	8,800	8,600	8,300	-5	-1
Unit Shipments or Seats	10,858	10,474	8,883	10,044	8,864	8,900	9,000	8,900	8,700	8,300	-5	-1
CPU Installed Base	48,076	52,382	51,929	50,061	45,551	42,000	39,700	38,600	37,700	36,200	-1	-4
Installed Seats	49,595	54,488	54,048	52,043	47,333	43,400	40,800	39,500	38,300	36,700	-1	-5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	69.0	57.4	65.0	62.5	51.2	42.1	41.8	41.2	41.3	41.5	-7	-4
Hardware-Only ASP	8.1	8.0	8.6	6.8	6.9	6.9	6.9	7.1	7.3	7.5	-4	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	143	127	111	94	79	70	68	67	67	65	-14	-4
CPU Revenue	132	110	99	89	74	68	67	66	65	64	-13	-3
Terminal Revenue	6	3	3	1	2	1	1	0	0	0	-27	-25
Peripheral Revenue (Turnkey)	5	14	9	5	3	2	1	1	1	1	-15	-27
Software Revenue	92	95	80	66	58	57	58	59	60	60	-11	1
Bundled	45	42	26	17	13	10	8	7	6	5	-26	-17
Unbundled	48	53	54	49	44	47	50	52	54	55	-2	4
Service Revenue	47	54	42	46	43	38	37	36	36	35	-2	-4
Total Factory Revenue	282	276	233	207	179	166	163	162	162	161	-11	-2
Increase over Prior Year (%)	-6	-2	-15	-11	-13	-8	-2	-0	0	-1		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (April 1994)

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Note: All tables show estimated data.

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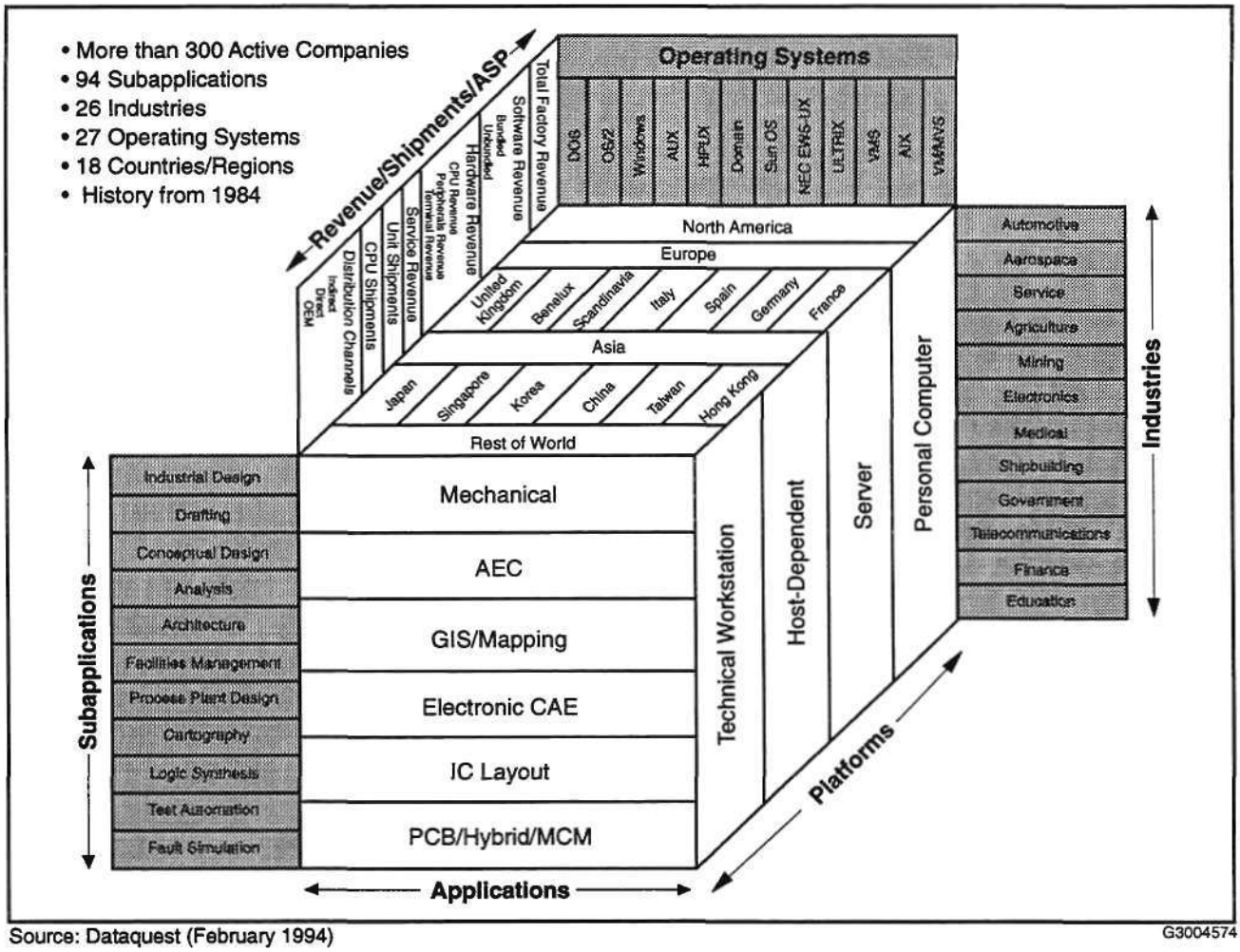
CAD/CAM/CAE and GIS Europe Overview Market Share—1993

Introduction

CAD/CAM/CAE/GIS systems have dramatically changed the methods by which designers and production managers originate and implement products. CAD and CAE systems allow designers to create, draft, analyze, test, and manipulate products on a screen in two and three dimensions. As CAD/CAM/CAE/GIS systems continue to decrease in cost, they become more available and cost justifiable to new users.

In order to provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure 1.

Figure 1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (February 1994)

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Table 1
CAD/CAM/CAE/GIS 1992-1993 Market Summary

	Software Revenue 1992 ($M)	Software Revenue 1993 ($M)	Growth Rate (%)	Total Revenue 1992 ($M)	Total Revenue 1993 ($M)	Growth Rate (%)	Hardware Unit Shipments 1992	Hardware Unit Shipments 1993	Growth Rate (%)
Application									
Mechanical	2,235.1	2,391.6	7.0	8,079.0	8,126.7	0.6	312,647	341,620	9.3
AEC	754.4	828.5	9.8	2,385.7	2,399.1	0.6	167,517	187,728	12.1
GIS/Mapping	587.1	653.8	11.4	2,018.3	2,124.8	5.3	87,918	104,504	18.9
Electronic CAE	740.7	787.7	6.3	2,135.7	2,295.7	7.5	96,797	102,196	5.6
IC Layout	228.6	234.6	2.6	640.6	686.5	7.2	14,580	17,368	19.1
PCB/Hybrid/MCM	290.9	290.2	-0.3	915.9	933.2	1.9	35,858	36,999	3.2
Total	4,836.7	5,186.3	7.2	16,175.2	16,565.8	2.4	715,317	790,415	10.5
Region									
North America	1,629.3	1,804.5	10.8	5,262.4	5,538.4	5.2	295,649	337,773	14.2
Europe	1,709.9	1,755.9	2.7	5,959.5	5,851.8	-1.8	238,241	261,348	9.7
Asia	1,375.1	1,500.0	9.1	4,575.7	4,799.7	4.9	160,991	168,811	4.9
Rest of World	122.5	125.9	2.8	377.7	375.9	-0.5	20,436	22,483	10.0
Total	4,836.7	5,186.3	7.2	16,175.2	16,565.8	2.4	715,317	790,415	10.5
In Local Currency									
Europe (ECU)	1,314.3	1,504.0	14.4	4,580.6	5,012.5	9.4			
Asia (Yen)	173,879	166,799	-4.1	578,591	533,729	-7.8			
Platform									
Technical Workstation	3,100.5	3,358.5	8.3	9,838.5	10,472.6	6.4	195,523	221,887	13.5
Host-Dependent	353.8	320.5	-9.4	2,324.6	1,925.0	-17.2	29,886	32,548	8.9
Server	190.6	210.8	10.6	1,040.4	1,070.6	2.9	15,030	17,482	16.3
Personal Computer	1,191.8	1,296.6	8.8	2,971.8	3,097.7	4.2	474,879	518,498	9.2
Total	4,836.7	5,186.3	7.2	16,175.2	16,565.8	2.4	715,317	790,415	10.5

Source: Dataquest (February 1994)

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A companion article analyzing major shifts in the 1993 market was published in our *Dataquest Alert*, dated January 31, 1994.

Table 1 summarizes the performance in various segments of the CAD/CAM/CAE/GIS markets in 1993 versus 1992. With the devaluation of the dollar against the yen (¥126.45/$ in 1992 versus ¥111.20/$ in 1993) and the appreciation of the dollar against the ECU (ECU 0.770/$ in 1992 versus ECU 0.858/$ in 1993) actual growth is not as it appears when denominated in U.S. dollars. With 75 percent of the Asian market in Japan, denominating in yen gives a rough indication of real growth in the Asian market, which was a negative 7.8 percent.

About This Document

This document contains Dataquest's detailed market share information on the CAD/CAM/CAE/GIS industry. Following is a description of the companies included in the *Market Share* books:

- Mechanical applications—All companies in database with mechanical revenue
- GIS and AEC applications—All companies in database with GIS revenue and all companies in database with AEC revenue
- Electronic design automation applications—All companies in database with EDA (electronic CAE, IC layout, PCB/hybrid/MCM) revenue
- Europe Overview—All Europe-based companies and all other companies with more than $1 million in European revenue
- Asia—All Asia-based companies and all other companies with more than $1 million in Asian revenue
- PC CAD—All companies in database with personal computer revenue

We no longer publish top-level market statistics for the entire CAD/CAM/CAE/GIS industry or companies whose revenue in any segment is less than $1 million. This data is available by calling Kathy Klotz at (408) 437-8243. More detailed data on these markets may be requested through our client inquiry service.

We recognize that final bookeeping is not yet complete for all companies. This document represents our best effort to get early, accurate information to our subscribers. We will follow up with primary and secondary research from February 1 through April 30 to verify and crosstab and refine, producing our market share update by May 31.

Dataquest's policy is to continually update its market information, for current and past years, with any new data received in order to arrive at the most accurate market representation possible.

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Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic Computer-Aided Engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of electronic CAE applications are schematic capture and simulation.
- IC Layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.

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- PCB/Hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe.

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong.

Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.

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- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

Metrics

The following paragraphs define measurements.

- Total factory revenue is defined as the amount of money received by a manufacturer for its goods and services measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue). Total factory revenue is the sum of software revenue, hardware revenue, and service revenue.
- Unit shipment is defined as the number of seats delivered (number of possible simultaneous users of product delivered) excluding OEM shipments.
- Hardware revenue is revenue derived from sales of CPUs (including operating systems), terminals (for host-dependent systems), and peripherals.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled application software.
- Service revenue is defined as all revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
  - Maintenance fees for hardware and software
  - Management and operations services—help desk, education and training, disaster recovery, vaulting, and configuration management.
  - Service bureau—project work, including construction of database, data conversion, product design, analysis, or manufacturing.
  - Application development—design and development of customized software applications or the modification, enhancement of customization of existing software applications, adding new functionality.

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- Consulting revenue—assessment of CAD/CAM/CAE/GIS business and information technology needs and the formulation of a plan based on needs identification.
- Implementation and integration services—planning, implementation, migration, and integration of software products (software network support and integration, account integration management, data center design, and construction).

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year and second quarter of the subsequent year, we survey all participants in each industry. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contacts at large companies. (Dataquest maintains a large contact database on all sources of information). Examples of the job titles of people contacted for information are the following:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning
- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE/GIS Marketing Programs
- Market research analyst

The Audit Process

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks

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- Articles in both the general and trade press
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice and checks with multiple sources at one company to cross-check data on that company.

Dataquest analysts have many years of experience in how to apply the above tools to get the most accurate information possible on a particular company (such as what to use when and what industry averages are). We believe that the estimates presented here are the most accurate and meaningful generally available today. It is the CAD/CAM/CAE/GIS group's policy to continually update our market information for any year, based on any new data received, in order to arrive at the most accurate market representation possible.

Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

Publishing Schedule

We publish market share and forecasting, twice each year for each, allowing for both timely distribution of data and thorough analysis and forecasting. Our annual delivery schedule is as follows:

- Market share data are available January 31. All tables will be published and distributed to clients by March 31.
- Forecasting from the market share tables provides a five-year forecast period, available after March 31. The books will be shipped by May 31.
- Final updated market share tables, based on additional data collection and analysis, will be completed by May 31. At this point, the market share database is frozen and will not be changed until the end of the year. For the next six months, supplementary market data will be based on these final market data. Books will be shipped by July 31.
- We provide complete final forecast tables by July 31. These tables take into consideration changes in the market share during the previous six months. Books will be shipped by September 31.

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Database Changes

Tables 2 through 5 show changes made to the database since last year's market share update. PC clone manufacturers are no longer tracked individually. We continue to show PC sales by IBM, Hewlett-Packard, and Digital, which also sell other platforms. The 1993 sale of GeoVision Systems to SHL Systemhouse, Computervision-GIS to Unisys, and Logic Modeling Corporation to Synopsys will be recognized in market reporting beginning in 1994.

Table 2
Companies Renamed

Company Name	Renamed to:
Alper Systems	Sysdeco Ltd.
Areon	Kreon
CADAM	Altium
Catalpa	Catalpa groupe Missler
Geotrace Technologies	Cadlynx
Logic Control	Logic Systems Designers
RIB/RZB	RIB Bausoftware
Sener Sistemas Marinos	Sener Inginiera y Sistemas
STI Strassle	Strassle Informationssysteme

Source: Dataquest (February 1994)

Table 3
Companies (or CAD Portions Thereof) Sold/Merged

Company Name	Acquired by, Merged with, Technology Sold to:
Aries Technology	MacNeal Schwendler
ASG	Softdesk
CAD Language Systems	Compass Design Automation
CAD/CAM Group	Data I/O
Comdisco	Cadence
DAT Standard info ssystemes	ISD Software
EEsof	Hewlett-Packard
Expertest	Sunrise Test
Fides Industrielle Automation	Strassle
HP Cade	Hewlett-Packard
Inca	Zycad
Infocel	Understanding Systems
PiE Design	Quickturn Design Systems
Quad Design Technology	Viewlogic
Wisdom Systems	ICAD

Source: Dataquest (February 1994)

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Table 4
Companies Deleted

Company Removed from Database:
European
Club Informatico SA
DATAID Technologies
DECISA
Micrograph
Olivetti*
North American
Bechtel
Compaq*
Dell Computer*
Engineering Systems Corporation
GeoQuest
Mega CADD
Object Design
Objectivity
Ontos
The CAD Group
Ultimap

*We no longer follow individual PC clone makers.
Source: Dataquest (February 1994)

Table 5
Companies Added

Company Added to Database:
European
APIC Systemes
ISD Software
North American
Aptix
Earth Resource Mapping
Graftek
Graphic Data Systems (GDS)
Systems Science, Inc.
Tactics Int'l Ltd.
VLSI Libraries
Asian
Adam Net
Kozo
Okura
Technodia
TECHSPERT
Toshiba Engineering
Yokogawa Digital Computer

Source: Dataquest (February 1994)

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Table 6
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	1,093.0	739.7	168.7	41,895	18.7%	25.4%	9.6%	16.0%
Hewlett-Packard	541.2	401.6	44.6	23,488	9.2%	13.8%	2.5%	9.0%
Digital	426.0	335.4	.0	14,263	7.3%	11.5%	.0%	5.5%
Intergraph	405.6	141.0	126.7	9,735	6.9%	4.8%	7.2%	3.7%
Computervision	371.4	78.5	125.5	5,724	6.3%	2.7%	7.1%	2.2%
Sun Microsystems	237.8	189.6	.0	10,044	4.1%	6.5%	.0%	3.8%
Siemens Nixdorf Info systeme	211.7	87.0	63.8	4,749	3.6%	3.0%	3.6%	1.8%
Autodesk	154.3	.0	154.3	0	2.6%	.0%	8.8%	.0%
Dassault*	108.7	.0	94.5	0	1.9%	.0%	5.4%	.0%
Silicon Graphics	98.6	88.0	.0	4,754	1.7%	3.0%	.0%	1.8%
Mentor Graphics	91.1	11.2	40.7	387	1.6%	.4%	2.3%	.1%
Matra Datavision	86.2	23.8	46.0	811	1.5%	.8%	2.6%	.3%
Control Data Systems	77.0	35.2	16.3	3,290	1.3%	1.2%	.9%	1.3%
Cadence	75.9	.0	59.3	0	1.3%	.0%	3.4%	.0%
Nemetschek	73.1	4.8	61.0	468	1.2%	.2%	3.5%	.2%
EDS Unigraphics	63.8	19.0	30.2	942	1.1%	.7%	1.7%	.4%
SDRC	53.1	.0	46.2	0	.9%	.0%	2.6%	.0%
IEZ	52.2	18.3	26.1	1,147	.9%	.6%	1.5%	.4%
Parametric Technology	49.7	.0	40.7	0	.8%	.0%	2.3%	.0%
Landmark Graphics	38.9	17.5	8.6	193	.7%	.6%	.5%	.1%
Applicon	38.5	12.7	15.0	424	.7%	.4%	.9%	.2%
ICL	36.6	21.4	12.6	1,052	.6%	.7%	.7%	.4%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Apple Computer	35.9	36.0	.0	7,564	.6%	1.2%	.0%	2.9%
Straessle Informationssysteme	32.6	4.5	20.6	480	.6%	.2%	1.2%	.2%
Wiechers Datentechnik	32.0	8.5	17.1	648	.5%	.3%	1.0%	.2%
Data Technology/DATECH*	31.9	7.5	21.1	7,003	.5%	.3%	1.2%	2.7%
ESRI	31.2	.0	25.0	0	.5%	.0%	1.4%	.0%
Han Dataport	28.7	8.7	15.8	647	.5%	.3%	.9%	.2%
ASCAD/ASCAM	28.2	16.7	8.7	436	.5%	.6%	.5%	.2%
Racal-Redac	26.7	3.4	12.1	126	.5%	.1%	.7%	.0%
ItalCad	24.5	8.0	9.3	280	.4%	.3%	.5%	.1%
Isicad CAD/CAM Systeme	24.3	6.1	13.5	261	.4%	.2%	.8%	.1%
Synopsys	24.2	.0	16.7	0	.4%	.0%	1.0%	.0%
Investronica SA	23.6	14.8	6.2	808	.4%	.5%	.4%	.3%
Cisigraph	23.6	6.4	11.3	272	.4%	.2%	.6%	.1%
Marcus Computer Systeme	22.1	11.3	7.6	400	.4%	.4%	.4%	.2%
ISD Software	21.1	4.3	13.6	682	.4%	.1%	.8%	.3%
Delcam International	21.1	7.4	9.5	280	.4%	.3%	.5%	.1%
GDS	20.7	9.1	9.5	426	.4%	.3%	.5%	.2%
Cimatron	20.3	9.0	9.2	686	.3%	.3%	.5%	.3%
MacNeal-Schwendler	19.2	.0	19.2	0	.3%	.0%	1.1%	.0%
Radan Computational	17.9	6.1	9.0	360	.3%	.2%	.5%	.1%
Smallworld Systems	17.0	3.9	9.4	377	.3%	.1%	.5%	.1%
CAD Lab	16.8	.0	13.9	0	.3%	.0%	.8%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
CAD Distribution	16.5	.0	14.8	247	.3%	.0%	.8%	.1%
Digital Kienzle	16.4	8.2	4.6	248	.3%	.3%	.3%	.1%
Engineering Computer Services*	15.7	6.2	5.5	427	.3%	.2%	.3%	.2%
Viewlogic Systems	15.4	.0	11.5	0	.3%	.0%	.7%	.0%
Research Machines	15.3	15.3	.0	5,667	.3%	.5%	.0%	2.2%
Ziegler Informatics	15.2	.0	15.2	0	.3%	.0%	.9%	.0%
Soft-Tech Software Technologies	14.7	1.9	11.4	948	.3%	.1%	.6%	.4%
Technische Computer Systeme	13.8	2.1	10.5	228	.2%	.1%	.6%	.1%
ABB Industria*	13.7	6.0	6.6	510	.2%	.2%	.4%	.2%
Tebis	13.3	3.5	2.0	89	.2%	.1%	.1%	.0%
Microway	13.2	7.9	4.0	145	.2%	.3%	.2%	.1%
Altium*	12.6	.0	12.0	0	.2%	.0%	.7%	.0%
PDA Engineering	12.6	.0	11.8	0	.2%	.0%	.7%	.0%
PAFEC	12.0	3.8	6.5	155	.2%	.1%	.4%	.1%
Star Informatic	11.5	3.2	6.7	613	.2%	.1%	.4%	.2%
COMPASS Design Automation	11.0	.0	8.7	5	.2%	.0%	.5%	.0%
Exapt	10.9	5.2	3.8	210	.2%	.2%	.2%	.1%
Graftek	10.6	4.1	3.8	192	.2%	.1%	.2%	.1%
Harris EDA	10.4	.9	6.4	60	.2%	.0%	.4%	.0%
CAD Centre	9.9	.0	8.1	0	.2%	.0%	.5%	.0%
RIB/Bausoftware	9.4	.8	7.7	67	.2%	.0%	.4%	.0%
Zycad	9.3	5.1	1.4	65	.2%	.2%	.1%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Framasoft	9.3	.3	3.6	19	.2%	.0%	.2%	.0%
Auto-Trol	9.3	3.3	3.7	117	.2%	.1%	.2%	.0%
Logic Modeling Corp.	9.3	.0	8.1	0	.2%	.0%	.5%	.0%
Laser-Scan	8.9	2.8	3.9	54	.2%	.1%	.2%	.0%
Aucotec	8.8	2.4	4.1	330	.2%	.1%	.2%	.1%
Moss Systems	8.7	.9	4.8	61	.1%	.0%	.3%	.0%
Sysscan	8.5	3.4	2.5	88	.1%	.1%	.1%	.0%
CIMTEK*	8.2	2.8	4.4	75	.1%	.1%	.2%	.0%
Unisys	8.2	1.7	2.7	153	.1%	.1%	.2%	.1%
Swanson Analysis	8.0	.0	7.2	0	.1%	.0%	.4%	.0%
Kockums Computer Systems	8.0	2.1	1.4	370	.1%	.1%	.1%	.1%
RoboCAD Solutions	7.8	.0	6.2	0	.1%	.0%	.4%	.0%
Hochtief	7.4	1.3	3.5	91	.1%	.0%	.2%	.0%
Serbi	7.0	.9	6.1	273	.1%	.0%	.3%	.1%
Sysdeco Ltd.	6.9	3.4	1.7	60	.1%	.1%	.1%	.0%
Sagantec	6.7	.0	6.1	0	.1%	.0%	.3%	.0%
Cimlinc	6.6	.0	4.4	169	.1%	.0%	.3%	.1%
Kohns & Poppenhaeger	6.6	3.0	2.6	76	.1%	.1%	.1%	.0%
Spectrum Graphics	6.5	1.9	3.3	62	.1%	.1%	.2%	.0%
Genasys II	6.2	.6	4.4	26	.1%	.0%	.2%	.0%
Complansoft CAD	6.2	3.1	3.1	148	.1%	.1%	.2%	.1%
APIC Systemes	5.9	.0	4.0	0	.1%	.0%	.2%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
debis Systemhaus	5.9	1.3	3.8	39	.1%	.0%	.2%	.0%
Gerber Systems	5.4	2.5	2.3	79	.1%	.1%	.1%	.0%
Analogy	5.3	.0	4.3	0	.1%	.0%	.2%	.0%
mb Programme	5.3	2.2	2.2	120	.1%	.1%	.1%	.0%
ADRA Systems	5.3	.1	4.0	9	.1%	.0%	.2%	.0%
Ground Modelling Systems	5.2	2.5	2.2	450	.1%	.1%	.1%	.2%
Graphisoft Software Dev	4.9	.0	4.9	0	.1%	.0%	.3%	.0%
BATISOFT	4.8	.7	2.4	322	.1%	.0%	.1%	.1%
Clemessy	4.8	3.8	.7	14	.1%	.1%	.0%	.0%
ANACAD	4.7	.0	4.7	0	.1%	.0%	.3%	.0%
Triplan	4.3	1.7	2.2	64	.1%	.1%	.1%	.0%
Aspen Technology	4.3	.0	2.8	0	.1%	.0%	.2%	.0%
Kloeckner-Moeller	4.2	.9	3.0	42	.1%	.0%	.2%	.0%
LSI Logic	4.2	.3	3.3	8	.1%	.0%	.2%	.0%
Softronics	4.2	.9	3.4	322	.1%	.0%	.2%	.1%
Computer Services Consultants	4.2	.0	4.2	0	.1%	.0%	.2%	.0%
Altera	4.0	.0	3.5	0	.1%	.0%	.2%	.0%
Alias Research	4.0	.0	3.7	0	.1%	.0%	.2%	.0%
Cadtronic*	3.9	1.9	2.0	117	.1%	.1%	.1%	.0%
Gable CAD Systems	3.9	2.8	.6	44	.1%	.1%	.0%	.0%
EME	3.9	1.0	1.8	107	.1%	.0%	.1%	.0%
FHECOR*	3.7	.0	3.7	0	.1%	.0%	.2%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Xilinx	3.7	.0	3.3	0	.1%	.0%	.2%	.0%
Micrografx	3.6	.0	3.6	0	.1%	.0%	.2%	.0%
Quickturn Design Systems	3.6	3.3	.3	44	.1%	.1%	.0%	.0%
Datagraphic	3.6	1.7	1.4	63	.1%	.1%	.1%	.0%
Asicom*	3.5	.3	3.3	40	.1%	.0%	.2%	.0%
MARC	3.5	.0	3.4	0	.1%	.0%	.2%	.0%
Orcad	3.5	.0	3.5	0	.1%	.0%	.2%	.0%
FEA	3.3	.7	.9	196	.1%	.0%	.0%	.1%
GeoVision Systems	3.3	.2	1.8	6	.1%	.0%	.1%	.0%
Teradyne	3.2	.4	2.3	8	.1%	.0%	.1%	.0%
Sener Inginiera y Sistemaus	3.2	.0	3.2	0	.1%	.0%	.2%	.0%
MCS	3.2	.1	2.7	17	.1%	.0%	.2%	.0%
Whessoe Computing Systems	3.2	.0	3.2	0	.1%	.0%	.2%	.0%
Pathtrace	3.0	.7	2.0	56	.1%	.0%	.1%	.0%
ISKA	3.0	1.3	1.2	54	.1%	.0%	.1%	.0%
SPATIAL Technology	2.9	.3	2.6	0	.0%	.0%	.1%	.0%
Assigraph	2.8	.0	2.3	0	.0%	.0%	.1%	.0%
CATALPA groupe Missler	2.8	1.2	1.2	84	.0%	.0%	.1%	.0%
Caroline Informatique	2.7	.5	1.4	27	.0%	.0%	.1%	.0%
MapInfo	2.7	.0	2.3	0	.0%	.0%	.1%	.0%
Geometria GIS Systems House	2.6	.3	.1	26	.0%	.0%	.0%	.0%
Zuken	2.6	.8	1.2	15	.0%	.0%	.1%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Mechanical Dynamics	2.5	.0	2.0	0	.0%	.0%	.1%	.0%
CAD-UL	2.5	.0	2.5	0	.0%	.0%	.1%	.0%
Anilam Electronics	2.5	.5	1.8	0	.0%	.0%	.1%	.0%
ALS Design	2.4	.2	2.2	30	.0%	.0%	.1%	.0%
ICAD	2.4	.0	2.0	0	.0%	.0%	.1%	.0%
Lamp Software	2.4	.6	1.7	166	.0%	.0%	.1%	.1%
Vero International Software	2.4	.0	2.2	0	.0%	.0%	.1%	.0%
CAD-Capture	2.3	.6	.6	26	.0%	.0%	.0%	.0%
ERDAS	2.3	.5	1.6	41	.0%	.0%	.1%	.0%
Genrad	2.3	.4	1.5	26	.0%	.0%	.1%	.0%
Superdraft	2.3	1.0	1.0	164	.0%	.0%	.1%	.1%
Microsim	2.3	.0	2.2	0	.0%	.0%	.1%	.0%
Synercom	2.2	.0	.9	0	.0%	.0%	.1%	.0%
BETRONEX	2.2	.1	2.1	42	.0%	.0%	.1%	.0%
Elstree Computing	2.1	.9	1.1	62	.0%	.0%	.1%	.0%
Rasna Corporation	2.1	.0	1.9	0	.0%	.0%	.1%	.0%
CADKEY	2.0	.0	2.0	0	.0%	.0%	.1%	.0%
FEGS	2.0	.0	1.1	0	.0%	.0%	.1%	.0%
Ikos Systems	2.0	1.5	.5	25	.0%	.1%	.0%	.0%
Logic System Designers*	2.0	.8	.8	49	.0%	.0%	.0%	.0%
DAPCO	2.0	.0	1.4	0	.0%	.0%	.1%	.0%
Enghouse Systems Ltd.	1.9	.1	1.7	3	.0%	.0%	.1%	.0%

(Continued)

Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Strategic Mapping	1.9	.0	1.7	0	.0%	.0%	.1%	.0%
ISDATA	1.8	.0	1.6	0	.0%	.0%	.1%	.0%
CAMTEK	1.8	.4	1.2	159	.0%	.0%	.1%	.1%
Test Systems Strategies	1.8	.0	1.6	0	.0%	.0%	.1%	.0%
ETAK	1.7	.1	1.6	3	.0%	.0%	.1%	.0%
Sinus Software	1.7	.9	.6	40	.0%	.0%	.0%	.0%
MEDESIGN	1.7	.5	.6	18	.0%	.0%	.0%	.0%
Aplein*	1.7	1.6	.1	20	.0%	.1%	.0%	.0%
Ascent Logic Corp	1.6	.0	1.3	0	.0%	.0%	.1%	.0%
Silvar-Lisco	1.6	.0	1.2	0	.0%	.0%	.1%	.0%
Moda CAD	1.6	.3	1.1	15	.0%	.0%	.1%	.0%
Macao Systems	1.6	.8	.6	16	.0%	.0%	.0%	.0%
Soft*	1.5	.0	1.1	0	.0%	.0%	.1%	.0%
PADS Software	1.5	.0	1.3	0	.0%	.0%	.1%	.0%
Point Control	1.5	.0	1.2	0	.0%	.0%	.1%	.0%
Solbourne	1.4	1.3	.0	119	.0%	.0%	.0%	.0%
Dynamic Graphics	1.4	.0	.9	0	.0%	.0%	.1%	.0%
ACTEL	1.4	.0	1.2	0	.0%	.0%	.1%	.0%
Data I/O	1.3	.0	1.3	0	.0%	.0%	.1%	.0%
Scientific & Engineering SW	1.3	.0	1.3	0	.0%	.0%	.1%	.0%
Engineering Mechanics	1.2	.1	1.1	6	.0%	.0%	.1%	.0%
Aucos elektronische Gerate	1.2	.4	.8	127	.0%	.0%	.0%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Mucke Software	1.2	.5	.5	25	.0%	.0%	.0%	.0%
Contract Data Research	1.2	.0	.3	0	.0%	.0%	.0%	.0%
ARKTEC	1.1	.1	.9	44	.0%	.0%	.1%	.0%
CAD TECH Iberica*	1.1	.6	.4	32	.0%	.0%	.0%	.0%
Sigma Design	1.1	.2	.8	62	.0%	.0%	.0%	.0%
CAMAX Systems Inc.	1.1	.2	.7	14	.0%	.0%	.0%	.0%
Compact Software	1.0	.0	.8	0	.0%	.0%	.0%	.0%
CADSI	1.0	.1	.8	7	.0%	.0%	.0%	.0%
Cascade Design Automation	1.0	.0	.8	0	.0%	.0%	.0%	.0%
Other Companies	204.0	359.6	.0	100,457	3.5%	12.3%	.0%	38.4%
All Companies	5,851.8	2,913.4	1,755.9	261,348	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	4,617.1	2,535.6	1,140.4	233,406	78.9%	87.0%	64.9%	89.3%
All Asian-Based Companies	2.9	.9	1.4	18	.0%	.0%	.1%	.0%
All European-Based Companies	1,231.8	376.9	614.1	27,924	21.1%	12.9%	35.0%	10.7%
All Hardware Companies	1,892.4	1,657.5	6.1	202,594	32.3%	56.9%	.3%	77.5%
All Turnkey & SW Companies	3,959.4	1,256.0	1,749.8	58,754	67.7%	43.1%	99.7%	22.5%

*Contains reseller or OEM revenue. All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 7
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	502.8	367.5	44.6	14,722	13.7%	22.5%	3.9%	19.5%
IBM	479.9	345.3	65.7	15,028	13.1%	21.2%	5.7%	19.9%
Computervision	364.6	77.8	119.8	5,603	9.9%	4.8%	10.4%	7.4%
Intergraph	333.8	119.4	88.2	4,574	9.1%	7.3%	7.6%	6.1%
Siemens Nixdorf Info systeme	198.7	77.8	62.1	3,485	5.4%	4.8%	5.4%	4.6%
Sun Microsystems	193.2	152.6	.0	8,784	5.3%	9.3%	.0%	11.6%
Digital	134.9	104.3	.0	4,255	3.7%	6.4%	.0%	5.6%
Mentor Graphics	91.1	11.2	40.7	387	2.5%	.7%	3.5%	.5%
Matra Datavision	86.2	23.8	46.0	811	2.3%	1.5%	4.0%	1.1%
Silicon Graphics	83.8	75.4	.0	4,503	2.3%	4.6%	.0%	6.0%
Cadence	71.1	.0	55.5	0	1.9%	.0%	4.8%	.0%
Dassault*	58.1	.0	50.2	0	1.6%	.0%	4.3%	.0%
SDRC	52.6	.0	45.7	0	1.4%	.0%	4.0%	.0%
IEZ	52.2	18.3	26.1	1,147	1.4%	1.1%	2.3%	1.5%
EDS Unigraphics	51.1	15.0	24.3	781	1.4%	.9%	2.1%	1.0%
Parametric Technology	49.7	.0	40.7	0	1.4%	.0%	3.5%	.0%
Applicon	38.5	12.7	15.0	424	1.0%	.8%	1.3%	.6%
ICL	36.6	21.4	12.6	1,052	1.0%	1.3%	1.1%	1.4%
Nemetschek	33.6	2.2	28.1	93	.9%	.1%	2.4%	.1%
Control Data Systems	33.0	18.1	8.8	867	.9%	1.1%	.8%	1.2%
Straessle Informationssysteme	32.6	4.5	20.6	480	.9%	.3%	1.8%	.6%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ASCAD/ASCAM	27.3	16.1	8.5	413	.7%	1.0%	.7%	.5%
Han Dataport	24.7	7.2	13.8	561	.7%	.4%	1.2%	.7%
ItalCad	24.5	8.0	9.3	280	.7%	.5%	.8%	.4%
Racal-Redac	24.3	3.4	9.8	126	.7%	.2%	.8%	.2%
Synopsys	24.2	.0	16.7	0	.7%	.0%	1.4%	.0%
Landmark Graphics	23.5	10.6	5.2	116	.6%	.6%	.4%	.2%
Isicad CAD/CAM Systeme	22.5	6.1	11.7	261	.6%	.4%	1.0%	.3%
Marcus Computer Systeme	22.1	11.3	7.6	400	.6%	.7%	.7%	.5%
Cisigraph	21.2	5.7	10.2	260	.6%	.4%	.9%	.3%
GDS	20.7	9.1	9.5	426	.6%	.6%	.8%	.6%
Delcam International	18.6	6.5	8.4	214	.5%	.4%	.7%	.3%
ISD Software	18.5	4.3	11.0	682	.5%	.3%	1.0%	.9%
Radan Computational	17.8	6.1	8.9	343	.5%	.4%	.8%	.5%
Smallworld Systems	17.0	3.9	9.4	377	.5%	.2%	.8%	.5%
Digital Kienzle	16.4	8.2	4.6	248	.4%	.5%	.4%	.3%
ESRI	16.2	.0	12.5	0	.4%	.0%	1.1%	.0%
Wiechers Datentechnik	14.1	4.9	6.3	340	.4%	.3%	.5%	.5%
CAD Lab	14.0	.0	11.3	0	.4%	.0%	1.0%	.0%
PDA Engineering	11.3	.0	10.6	0	.3%	.0%	.9%	.0%
Cimatron	11.2	4.9	5.1	228	.3%	.3%	.4%	.3%
COMPASS Design Automation	11.0	.0	8.7	5	.3%	.0%	.8%	.0%
PAFEC	10.8	3.8	5.4	155	.3%	.2%	.5%	.2%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Star Informatic	10.8	2.6	6.7	432	.3%	.2%	.6%	.6%
Viewlogic Systems	10.2	.0	7.4	0	.3%	.0%	.6%	.0%
CAD Centre	9.9	.0	8.1	0	.3%	.0%	.7%	.0%
Autodesk	9.9	.0	9.9	0	.3%	.0%	.9%	.0%
Technische Computer Systeme	9.5	1.3	7.2	106	.3%	.1%	.6%	.1%
Microway	9.4	5.7	2.9	93	.3%	.3%	.2%	.1%
Auto-Trol	9.3	3.3	3.7	117	.3%	.2%	.3%	.2%
Harris EDA	9.2	.7	5.5	41	.3%	.0%	.5%	.1%
Logic Modeling Corp.	9.2	.0	8.0	0	.2%	.0%	.7%	.0%
Moss Systems	8.7	.9	4.8	61	.2%	.1%	.4%	.1%
Graftek	8.5	3.4	3.3	138	.2%	.2%	.3%	.2%
Laser-Scan	8.5	2.5	3.8	52	.2%	.2%	.3%	.1%
Framasoft	8.4	.3	3.2	19	.2%	.0%	.3%	.0%
Kockums Computer Systems	8.0	2.1	1.4	370	.2%	.1%	.1%	.5%
CIMTEK*	7.6	2.7	4.0	67	.2%	.2%	.3%	.1%
Engineering Computer Services*	7.5	2.9	2.5	100	.2%	.2%	.2%	.1%
Sysdeco Ltd.	6.9	3.4	1.7	60	.2%	.2%	.1%	.1%
Sagantec	6.7	.0	6.1	0	.2%	.0%	.5%	.0%
Kohns & Poppenhaeger	6.6	3.0	2.6	76	.2%	.2%	.2%	.1%
Spectrum Graphics	6.5	1.9	3.3	62	.2%	.1%	.3%	.1%
Cimlinc	6.3	.0	4.2	169	.2%	.0%	.4%	.2%
Complansoft CAD	6.2	3.1	3.1	148	.2%	.2%	.3%	.2%

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
APIC Systemes	5.9	.0	4.0	0	.2%	.0%	.3%	.0%
MacNeal-Schwendler	5.8	.0	5.8	0	.2%	.0%	.5%	.0%
Unisys	5.7	.9	2.2	84	.2%	.1%	.2%	.1%
Genasys II	5.6	.6	3.9	12	.2%	.0%	.3%	.0%
Gerber Systems	5.4	2.5	2.3	79	.1%	.2%	.2%	.1%
Analogy	5.2	.0	4.2	0	.1%	.0%	.4%	.0%
Swanson Analysis	4.9	.0	4.4	0	.1%	.0%	.4%	.0%
ANACAD	4.7	.0	4.7	0	.1%	.0%	.4%	.0%
debis Systemhaus	4.6	1.0	3.0	22	.1%	.1%	.3%	.0%
Sysscan	4.5	1.5	1.6	56	.1%	.1%	.1%	.1%
Triplan	4.3	1.7	2.2	64	.1%	.1%	.2%	.1%
Clemessy	4.3	3.4	.6	12	.1%	.2%	.1%	.0%
Alias Research	4.0	.0	3.7	0	.1%	.0%	.3%	.0%
LSI Logic	4.0	.3	3.1	7	.1%	.0%	.3%	.0%
Gable CAD Systems	3.9	2.8	.6	44	.1%	.2%	.1%	.1%
ADRA Systems	3.8	.1	2.8	9	.1%	.0%	.2%	.0%
Data Technology/DATECH*	3.8	.0	3.5	0	.1%	.0%	.3%	.0%
Quickturn Design Systems	3.6	3.3	.3	44	.1%	.2%	.0%	.1%
Exapt	3.3	1.6	1.2	112	.1%	.1%	.1%	.1%
Sener Inginiera y Sistemaus	3.2	.0	3.2	0	.1%	.0%	.3%	.0%
Aspen Technology	3.2	.0	2.1	0	.1%	.0%	.2%	.0%
Zycad	3.1	1.7	.5	23	.1%	.1%	.0%	.0%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ISKA	3.0	1.3	1.2	54	.1%	.1%	.1%	.1%
RIB/Bausoftware	2.8	.2	2.3	14	.1%	.0%	.2%	.0%
GeoVision Systems	2.8	.2	1.5	6	.1%	.0%	.1%	.0%
MARC	2.6	.0	2.5	0	.1%	.0%	.2%	.0%
Zuken	2.6	.8	1.2	15	.1%	.0%	.1%	.0%
SPATIAL Technology	2.6	.0	2.6	0	.1%	.0%	.2%	.0%
Assigraph	2.6	.0	2.1	0	.1%	.0%	.2%	.0%
ICAD	2.4	.0	2.0	0	.1%	.0%	.2%	.0%
Aucotec	2.2	.5	1.1	46	.1%	.0%	.1%	.1%
Genrad	2.1	.3	1.4	21	.1%	.0%	.1%	.0%
DAPCO	2.0	.0	1.4	0	.1%	.0%	.1%	.0%
FEGS	1.8	.0	1.0	0	.0%	.0%	.1%	.0%
Mechanical Dynamics	1.8	.0	1.5	0	.0%	.0%	.1%	.0%
Teradyne	1.8	.1	1.4	5	.0%	.0%	.1%	.0%
ERDAS	1.7	.4	1.2	10	.0%	.0%	.1%	.0%
Sinus Software	1.7	.9	.6	40	.0%	.1%	.1%	.1%
Test Systems Strategies	1.7	.0	1.5	0	.0%	.0%	.1%	.0%
Caroline Informatique	1.7	.3	.9	9	.0%	.0%	.1%	.0%
MEDESIGN	1.7	.5	.6	18	.0%	.0%	.1%	.0%
Rasna Corporation	1.7	.0	1.5	0	.0%	.0%	.1%	.0%
Aplein*	1.7	1.6	.1	20	.0%	.1%	.0%	.0%
CATALPA groupe Missler	1.7	.7	.8	19	.0%	.0%	.1%	.0%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Synercom	1.7	.0	.7	0	.0%	.0%	.1%	.0%
MCS	1.7	.0	1.4	6	.0%	.0%	.1%	.0%
EME	1.6	.3	.8	22	.0%	.0%	.1%	.0%
Silvar-Lisco	1.6	.0	1.2	0	.0%	.0%	.1%	.0%
Dynamic Graphics	1.3	.0	.9	0	.0%	.0%	.1%	.0%
Scientific & Engineering SW	1.3	.0	1.3	0	.0%	.0%	.1%	.0%
FEA	1.3	.3	.3	19	.0%	.0%	.0%	.0%
Ascent Logic Corp	1.2	.0	.9	0	.0%	.0%	.1%	.0%
Xilinx	1.2	.0	1.1	0	.0%	.0%	.1%	.0%
Macao Systems	1.2	.6	.4	13	.0%	.0%	.0%	.0%
CAMAX Systems Inc.	1.1	.2	.7	14	.0%	.0%	.1%	.0%
Cascade Design Automation	1.0	.0	.8	0	.0%	.0%	.1%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	3,671.3	1,632.1	1,155.3	75,431	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2,772.2	1,344.2	737.0	61,608	75.5%	82.4%	63.8%	81.7%
All Asian-Based Companies	2.9	.9	1.4	18	.1%	.1%	.1%	.0%
All European-Based Companies	896.2	287.0	416.9	13,805	24.4%	17.6%	36.1%	18.3%
All Hardware Companies	969.5	821.2	3.9	39,898	26.4%	50.3%	.3%	52.9%
All Turnkey & SW Companies	2,701.8	810.9	1,151.4	35,533	73.6%	49.7%	99.7%	47.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 8
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Host-Dependent
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	397.2	249.5	60.4	5,364	53.3%	49.7%	64.0%	42.9%
Digital	139.3	108.0	.0	0	18.7%	21.5%	.0%	.0%
Control Data Systems	41.6	16.3	6.9	2,415	5.6%	3.2%	7.3%	19.3%
Dassault*	36.6	.0	32.3	0	4.9%	.0%	34.2%	.0%
MacNeal-Schwendler	13.4	.0	13.4	0	1.8%	.0%	14.2%	.0%
Exapt	7.6	3.6	2.7	98	1.0%	.7%	2.8%	.8%
Siemens Nixdorf Info systeme	6.3	2.8	1.7	99	.8%	.6%	1.8%	.8%
PDA Engineering	1.2	.0	1.2	0	.2%	.0%	1.3%	.0%
Aspen Technology	1.1	.0	.7	0	.1%	.0%	.7%	.0%
Other Companies	90.8	120.0	.0	4,494	12.2%	23.9%	.0%	35.9%
All Companies	745.3	501.7	94.3	12,511	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	726.9	494.2	87.6	12,301	97.5%	98.5%	92.9%	98.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	18.3	7.5	6.7	210	2.5%	1.5%	7.1%	1.7%
All Hardware Companies	273.3	230.7	1.7	5,099	36.7%	46.0%	1.8%	40.8%
All Turnkey & SW Companies	472.0	271.0	92.5	7,412	63.3%	54.0%	98.2%	59.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 9
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Server
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	129.5	71.2	30.7	1,831	31.0%	28.6%	42.3%	29.2%
Digital	117.3	90.4	.0	1,807	28.1%	36.3%	.0%	28.8%
Sun Microsystems	44.6	37.0	.0	1,260	10.7%	14.9%	.0%	20.1%
Intergraph	33.4	8.3	13.4	363	8.0%	3.3%	18.4%	5.8%
Landmark Graphics	15.5	7.0	3.4	77	3.7%	2.8%	4.7%	1.2%
Silicon Graphics	14.8	12.6	.0	251	3.5%	5.0%	.0%	4.0%
Dassault*	14.0	.0	12.0	0	3.4%	.0%	16.5%	.0%
EDS Unigraphics	12.8	4.0	5.9	161	3.0%	1.6%	8.1%	2.6%
ESRI	9.7	.0	7.5	0	2.3%	.0%	10.3%	.0%
Hewlett-Packard	7.2	6.0	.0	141	1.7%	2.4%	.0%	2.2%
Zycad	6.2	3.4	.9	42	1.5%	1.4%	1.3%	.7%
Cadence	4.8	.0	3.8	0	1.2%	.0%	5.3%	.0%
Sysscan	4.0	1.9	.8	32	1.0%	.7%	1.2%	.5%
Unisys	2.5	.8	.6	69	.6%	.3%	.8%	1.1%
Han Dataport	2.4	1.1	1.0	36	.6%	.4%	1.4%	.6%
Control Data Systems	2.4	.9	.6	8	.6%	.4%	.9%	.1%
Cisigraph	2.4	.7	1.2	12	.6%	.3%	1.6%	.2%
Ikos Systems	2.0	1.5	.5	25	.5%	.6%	.7%	.4%
Computervision	1.8	.7	.7	23	.4%	.3%	.9%	.4%
Graftek	1.7	.5	.4	37	.4%	.2%	.6%	.6%
Teradyne	1.5	.3	.9	4	.3%	.1%	1.3%	.1%

(Continued)

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Table 9 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Server
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Solbourne	1.3	1.2	.0	86	.3%	.5%	.0%	1.4%
Other Companies	.0	.0	.0	1	.0%	.0%	.0%	.0%
All Companies	418.3	249.2	72.7	6,265	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	409.5	245.6	69.7	6,186	97.9%	98.6%	95.9%	98.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	8.8	3.6	3.0	79	2.1%	1.4%	4.1%	1.3%
All Hardware Companies	192.5	153.2	.4	3,693	46.0%	61.5%	.6%	59.0%
All Turnkey & SW Companies	225.8	96.0	72.3	2,572	54.0%	38.5%	99.4%	41.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 10
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Personal Computer
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Autodesk	144.4	.0	144.4	0	14.2%	.0%	33.3%	.0%
IBM	86.3	73.8	12.0	19,672	8.5%	13.9%	2.8%	11.8%
Nemetschek	39.5	2.6	33.0	375	3.9%	.5%	7.6%	.2%
Intergraph	38.4	13.3	25.2	4,798	3.8%	2.5%	5.8%	2.9%
Apple Computer	35.9	36.0	.0	7,564	3.5%	6.8%	.0%	4.5%
Digital	34.5	32.8	.0	8,200	3.4%	6.2%	.0%	4.9%
Hewlett-Packard	31.1	28.1	.0	8,625	3.1%	5.3%	.0%	5.2%
Data Technology/DATECH*	28.1	7.5	17.7	7,003	2.8%	1.4%	4.1%	4.2%
Investronica SA	23.6	14.8	6.2	808	2.3%	2.8%	1.4%	.5%
Wiechers Datentechnik	18.0	3.6	10.8	309	1.8%	.7%	2.5%	.2%
CAD Distribution	16.5	.0	14.8	247	1.6%	.0%	3.4%	.1%
Research Machines	15.3	15.3	.0	5,667	1.5%	2.9%	.0%	3.4%
Ziegler Informatics	15.2	.0	15.2	0	1.5%	.0%	3.5%	.0%
Soft-Tech Software Technologies	14.7	1.9	11.4	948	1.4%	.4%	2.6%	.6%
ABB Industria*	13.7	6.0	6.6	510	1.3%	1.1%	1.5%	.3%
Tebis	13.3	3.5	2.0	89	1.3%	.7%	.5%	.1%
Altium*	12.6	.0	12.0	0	1.2%	.0%	2.8%	.0%
Cimatron	9.1	4.0	4.2	458	.9%	.8%	1.0%	.3%
Engineering Computer Services*	8.3	3.4	3.0	327	.8%	.6%	.7%	.2%
RoboCAD Solutions	7.8	.0	6.2	0	.8%	.0%	1.4%	.0%
Hochtief	7.3	1.2	3.5	90	.7%	.2%	.8%	.1%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Personal Computer
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Serbi	7.0	.9	6.1	273	.7%	.2%	1.4%	.2%
Siemens Nixdorf Info systeme	6.7	6.3	.0	1,166	.7%	1.2%	.0%	.7%
RIB/Bausoftware	6.6	.6	5.4	52	.6%	.1%	1.3%	.0%
Aucotec	6.6	1.9	3.0	284	.6%	.4%	.7%	.2%
mb Programme	5.3	2.2	2.2	120	.5%	.4%	.5%	.1%
Ground Modelling Systems	5.2	2.5	2.2	450	.5%	.5%	.5%	.3%
Viewlogic Systems	5.2	.0	4.1	0	.5%	.0%	.9%	.0%
ESRI	5.2	.0	4.9	0	.5%	.0%	1.1%	.0%
Computervision	5.0	.0	5.0	98	.5%	.0%	1.1%	.1%
Graphisoft Software Dev	4.9	.0	4.9	0	.5%	.0%	1.1%	.0%
BATISOFT	4.8	.7	2.4	322	.5%	.1%	.6%	.2%
Technische Computer Systeme	4.3	.8	3.3	122	.4%	.1%	.8%	.1%
Kloeckner-Moeller	4.2	.9	3.0	42	.4%	.2%	.7%	.0%
Softronics	4.2	.9	3.4	322	.4%	.2%	.8%	.2%
Computer Services Consultants	4.2	.0	4.2	0	.4%	.0%	1.0%	.0%
Altera	4.0	.0	3.5	0	.4%	.0%	.8%	.0%
Cadtronic*	3.9	1.9	2.0	117	.4%	.4%	.5%	.1%
Microway	3.8	2.2	1.1	52	.4%	.4%	.3%	.0%
Micrografx	3.6	.0	3.6	0	.4%	.0%	.8%	.0%
Datagraphic	3.6	1.7	1.4	63	.3%	.3%	.3%	.0%
Orcad	3.5	.0	3.5	0	.3%	.0%	.8%	.0%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Personal Computer
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Asicom*	3.1	.3	2.9	40	.3%	.0%	.7%	.0%
FHECOR*	3.1	.0	3.1	0	.3%	.0%	.7%	.0%
Pathtrace	3.0	.7	2.0	56	.3%	.1%	.5%	.0%
CAD Lab	2.9	.0	2.6	0	.3%	.0%	.6%	.0%
ISD Software	2.6	.0	2.6	0	.3%	.0%	.6%	.0%
Anilam Electronics	2.5	.5	1.8	0	.2%	.1%	.4%	.0%
Xilinx	2.5	.0	2.2	0	.2%	.0%	.5%	.0%
Delcam International	2.5	.9	1.1	66	.2%	.2%	.3%	.0%
Whessoe Computing Systems	2.5	.0	2.5	0	.2%	.0%	.6%	.0%
ALS Design	2.4	.2	2.1	30	.2%	.0%	.5%	.0%
MapInfo	2.4	.0	2.1	0	.2%	.0%	.5%	.0%
Racal-Redac	2.4	.0	2.3	0	.2%	.0%	.5%	.0%
Vero International Software	2.4	.0	2.2	0	.2%	.0%	.5%	.0%
Superdraft	2.3	1.0	1.0	164	.2%	.2%	.2%	.1%
EME	2.2	.6	1.0	85	.2%	.1%	.2%	.1%
Swanson Analysis	2.2	.0	1.9	0	.2%	.0%	.4%	.0%
BETRONEX	2.2	.1	2.1	42	.2%	.0%	.5%	.0%
Elstree Computing	2.1	.9	1.1	62	.2%	.2%	.3%	.0%
Microsim	2.0	.0	1.9	0	.2%	.0%	.4%	.0%
CAD-UL	2.0	.0	2.0	0	.2%	.0%	.5%	.0%
Strategic Mapping	1.9	.0	1.7	0	.2%	.0%	.4%	.0%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Personal Computer
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
CADKEY	1.9	.0	1.9	0	.2%	.0%	.4%	.0%
CAD-Capture	1.8	.5	.5	23	.2%	.1%	.1%	.0%
Geometria GIS Systems House	1.8	.2	.0	21	.2%	.0%	.0%	.0%
Isicad CAD/CAM Systeme	1.8	.0	1.8	0	.2%	.0%	.4%	.0%
FEA	1.8	.4	.4	176	.2%	.1%	.1%	.1%
CAMTEK	1.7	.4	1.2	157	.2%	.1%	.3%	.1%
Lamp Software	1.6	.3	1.3	110	.2%	.1%	.3%	.1%
Han Dataport	1.6	.4	1.0	50	.2%	.1%	.2%	.0%
Moda CAD	1.6	.3	1.1	15	.2%	.1%	.3%	.0%
MCS	1.5	.0	1.3	11	.2%	.0%	.3%	.0%
ADRA Systems	1.5	.0	1.2	0	.1%	.0%	.3%	.0%
Enghouse Systems Ltd.	1.5	.0	1.3	0	.1%	.0%	.3%	.0%
Logic System Designers*	1.4	.5	.6	43	.1%	.1%	.1%	.0%
Soft*	1.4	.0	1.0	0	.1%	.0%	.2%	.0%
PADS Software	1.4	.0	1.2	0	.1%	.0%	.3%	.0%
Point Control	1.3	.0	1.1	0	.1%	.0%	.2%	.0%
ETAK	1.3	.1	1.3	2	.1%	.0%	.3%	.0%
ISDATA	1.2	.0	1.1	0	.1%	.0%	.2%	.0%
Data I/O	1.2	.0	1.2	0	.1%	.0%	.3%	.0%
Aucos elektronische Gerate	1.2	.4	.8	127	.1%	.1%	.2%	.1%
Mucke Software	1.2	.5	.5	25	.1%	.1%	.1%	.0%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Personal Computer
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Contract Data Research	1.2	.0	.3	0	.1%	.0%	.1%	.0%
PAFEC	1.1	.0	1.1	0	.1%	.0%	.3%	.0%
CATALPA groupe Missler	1.1	.5	.5	65	.1%	.1%	.1%	.0%
Caroline Informatique	1.0	.2	.5	19	.1%	.0%	.1%	.0%
Harris EDA	1.0	.1	.8	13	.1%	.0%	.2%	.0%
Other Companies	200.2	246.5	.0	96,141	19.7%	46.5%	.0%	57.5%
All Companies	1,016.9	530.4	433.6	167,141	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	708.5	451.5	246.1	153,311	69.7%	85.1%	56.7%	91.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	308.5	78.9	187.5	13,830	30.3%	14.9%	43.3%	8.3%
All Hardware Companies	457.1	452.3	.0	153,904	44.9%	85.3%	.0%	92.1%
All Turnkey & SW Companies	559.9	78.1	433.6	13,237	55.1%	14.7%	100.0%	7.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 11
1993 CAD/CAM/CAE/GIS Market Share

Application: Mechanical
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	829.6	530.7	144.9	22,809	26.0%	32.1%	16.5%	19.0%
Hewlett-Packard	342.8	236.1	41.2	11,384	10.7%	14.3%	4.7%	9.5%
Computervision	314.7	67.4	105.9	4,897	9.9%	4.1%	12.1%	4.1%
Digital	198.3	156.8	.0	5,772	6.2%	9.5%	.0%	4.8%
Sun Microsystems	114.0	90.9	.0	4,818	3.6%	5.5%	.0%	4.0%
Dassault*	99.7	.0	86.7	0	3.1%	.0%	9.9%	.0%
Intergraph	85.1	27.1	29.6	1,974	2.7%	1.6%	3.4%	1.6%
Matra Datavision	84.5	23.3	45.1	795	2.6%	1.4%	5.1%	.7%
Silicon Graphics	79.0	70.5	.0	3,811	2.5%	4.3%	.0%	3.2%
Control Data Systems	72.0	32.7	15.1	3,135	2.3%	2.0%	1.7%	2.6%
EDS Unigraphics	63.8	19.0	30.2	942	2.0%	1.1%	3.4%	.8%
Siemens Nixdorf Info systeme	63.3	32.4	11.5	1,734	2.0%	2.0%	1.3%	1.4%
Autodesk	61.7	.0	61.7	0	1.9%	.0%	7.0%	.0%
SDRC	53.1	.0	46.2	0	1.7%	.0%	5.3%	.0%
Parametric Technology	49.7	.0	40.7	0	1.6%	.0%	4.6%	.0%
Applicon	38.5	12.7	15.0	424	1.2%	.8%	1.7%	.4%
ASCAD/ASCAM	28.2	16.7	8.7	436	.9%	1.0%	1.0%	.4%
Investronica SA	23.6	14.8	6.2	808	.7%	.9%	.7%	.7%
Cisigraph	23.6	6.4	11.3	272	.7%	.4%	1.3%	.2%
Straessle Informationssysteme	23.1	3.2	14.6	341	.7%	.2%	1.7%	.3%
Marcus Computer Systeme	22.1	11.3	7.6	400	.7%	.7%	.9%	.3%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Mechanical
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Delcam International	21.1	7.4	9.5	280	.7%	.4%	1.1%	.2%
ISD Software	20.6	4.3	13.0	682	.6%	.3%	1.5%	.6%
Cimatron	20.3	9.0	9.2	686	.6%	.5%	1.1%	.6%
Data Technology/DATECH*	19.3	5.0	12.4	962	.6%	.3%	1.4%	.8%
Isicad CAD/CAM Systeme	18.6	5.0	9.7	216	.6%	.3%	1.1%	.2%
MacNeal-Schwendler	18.4	.0	18.4	0	.6%	.0%	2.1%	.0%
Wiechers Datentechnik	18.1	3.9	10.5	324	.6%	.2%	1.2%	.3%
CAD Lab	16.8	.0	13.9	0	.5%	.0%	1.6%	.0%
Digital Kienzle	16.4	8.2	4.6	248	.5%	.5%	.5%	.2%
Han Dataport	16.2	4.9	9.0	367	.5%	.3%	1.0%	.3%
ItalCad	16.2	5.3	6.2	185	.5%	.3%	.7%	.2%
Radan Computational	16.1	5.5	8.1	324	.5%	.3%	.9%	.3%
Engineering Computer Services*	15.7	6.2	5.5	427	.5%	.4%	.6%	.4%
Tebis	13.3	3.5	2.0	89	.4%	.2%	.2%	.1%
Apple Computer	12.6	12.6	.0	2,646	.4%	.8%	.0%	2.2%
PDA Engineering	12.6	.0	11.8	0	.4%	.0%	1.3%	.0%
Exapt	10.9	5.2	3.8	210	.3%	.3%	.4%	.2%
ICL	10.0	5.8	3.4	287	.3%	.4%	.4%	.2%
Framasoft	9.3	.3	3.6	19	.3%	.0%	.4%	.0%
Altium*	9.0	.0	8.6	0	.3%	.0%	1.0%	.0%
PAFEC	8.6	2.6	4.9	107	.3%	.2%	.6%	.1%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Mechanical
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
CIMTEK*	8.2	2.8	4.4	75	.3%	.2%	.5%	.1%
Swanson Analysis	8.0	.0	7.2	0	.3%	.0%	.8%	.0%
CAD Distribution	7.9	.0	7.1	101	.2%	.0%	.8%	.1%
Research Machines	7.8	7.8	.0	2,890	.2%	.5%	.0%	2.4%
Cimlinc	6.6	.0	4.4	169	.2%	.0%	.5%	.1%
Auto-Trol	6.5	2.3	2.6	81	.2%	.1%	.3%	.1%
Ziegler Informatics	6.0	.0	6.0	0	.2%	.0%	.7%	.0%
Gerber Systems	5.4	2.5	2.3	79	.2%	.2%	.3%	.1%
ADRA Systems	5.3	.1	4.0	9	.2%	.0%	.5%	.0%
Serbi	5.1	.6	4.5	200	.2%	.0%	.5%	.2%
ABB Industria*	5.1	2.2	2.4	189	.2%	.1%	.3%	.2%
Technische Computer Systeme	4.1	.6	3.1	68	.1%	.0%	.4%	.1%
Alias Research	4.0	.0	3.7	0	.1%	.0%	.4%	.0%
MARC	3.5	.0	3.4	0	.1%	.0%	.4%	.0%
RoboCAD Solutions	3.3	.0	2.6	0	.1%	.0%	.3%	.0%
FEA	3.3	.7	.9	196	.1%	.0%	.1%	.2%
MCS	3.2	.1	2.7	17	.1%	.0%	.3%	.0%
Whessoe Computing Systems	3.2	.0	3.2	0	.1%	.0%	.4%	.0%
debis Systemhaus	3.1	.7	2.0	22	.1%	.0%	.2%	.0%
Pathtrace	3.0	.7	2.0	56	.1%	.0%	.2%	.0%
CATALPA groupe Missler	2.8	1.2	1.2	84	.1%	.1%	.1%	.1%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Mechanical
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Kloeckner-Moeller	2.8	.6	1.9	0	.1%	.0%	.2%	.0%
Caroline Informatique	2.7	.5	1.4	27	.1%	.0%	.2%	.0%
SPATIAL Technology	2.7	.3	2.4	0	.1%	.0%	.3%	.0%
Mechanical Dynamics	2.5	.0	2.0	0	.1%	.0%	.2%	.0%
Anilam Electronics	2.5	.5	1.8	0	.1%	.0%	.2%	.0%
Vero International Software	2.4	.0	2.2	0	.1%	.0%	.2%	.0%
Superdraft	2.3	1.0	1.0	164	.1%	.1%	.1%	.1%
ICAD	2.3	.0	1.9	0	.1%	.0%	.2%	.0%
ISKA	2.1	.9	.9	39	.1%	.1%	.1%	.0%
Rasna Corporation	2.1	.0	1.9	0	.1%	.0%	.2%	.0%
FEGS	2.0	.0	1.1	0	.1%	.0%	.1%	.0%
Logic System Designers*	2.0	.8	.8	49	.1%	.0%	.1%	.0%
CAMTEK	1.8	.4	1.2	159	.1%	.0%	.1%	.1%
Softronics	1.6	.3	1.3	123	.1%	.0%	.1%	.1%
Micrografx	1.5	.0	1.5	0	.0%	.0%	.2%	.0%
Graftek	1.5	.7	.6	31	.0%	.0%	.1%	.0%
Point Control	1.5	.0	1.2	0	.0%	.0%	.1%	.0%
Asicom*	1.5	.1	1.4	8	.0%	.0%	.2%	.0%
Engineering Mechanics	1.2	.1	1.1	6	.0%	.0%	.1%	.0%
CAD-Capture	1.2	.3	.3	13	.0%	.0%	.0%	.0%
CAD TECH Iberica*	1.1	.6	.4	32	.0%	.0%	.0%	.0%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Mechanical
Platform: All Platforms*
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Moda CAD	1.1	.2	.8	10	.0%	.0%	.1%	.0%
EME	1.1	.3	.5	31	.0%	.0%	.1%	.0%
CAMAX Systems Inc.	1.1	.2	.7	14	.0%	.0%	.1%	.0%
CADKEY	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
CADSI	1.0	.1	.8	7	.0%	.0%	.1%	.0%
Other Companies	39.9	176.8	.0	42,136	1.3%	10.7%	.0%	35.1%
All Companies	3,190.9	1,655.8	876.7	120,010	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2,632.5	1,464.5	620.7	107,219	82.5%	88.4%	70.8%	89.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	558.4	191.3	256.1	12,791	17.5%	11.6%	29.2%	10.7%
All Hardware Companies	937.4	818.8	5.3	85,822	29.4%	49.5%	.6%	71.5%
All Turnkey & SW Companies	2,253.5	837.0	871.4	34,188	70.6%	50.5%	99.4%	28.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 12
1993 CAD/CAM/CAE/GIS Market Share

Application: AEC
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	151.9	45.8	49.4	4,319	15.7%	10.3%	13.5%	5.7%
IBM	120.0	91.1	13.5	9,590	12.4%	20.6%	3.7%	12.6%
Nemetschek	73.1	4.8	61.0	468	7.5%	1.1%	16.7%	.6%
Autodesk	66.3	.0	66.3	0	6.8%	.0%	18.1%	.0%
IEZ	52.2	18.3	26.1	1,147	5.4%	4.1%	7.1%	1.5%
Digital	50.7	41.7	.0	3,686	5.2%	9.4%	.0%	4.8%
Computervision	38.1	7.3	13.3	563	3.9%	1.7%	3.6%	.7%
Hewlett-Packard	20.6	18.1	.0	3,441	2.1%	4.1%	.0%	4.5%
Apple Computer	20.4	20.4	.0	4,292	2.1%	4.6%	.0%	5.6%
Siemens Nixdorf Info systeme	18.9	10.3	3.4	818	1.9%	2.3%	.9%	1.1%
Soft-Tech Software Technologies	14.7	1.9	11.4	948	1.5%	.4%	3.1%	1.2%
Han Dataport	12.5	3.8	6.8	280	1.3%	.9%	1.9%	.4%
Microway	12.5	7.5	3.8	138	1.3%	1.7%	1.0%	.2%
Wiechers Datentechnik	12.3	4.3	5.5	296	1.3%	1.0%	1.5%	.4%
Data Technology/DATECH*	11.2	2.1	7.8	5,709	1.2%	.5%	2.1%	7.5%
CAD Centre	9.2	.0	7.5	0	1.0%	.0%	2.0%	.0%
Silicon Graphics	9.2	8.2	.0	442	.9%	1.8%	.0%	.6%
Dassault*	9.0	.0	7.8	0	.9%	.0%	2.1%	.0%
Moss Systems	8.7	.9	4.8	61	.9%	.2%	1.3%	.1%
Sun Microsystems	8.7	7.0	.0	336	.9%	1.6%	.0%	.4%
Technische Computer Systeme	8.3	1.3	6.3	137	.9%	.3%	1.7%	.2%

(Continued)

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Table 12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: AEC
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Kockums Computer Systems	8.0	2.1	1.4	370	.8%	.5%	.4%	.5%
Hochtief	7.4	1.3	3.5	91	.8%	.3%	1.0%	.1%
RIB/Bausoftware	7.4	.5	6.1	45	.8%	.1%	1.7%	.1%
ItalCad	7.4	2.4	2.8	84	.8%	.5%	.8%	.1%
CAD Distribution	6.4	.0	5.8	112	.7%	.0%	1.6%	.1%
Star Informatic	6.2	2.0	3.5	403	.6%	.4%	.9%	.5%
Complansoft CAD	6.2	3.1	3.1	148	.6%	.7%	.8%	.2%
GDS	5.9	2.6	2.8	119	.6%	.6%	.8%	.2%
Isicad CAD/CAM Systeme	5.6	1.0	3.8	45	.6%	.2%	1.0%	.1%
mb Programme	5.3	2.2	2.2	120	.5%	.5%	.6%	.2%
ABB Industria*	5.1	2.2	2.4	189	.5%	.5%	.7%	.2%
BATISOFT	4.8	.7	2.4	322	.5%	.2%	.7%	.4%
Research Machines	4.6	4.6	.0	1,700	.5%	1.0%	.0%	2.2%
Graphisoft Software Dev	4.4	.0	4.4	0	.5%	.0%	1.2%	.0%
Aspen Technology	4.3	.0	2.8	0	.4%	.0%	.8%	.0%
Computer Services Consultants	4.2	.0	4.2	0	.4%	.0%	1.1%	.0%
RoboCAD Solutions	4.1	.0	3.2	0	.4%	.0%	.9%	.0%
Gable CAD Systems	3.9	2.8	.6	44	.4%	.6%	.2%	.1%
Datagraphic	3.6	1.7	1.4	63	.4%	.4%	.4%	.1%
Triplan	3.5	1.4	1.7	52	.4%	.3%	.5%	.1%
Sener Inginiera y Sistemaus	3.2	.0	3.2	0	.3%	.0%	.9%	.0%

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Table 12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: AEC
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
FHECOR*	3.1	.0	3.1	0	.3%	.0%	.8%	.0%
Cadtronic*	2.9	1.3	1.6	80	.3%	.3%	.4%	.1%
Auto-Trol	2.8	1.0	1.1	36	.3%	.2%	.3%	.0%
Assigraph	2.8	.0	2.3	0	.3%	.0%	.6%	.0%
Ziegler Informatics	2.4	.0	2.4	0	.2%	.0%	.7%	.0%
Ground Modelling Systems	2.3	1.2	.9	211	.2%	.3%	.3%	.3%
Lamp Software	2.2	.5	1.6	152	.2%	.1%	.4%	.2%
Elstree Computing	2.1	.9	1.1	62	.2%	.2%	.3%	.1%
Micrografx	2.1	.0	2.1	0	.2%	.0%	.6%	.0%
Control Data Systems	1.8	.8	.4	72	.2%	.2%	.1%	.1%
Radan Computational	1.8	.6	.9	36	.2%	.1%	.2%	.0%
Asicom*	1.8	.2	1.6	28	.2%	.0%	.4%	.0%
Softronics	1.8	.4	1.4	135	.2%	.1%	.4%	.2%
Matra Datavision	1.7	.5	.9	16	.2%	.1%	.3%	.0%
Sinus Software	1.7	.9	.6	40	.2%	.2%	.2%	.1%
MEDESIGN	1.7	.5	.6	18	.2%	.1%	.2%	.0%
Macao Systems	1.6	.8	.6	16	.2%	.2%	.2%	.0%
Soft*	1.5	.0	1.1	0	.2%	.0%	.3%	.0%
Mucke Software	1.2	.5	.5	25	.1%	.1%	.1%	.0%
ARKTEC	1.1	.1	.9	44	.1%	.0%	.2%	.1%
Sigma Design	1.1	.2	.8	62	.1%	.0%	.2%	.1%

(Continued)

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Table 12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: AEC
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Altium*	1.1	.0	1.0	0	.1%	.0%	.3%	.0%
Aplein*	1.0	1.0	.1	13	.1%	.2%	.0%	.0%
CADKEY	1.0	.0	1.0	0	.1%	.0%	.3%	.0%
Other Companies	81.0	105.6	.0	34,368	8.4%	23.8%	.0%	45.2%
All Companies	970.4	443.3	366.1	76,067	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	629.8	358.1	163.1	67,405	64.9%	80.8%	44.6%	88.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	340.6	85.2	203.0	8,663	35.1%	19.2%	55.4%	11.4%
All Hardware Companies	290.4	272.5	.2	62,969	29.9%	61.5%	.0%	82.8%
All Turnkey & SW Companies	680.0	170.8	365.9	13,099	70.1%	38.5%	100.0%	17.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 13
1993 CAD/CAM/CAE/GIS Market Share

Application: GIS/Mapping
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	140.6	59.6	38.8	3,119	18.8%	17.3%	16.6%	11.9%
Siemens Nixdorf Info systeme	126.5	42.7	48.4	2,066	17.0%	12.4%	20.8%	7.9%
IBM	54.9	43.5	4.4	2,808	7.4%	12.6%	1.9%	10.7%
Digital	50.1	37.2	.0	1,875	6.7%	10.8%	.0%	7.2%
Landmark Graphics	38.9	17.5	8.6	193	5.2%	5.1%	3.7%	.7%
ESRI	31.2	.0	25.0	0	4.2%	.0%	10.7%	.0%
Sun Microsystems	28.5	23.2	.0	980	3.8%	6.7%	.0%	3.7%
ICL	26.0	15.2	9.0	749	3.5%	4.4%	3.9%	2.9%
Hewlett-Packard	24.6	21.0	.0	1,206	3.3%	6.1%	.0%	4.6%
Smallworld Systems	17.0	3.9	9.4	377	2.3%	1.1%	4.0%	1.4%
Autodesk	17.0	.0	17.0	0	2.3%	.0%	7.3%	.0%
GDS	14.8	6.6	6.7	307	2.0%	1.9%	2.9%	1.2%
Straessle Informationssysteme	9.5	1.3	6.0	139	1.3%	.4%	2.6%	.5%
Graftek	9.1	3.4	3.2	161	1.2%	1.0%	1.4%	.6%
Laser-Scan	8.9	2.8	3.9	54	1.2%	.8%	1.7%	.2%
Sysscan	8.5	3.4	2.5	88	1.1%	1.0%	1.1%	.3%
Unisys	8.2	1.7	2.7	153	1.1%	.5%	1.2%	.6%
Computervision	7.5	1.7	2.4	98	1.0%	.5%	1.0%	.4%
Sysdeco Ltd.	6.9	3.4	1.7	60	.9%	1.0%	.7%	.2%
Kohns & Poppenhaeger	6.6	3.0	2.6	76	.9%	.9%	1.1%	.3%
Genasys II	6.2	.6	4.4	26	.8%	.2%	1.9%	.1%

(Continued)

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Table 13 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: GIS/Mapping
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
APIC Systemes	5.9	.0	4.0	0	.8%	.0%	1.7%	.0%
Silicon Graphics	5.9	5.2	.0	283	.8%	1.5%	.0%	1.1%
Spectrum Graphics	5.4	1.6	2.7	52	.7%	.5%	1.2%	.2%
Star Informatic	5.3	1.2	3.3	210	.7%	.4%	1.4%	.8%
Clemessy	4.8	3.8	.7	14	.6%	1.1%	.3%	.1%
GeoVision Systems	3.3	.2	1.8	6	.4%	.1%	.8%	.0%
Control Data Systems	3.2	1.7	.8	83	.4%	.5%	.4%	.3%
Ground Modelling Systems	2.9	1.3	1.3	239	.4%	.4%	.6%	.9%
PAFEC	2.7	.9	1.3	38	.4%	.3%	.6%	.1%
MapInfo	2.7	.0	2.3	0	.4%	.0%	1.0%	.0%
Geometria GIS Systems House	2.6	.3	.1	26	.3%	.1%	.0%	.1%
ERDAS	2.2	.5	1.5	39	.3%	.1%	.7%	.1%
Synercom	2.2	.0	.9	0	.3%	.0%	.4%	.0%
RIB/Bausoftware	2.0	.2	1.6	22	.3%	.1%	.7%	.1%
Ziegler Informatics	2.0	.0	2.0	0	.3%	.0%	.9%	.0%
Enghouse Systems Ltd.	1.9	.1	1.7	3	.3%	.0%	.7%	.0%
ABB Industria*	1.9	.8	.9	71	.3%	.2%	.4%	.3%
Strategic Mapping	1.9	.0	1.7	0	.2%	.0%	.7%	.0%
ETAK	1.7	.1	1.6	3	.2%	.0%	.7%	.0%
Dynamic Graphics	1.4	.0	.9	0	.2%	.0%	.4%	.0%
EME	1.2	.3	.5	45	.2%	.1%	.2%	.2%

(Continued)

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Table 13 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: GIS/Mapping
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Contract Data Research	1.2	.0	.3	0	.2%	.0%	.1%	.0%
DAPCO	1.1	.0	.8	0	.2%	.0%	.3%	.0%
Research Machines	1.1	1.1	.0	397	.1%	.3%	.0%	1.5%
Other Companies	32.3	30.6	1.2	9,833	4.3%	8.9%	.5%	37.5%
All Companies	745.9	344.1	233.1	26,205	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	493.3	256.2	128.5	21,458	66.1%	74.5%	55.1%	81.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	252.6	87.9	104.6	4,746	33.9%	25.5%	44.9%	18.1%
All Hardware Companies	177.3	151.6	.3	17,365	23.8%	44.1%	.1%	66.3%
All Turnkey & SW Companies	568.6	192.5	232.8	8,839	76.2%	55.9%	99.9%	33.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 14
1993 CAD/CAM/CAE/GIS Market Share

Application: Electronic Design Automation
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	153.2	126.5	3.4	7,456	16.2%	26.9%	1.2%	19.1%
Digital	126.9	99.7	.0	2,929	13.4%	21.2%	.0%	7.5%
Mentor Graphics	91.1	11.2	40.7	387	9.6%	2.4%	14.5%	1.0%
IBM	88.6	74.3	5.9	6,688	9.4%	15.8%	2.1%	17.1%
Sun Microsystems	86.7	68.5	.0	3,910	9.2%	14.6%	.0%	10.0%
Cadence	75.9	.0	59.3	0	8.0%	.0%	21.2%	.0%
Intergraph	28.0	8.5	8.9	322	3.0%	1.8%	3.2%	.8%
Racal-Redac	26.7	3.4	12.1	126	2.8%	.7%	4.3%	.3%
Synopsys	24.2	.0	16.7	0	2.6%	.0%	6.0%	.0%
Viewlogic Systems	15.4	.0	11.5	0	1.6%	.0%	4.1%	.0%
Computervision	11.2	2.2	3.9	166	1.2%	.5%	1.4%	.4%
COMPASS Design Automation	11.0	.0	8.7	5	1.2%	.0%	3.1%	.0%
Harris EDA	10.4	.9	6.4	60	1.1%	.2%	2.3%	.2%
Zycad	9.3	5.1	1.4	65	1.0%	1.1%	.5%	.2%
Autodesk	9.3	.0	9.3	0	1.0%	.0%	3.3%	.0%
Logic Modeling Corp.	9.3	.0	8.1	0	1.0%	.0%	2.9%	.0%
Aucotec	8.8	2.4	4.1	330	.9%	.5%	1.5%	.8%
Sagantec	6.7	.0	6.1	0	.7%	.0%	2.2%	.0%
Analogy	5.3	.0	4.3	0	.6%	.0%	1.5%	.0%
Ziegler Informatics	4.7	.0	4.7	0	.5%	.0%	1.7%	.0%
ANACAD	4.7	.0	4.7	0	.5%	.0%	1.7%	.0%
Silicon Graphics	4.5	4.0	.0	217	.5%	.9%	.0%	.6%

(Continued)

Table 14 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Electronic Design Automation
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
LSI Logic	4.2	.3	3.3	8	.4%	.1%	1.2%	.0%
Altera	4.0	.0	3.5	0	.4%	.0%	1.2%	.0%
Xilinx	3.7	.0	3.3	0	.4%	.0%	1.2%	.0%
Quickturn Design Systems	3.6	3.3	.3	44	.4%	.7%	.1%	.1%
Orcad	3.5	.0	3.5	0	.4%	.0%	1.3%	.0%
Teradyne	3.2	.4	2.3	8	.3%	.1%	.8%	.0%
Siemens Nixdorf Info systeme	3.0	1.6	.5	131	.3%	.3%	.2%	.3%
debis Systemhaus	2.8	.6	1.8	17	.3%	.1%	.6%	.0%
Zuken	2.6	.8	1.2	15	.3%	.2%	.4%	.0%
Altium*	2.5	.0	2.4	0	.3%	.0%	.9%	.0%
CAD-UL	2.5	.0	2.5	0	.3%	.0%	.9%	.0%
ALS Design	2.4	.2	2.2	30	.3%	.0%	.8%	.1%
Genrad	2.3	.4	1.5	26	.2%	.1%	.5%	.1%
Microsim	2.3	.0	2.2	0	.2%	.0%	.8%	.0%
BETRONEX	2.2	.1	2.1	42	.2%	.0%	.7%	.1%
Apple Computer	2.1	2.1	.0	436	.2%	.4%	.0%	1.1%
Ikos Systems	2.0	1.5	.5	25	.2%	.3%	.2%	.1%
ISDATA	1.8	.0	1.6	0	.2%	.0%	.6%	.0%
Research Machines	1.8	1.8	.0	680	.2%	.4%	.0%	1.7%
Test Systems Strategies	1.8	.0	1.6	0	.2%	.0%	.6%	.0%
Wiechers Datentechnik	1.7	.3	1.0	29	.2%	.1%	.4%	.1%
CAD Distribution	1.7	.0	1.5	26	.2%	.0%	.5%	.1%

(Continued)

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Table 14 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Electronic Design Automation
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ABB Industria*	1.6	.7	.8	61	.2%	.2%	.3%	.2%
EME	1.6	.4	.8	32	.2%	.1%	.3%	.1%
Ascent Logic Corp	1.6	.0	1.3	0	.2%	.0%	.5%	.0%
Silvar-Lisco	1.6	.0	1.2	0	.2%	.0%	.4%	.0%
PADS Software	1.5	.0	1.3	0	.2%	.0%	.5%	.0%
Kloeckner-Moeller	1.4	.3	1.0	42	.2%	.1%	.4%	.1%
ACTEL	1.4	.0	1.2	0	.1%	.0%	.4%	.0%
Data Technology/DATECH*	1.4	.3	1.0	332	.1%	.1%	.3%	.9%
Technische Computer Systeme	1.4	.2	1.1	23	.1%	.0%	.4%	.1%
Data I/O	1.3	.0	1.3	0	.1%	.0%	.5%	.0%
Scientific & Engineering SW	1.3	.0	1.3	0	.1%	.0%	.5%	.0%
Aucos elektronische Gerate	1.2	.4	.8	127	.1%	.1%	.3%	.3%
Compact Software	1.0	.0	.8	0	.1%	.0%	.3%	.0%
Cascade Design Automation	1.0	.0	.8	0	.1%	.0%	.3%	.0%
Other Companies	50.8	46.5	3.3	14,120	5.4%	9.9%	1.2%	36.1%
All Companies	944.7	470.2	280.0	39,066	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	861.5	456.8	228.1	37,324	91.2%	97.2%	81.5%	95.5%
All Asian-Based Companies	2.9	.9	1.4	18	.3%	.2%	.5%	.0%
All European-Based Companies	80.3	12.5	50.5	1,725	8.5%	2.7%	18.0%	4.4%
All Hardware Companies	487.3	414.5	.3	36,439	51.6%	88.2%	.1%	93.3%
All Turnkey & SW Companies	457.4	55.7	279.8	2,627	48.4%	11.8%	99.9%	6.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 15
1993 CAD/CAM/CAE/GIS Market Share

Application: Electronic CAE
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	94.6	76.6	3.4	4,719	15.9%	25.7%	1.9%	17.5%
Digital	80.9	63.6	.0	1,990	13.6%	21.3%	.0%	7.4%
Sun Microsystems	61.2	48.4	.0	2,772	10.3%	16.2%	.0%	10.3%
Mentor Graphics	47.3	5.8	21.2	201	8.0%	2.0%	11.8%	.7%
IBM	43.4	40.8	.0	4,459	7.3%	13.7%	.0%	16.6%
Cadence	39.5	.0	30.9	0	6.7%	.0%	17.2%	.0%
Synopsys	24.2	.0	16.7	0	4.1%	.0%	9.3%	.0%
Intergraph	15.5	4.7	5.0	178	2.6%	1.6%	2.8%	.7%
Viewlogic Systems	15.4	.0	11.5	0	2.6%	.0%	6.4%	.0%
Zycad	9.3	5.1	1.4	65	1.6%	1.7%	.8%	.2%
Logic Modeling Corp.	9.3	.0	8.1	0	1.6%	.0%	4.5%	.0%
Aucotec	8.8	2.4	4.1	330	1.5%	.8%	2.3%	1.2%
Autodesk	7.7	.0	7.7	0	1.3%	.0%	4.3%	.0%
Racal-Redac	7.7	1.0	3.5	36	1.3%	.3%	1.9%	.1%
COMPASS Design Automation	6.6	.0	5.2	3	1.1%	.0%	2.9%	.0%
Analogy	5.3	.0	4.3	0	.9%	.0%	2.4%	.0%
ANACAD	4.7	.0	4.7	0	.8%	.0%	2.6%	.0%
Silicon Graphics	4.5	4.0	.0	217	.8%	1.4%	.0%	.8%
Altera	4.0	.0	3.5	0	.7%	.0%	1.9%	.0%
Harris EDA	3.8	.4	2.4	27	.6%	.1%	1.4%	.1%
LSI Logic	3.8	.3	3.0	7	.6%	.1%	1.7%	.0%

(Continued)

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Table 15 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Electronic CAE
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Xilinx	3.7	.0	3.3	0	.6%	.0%	1.9%	.0%
Quickturn Design Systems	3.6	3.3	.3	44	.6%	1.1%	.1%	.2%
Teradyne	3.2	.4	2.3	8	.5%	.1%	1.3%	.0%
Siemens Nixdorf Info systeme	3.0	1.6	.5	131	.5%	.5%	.3%	.5%
Computervision	3.0	.6	1.1	44	.5%	.2%	.6%	.2%
debis Systemhaus	2.8	.6	1.8	17	.5%	.2%	1.0%	.1%
Ziegler Informatics	2.5	.0	2.5	0	.4%	.0%	1.4%	.0%
Orcad	2.5	.0	2.5	0	.4%	.0%	1.4%	.0%
Genrad	2.3	.4	1.5	26	.4%	.1%	.9%	.1%
Microsim	2.3	.0	2.2	0	.4%	.0%	1.2%	.0%
Ikos Systems	2.0	1.5	.5	25	.3%	.5%	.3%	.1%
Apple Computer	1.9	1.9	.0	392	.3%	.6%	.0%	1.5%
ISDATA	1.8	.0	1.6	0	.3%	.0%	.9%	.0%
Research Machines	1.8	1.8	.0	680	.3%	.6%	.0%	2.5%
Test Systems Strategies	1.8	.0	1.6	0	.3%	.0%	.9%	.0%
Wiechers Datentechnik	1.7	.3	1.0	29	.3%	.1%	.6%	.1%
CAD Distribution	1.7	.0	1.5	26	.3%	.0%	.8%	.1%
Ascent Logic Corp	1.6	.0	1.3	0	.3%	.0%	.7%	.0%
ALS Design	1.6	.1	1.4	19	.3%	.0%	.8%	.1%
Kloeckner-Moeller	1.4	.3	1.0	42	.2%	.1%	.6%	.2%
Zuken	1.4	.4	.7	8	.2%	.1%	.4%	.0%

(Continued)

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Table 15 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Electronic CAE
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ACTEL	1.4	.0	1.2	0	.2%	.0%	.7%	.0%
Technische Computer Systeme	1.4	.2	1.1	23	.2%	.1%	.6%	.1%
Data I/O	1.3	.0	1.3	0	.2%	.0%	.7%	.0%
Scientific & Engineering SW	1.3	.0	1.3	0	.2%	.0%	.7%	.0%
ABB Industria*	1.2	.5	.6	46	.2%	.2%	.3%	.2%
Aucos elektronische Gerate	1.2	.4	.8	127	.2%	.1%	.4%	.5%
Other Companies	35.0	29.9	4.4	9,800	5.9%	10.0%	2.5%	36.4%
All Companies	593.2	298.2	179.6	26,903	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	547.1	288.6	151.6	25,360	92.2%	96.8%	84.4%	94.3%
All Asian-Based Companies	1.4	.4	.7	8	.2%	.1%	.4%	.0%
All European-Based Companies	44.7	9.2	27.4	1,534	7.5%	3.1%	15.2%	5.7%
All Hardware Companies	315.0	268.3	.3	25,242	53.1%	90.0%	.1%	93.8%
All Turnkey & SW Companies	278.2	30.0	179.4	1,661	46.9%	10.0%	99.9%	6.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 16
1993 CAD/CAM/CAE/GIS Market Share

Application: IC Layout
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cadence	27.8	.0	21.8	0	20.7%	.0%	50.7%	.0%
Digital	21.4	16.7	.0	322	15.9%	26.6%	.0%	11.4%
Sun Microsystems	19.9	15.8	.0	886	14.8%	25.2%	.0%	31.3%
Mentor Graphics	17.3	2.1	7.8	74	12.9%	3.4%	18.1%	2.6%
IBM	15.2	14.0	.0	707	11.3%	22.3%	.0%	24.9%
Hewlett-Packard	14.6	12.4	.0	602	10.9%	19.8%	.0%	21.2%
Sagantec	6.7	.0	6.1	0	5.0%	.0%	14.2%	.0%
COMPASS Design Automation	4.4	.0	3.5	2	3.3%	.0%	8.1%	.1%
Intergraph	1.9	.5	.6	21	1.4%	.9%	1.3%	.7%
Silvar-Lisco	1.6	.0	1.2	0	1.2%	.0%	2.9%	.0%
Other Companies	1.6	1.0	.6	200	1.2%	1.6%	1.3%	7.1%
All Companies	134.4	62.7	42.9	2,833	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	127.8	62.7	36.8	2,833	95.0%	100.0%	85.8%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	6.7	.0	6.1	0	5.0%	.0%	14.2%	.0%
All Hardware Companies	72.3	60.0	.0	2,735	53.8%	95.7%	.0%	96.5%
All Turnkey & SW Companies	62.1	2.7	42.9	98	46.2%	4.3%	100.0%	3.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 17
1993 CAD/CAM/CAE/GIS Market Share

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	44.0	37.5	.0	2,135	20.3%	34.3%	.0%	22.9%
IBM	30.1	19.6	5.9	1,523	13.9%	17.9%	10.3%	16.3%
Mentor Graphics	26.4	3.3	11.8	112	12.2%	3.0%	20.5%	1.2%
Digital	24.6	19.3	.0	617	11.3%	17.7%	.0%	6.6%
Racal-Redac	19.0	2.4	8.6	90	8.8%	2.2%	14.9%	1.0%
Intergraph	10.7	3.2	3.4	123	4.9%	2.9%	5.9%	1.3%
Cadence	8.6	.0	6.7	0	3.9%	.0%	11.6%	.0%
Computervision	8.2	1.6	2.9	121	3.8%	1.4%	5.0%	1.3%
Harris EDA	6.6	.5	3.9	33	3.0%	.5%	6.8%	.4%
Sun Microsystems	5.5	4.4	.0	252	2.6%	4.0%	.0%	2.7%
Altium*	2.5	.0	2.4	0	1.2%	.0%	4.2%	.0%
CAD-UL	2.5	.0	2.5	0	1.2%	.0%	4.4%	.0%
Ziegler Informatics	2.2	.0	2.2	0	1.0%	.0%	3.8%	.0%
BETRONEX	2.2	.1	2.1	42	1.0%	.1%	3.6%	.4%
EME	1.6	.4	.8	32	.8%	.3%	1.4%	.3%
Autodesk	1.6	.0	1.6	0	.7%	.0%	2.7%	.0%
Zuken	1.2	.3	.6	7	.5%	.3%	1.0%	.1%
PADS Software	1.1	.0	1.0	0	.5%	.0%	1.7%	.0%

(Continued)

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Table 17 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Orcad	1.1	.0	1.1	0	.5%	.0%	1.8%	.0%
Other Companies	14.3	15.7	.0	4,119	6.6%	14.3%	.0%	44.2%
All Companies	217.1	109.3	57.5	9,330	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	186.6	105.6	39.7	9,130	86.0%	96.6%	69.1%	97.9%
All Asian-Based Companies	1.5	.5	.7	10	.7%	.4%	1.3%	.1%
All European-Based Companies	28.9	3.3	17.1	190	13.3%	3.0%	29.6%	2.0%
All Hardware Companies	99.9	86.3	.0	8,461	46.0%	78.9%	.0%	90.7%
All Turnkey & SW Companies	117.1	23.1	57.5	869	54.0%	21.1%	100.0%	9.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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  - Total European Market
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  - Technical workstation
  - Host-based
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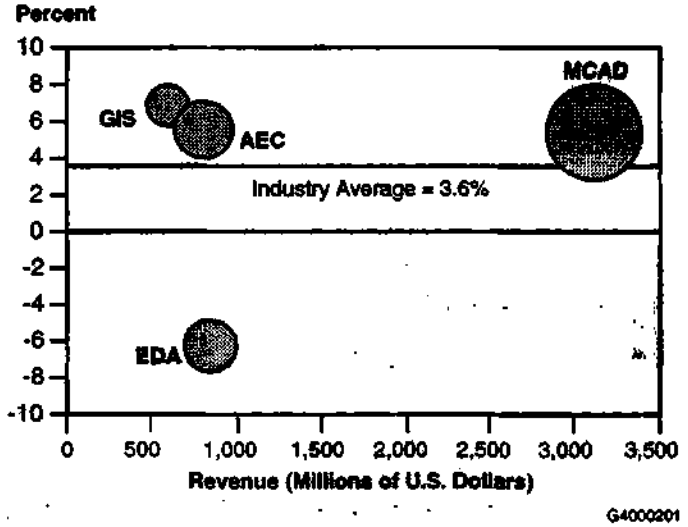
  - Mechanical
  - AEC
  - GIS/mapping
  - Electronic CAE
  - IC layout
  - PCB/MCM/hybrid
- Industries
  - The 25 major industry segments

1992 European CAD/CAM/CAE/GIS Market Size and Growth Rates



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A detailed analysis of software distribution channels is the tentatively scheduled topic for the special focus report that will be published by Dataquest's Software Group services.

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The organizational structure, product portfolio strengths and weaknesses, and strategic directions of top CAD/CAM/CAE players in Europe.

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A new online product being piloted by the services that comprise Dataquest's Software Group, DQ Software QuickTakes provides weekly summaries of the top news stories in the software industry, accompanied by the "Dataquest Take" for the most important events. This document is delivered electronically every Monday morning to subscribers at any e-mail address accessible via the Internet (including AppleLink, cc:Mail, CompuServ, IBM Mail, MCI Mail, AT&T Mail, and so on).

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Dataquest Perspective

Software

CAD/CAM/CAE/GIS Europe

In This Issue

The European CAD/CAM/CAE and GIS Software Market in 1993
The European CAD/CAM/CAE and GIS software market, which represented the world's largest regional market for this software until the beginning of 1993, suffered a setback in 1993 and lost its leading position in this market. Adverse economic conditions, which hit the manufacturing and construction industries particularly hard, were the main cause of the slowdown in revenue growth.

This *Dataquest Perspective* gives an analysis of the top-level European market share data by application and provides country focus for the four major countries in the European CAD/CAM/CAE/GIS industry: Germany, United Kingdom, France, and Italy.
By Petra Gartzen

The European CAD/CAM/CAE and GIS Software Market in 1993

Overall, the European CAD/CAM/CAE and GIS market dropped 5.6 percent, falling to $5.4 billion in total factory revenue in 1993. Software revenue dropped 5 percent to $1.6 billion. Of the total software revenue, U.S. vendors shipped 64.3 percent, and European vendors shipped 35.7 percent. The Asian vendors' share is negligible. Currency fluctuations are complicating the picture. The dollar appreciated strongly against European currencies in 1993, which had a big negative impact on growth in the European countries (see Table 1). Calculating the European revenue in European Currency Units (ECU), the market actually showed positive growth: 5.2 percent for total revenue and 5.8 percent for software revenue. The main reasons behind this slower growth rate were the continuing recessionary climate in most European countries, a decline in the manufacturing industry followed by the continuing rapid decline of hardware prices, and the repositioning of major CAD vendors like Computervision from turnkey to software vendors.

Figure 1 provides a snapshot of the activities in the European CAD/CAM/CAE/GIS software industry, indicating market size and market growth rate for each segment and each European region. In this figure, as well as in Figures 3 through 6, the heavy horizontal line indicates the industry average for software revenue growth; the positions of the bubbles indicate their segment or regional growth rates (x-axis) and segment or regional sizes (y-axis) for 1993. Growth is shown in local currency terms for CAD/CAM/CAE and GIS in Europe by region and by application. To enable a comparison between regions, the actual market sizes in Figure 1 are given in U.S. dollars. Figures 3 through 6 show the individual market sizes in local currency.

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Table 1
Exchange Rates between U.S. Dollars and European Currencies

Country	Currency	1990 per U.S.$	1991 per U.S.$	Change (%)	1992 per U.S.$	Change (%)	1993 per U.S.$	Change (%)
Austria	Schilling	0.08821	0.08802	-0.2	0.0916	4.1	0.08594	-6.2
Belgium	Franc	0.03002	0.0294	-2.1	0.03131	6.5	0.02889	-7.7
Denmark	Krone	0.1622	0.157	-3.2	0.1667	6.2	0.1544	-7.4
Finland	Markka	0.26233	0.24832	-5.3	0.22599	-9.0	0.17461	-22.7
France	Franc	0.18424	0.17799	-3.4	0.19022	6.9	0.17655	-7.2
Germany	D-Mark	0.6207	0.6052	-2.5	0.6446	6.5	0.6045	-6.2
Italy	Lira	0.0008368	0.0008097	-3.2	0.0008191	1.2	0.0006349	-22.5
Netherlands	Guilder	0.551	0.5372	-2.5	0.5725	6.6	0.5385	-5.9
Norway	Krone	0.1603	0.1547	-3.5	0.1622	4.8	0.1409	-13.1
Spain	Peseta	0.009833	0.009664	-1.7	0.009652	-0.1	0.007668	-20.6
Sweden	Krona	0.1691	0.1658	-2.0	0.1731	4.4	0.1282	-25.9
Switzerland	Franc	0.7239	0.6999	-3.3	0.7182	2.6	0.6759	-5.9
United Kingdom	Pound	1.7859	1.7674	-1.0	1.7694	0.1	1.5004	-15.2
European Average	ECU		1.23776		1.30102	5.1	1.16744	-10.3

Source: Dataquest (September 1994)

Applications

The proportional split of software revenue by application changed in distribution from 1992 to 1993, with actual percentages varying slightly from last year's picture (see Figure 2). In terms of actual software revenue growth based on ECU for the various applications in 1993, the GIS/mapping sector showed a 25.1 percent gain over 1992, followed by EDA applications with 10.3 percent growth. AEC grew 5.4 percent, whereas mechanical applications showed a 0.2 percent decrease.

Mechanical

The market for mechanical CAD/CAM/CAE software was badly affected during 1993 by the overall economic situation in the manufacturing industry in Europe. Because of the fall in 1992 and 1993 in industrial production throughout Europe, the level of spare capacity generated through this decline resulted in a sharp decline in machinery and equipment investment in the manufacturing industry during this period.

Mechanical applications, which totaled $782 million, had a 48.6 percent share of the total European CAD/CAM/CAE and GIS software market, compared with 51.5 percent in 1992 and 53.9 percent in 1991, and dropped 0.2 percent in software revenue based on ECU. Compared with this, the top 10 vendors actually grew 2.2 percent and now control 64 percent of this market (see Table 2). New entrants among the top 10 were Parametric Technology and MacNeal-Schwendler, which made the top 10 list at the

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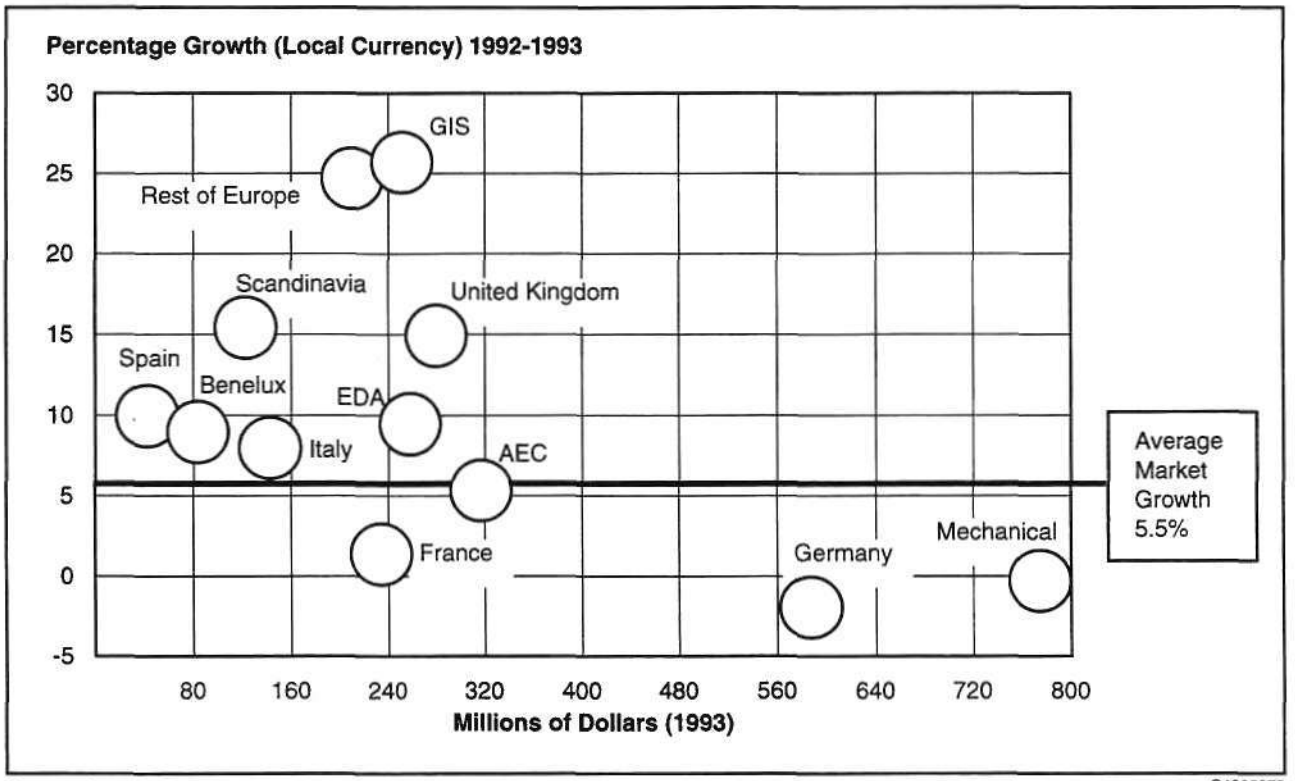
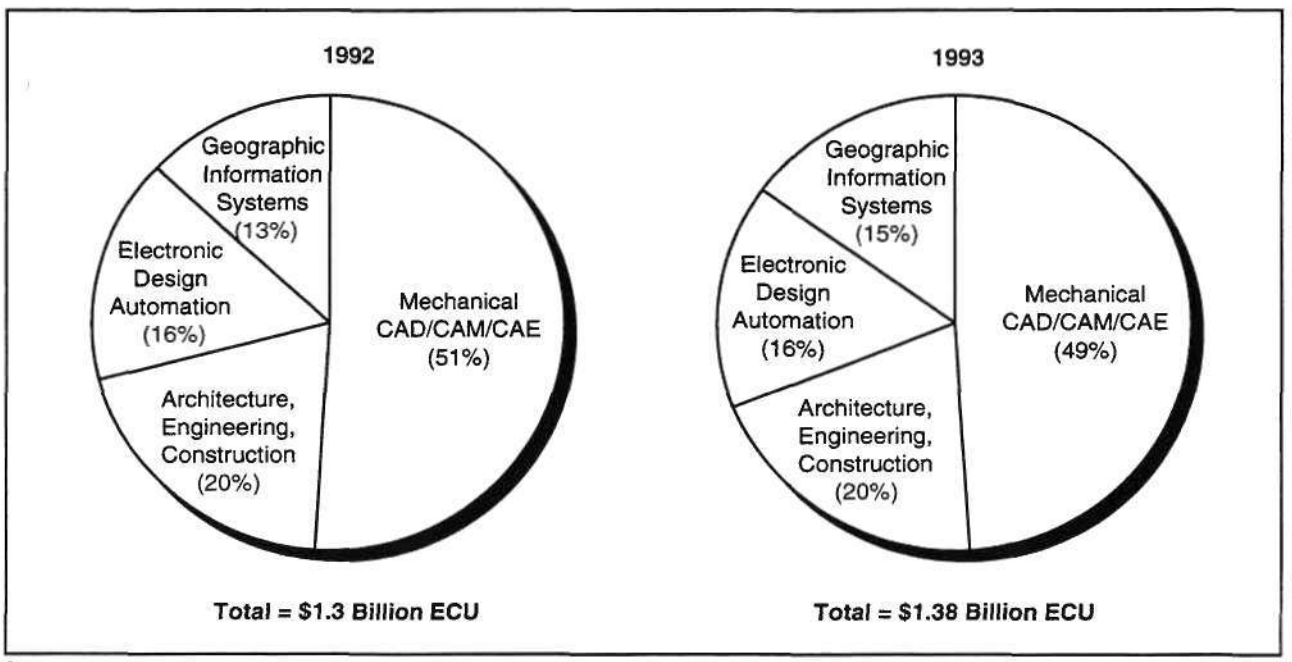
Figure 1
1993 European CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (September 1994) G4005070

Figure 2
1992 and 1993 Software Revenue Distribution by Application



Source: Dataquest (September 1994) G4005071

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Table 2
Top 10 Mechanical CAD/CAM/CAE Software Vendors' Size and Growth in Europe

Company	1993 Revenue ($M)	Growth (%)	1992 Ranking
IBM	136.4	4.1	1
Computervision	86.3	-32.0	2
Autodesk	52.9	3.8	3
Matra Datavision	43.1	0.7	5
Parametric Technology	40.4	122.9	11
Hewlett-Packard	35.8	-15.2	6
SDRC	35.0	-24.9	4
EDS Unigraphics	33.2	12.6	7
MacNeal-Schwendler	20.8	23.5	12
Intergraph	19.9	-26.9	9
Top 10 Companies*	503.8	2.2	
All Companies*	782.0	-0.2	

*Growth rates based on ECU
Source: Dataquest (September 1994)

expense of Siemens-Nixdorf and Applicon. U.S.-based vendors had 79 percent share of the mechanical CAD/CAM/CAE software market, with European vendors holding the rest. Over the last few years we have seen the share of European vendors decline in favor of U.S.-based vendors. This trend is, on the one hand, because of U.S. vendors' acquisitions of several European companies (Norsk Data, Isykon product line) and, on the other hand, because of local mergers and acquisition (Straessle acquired Nestler and Fides). Or, companies have simply pulled out of this market.

AEC

The European construction industry, like the economy of the region, was in retreat during 1993. Economic recession, high interest rates, and mounting unemployment hit exports and undermined consumer confidence. Private investment in homes and by manufacturers and service industries declined as demand for these products fell. Companies are unlikely to invest in improving premises or new buildings while their own sales remain weak, and public sector spending on construction is unlikely to see much improvement when looking at the budget deficits that most countries have accumulated. The situation has not been helped by overdevelopment of offices in the late 1980s, which has left many buildings empty.

The European AEC software market reached $313.4 million in software revenue in 1993. Based on ECU, AEC software revenue in Europe actually increased by 5.4 percent. This growth was driven by the top 10 vendors, which grew 9.1 percent in aggregate. These top 10 vendors now control 71 percent of this market segment with 6 European companies among the top 10 (see Table 3). In the AEC segment, European vendors keep gaining market share and now control 56.2 percent of the market, with U.S.-based vendors controlling the rest in terms of software revenue. This compares with a 52.7 share for European vendors in 1991.

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Table 3
Top 10 AEC Software Vendors' Size and Growth in Europe

Company	1993 Revenue ($M)	Growth (%)	1992 Ranking
Autodesk	56.9	3.9	1
Nemetschek	44.7	37.6	3
Intergraph	40.1	-8.0	2
IEZ	27.8	5.9	4
IBM	13.0	-13.1	6
Soft-Tech Software Technologies	11.4	9.8	8
Computervision	7.6	-58.1	5
Han Dataport	6.5	0.5	11
RIB/Bausoftware	6.1	13.8	12
CADCentre	7.6	-30.4	9
Top 10 Companies*	221.7	9.1	
All Companies*	313.4	5.4	

*Growth rates based on ECU
Source: Dataquest (September 1994)

GIS

There is a tendency around Europe to make the public sector smaller. In countries where, for example, the utility sector was privatized, we have seen a surge in GIS spending as almost a direct result. Also, the telecommunications sector is becoming increasingly deregulated, and in order for telecommunications companies to have a competitive edge, they have had to become more efficient in managing territories. This trend has resulted in large orders for GIS by, for instance, German Telekom and France Telecom.

Growth in Europe for GIS software accelerated in 1993 to 25.1 percent based on the ECU, reaching $246 million in revenue. The top 10 vendors, which control 73 percent of this market segment, increased their software revenue by 43 percent in aggregate (see Table 4). Compared with 1991, when European vendors held a 52 percent share of the European GIS software market, the roles have now switched, with U.S.-based vendors holding 55 percent of the market in 1993 despite the fact that there are 6 European vendors among the top 10.

EDA

The main investment in EDA software in Europe during 1993 came from the telecommunications sector, which continues to dominate electronic design in Europe. Forty percent of the EDA software revenue generated in Europe came from the telecommunications sector. In addition to this sector, the semiconductor and even the defense industries in Europe increased their investment in EDA software tools. Several North American and Japanese semiconductor companies established operations in Europe during the past year. These new operations boosted the sale of CAE and IC layout tools in particular.

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Table 4
Top 10 GIS Software Vendors' Size and Growth in Europe

Company	1993 Revenue ($M)	Growth (%)	1992 Ranking
Siemens Nixdorf Informationssysteme	48.2	-4.1	1
Intergraph	43.0	19.0	2
ESRI	36.0	54.1	3
Autodesk	14.5	3.9	4
Smallworld Systems	13.8	138.6	6
Straessle Informationssysteme	6.5	142.2	14
Sysdeco Ltd.	5.9	270.6	19
Genasys II	4.4	11.2	8
Laser-Scan	4.2	22.0	9
APIC Systemes	4.0	24.5	13
Top 10 Companies*	180.5	43.1	
All Companies*	246.0	25.1	

* Growth rates based on ECU
Source: Dataquest (September 1994)

Based on these trends, the European EDA software market showed relatively healthy growth. Overall EDA software revenue growth in Europe was 10.3 percent based on ECU. In U.S. dollars, the market reached a size of $267.6 million. The top 10 vendors had a 63 percent share of the total EDA software market. The positions of these vendors changed significantly in 1993 compared with 1992 (see Table 5). When compared with the other application sectors, these top 10 vendors had only a marginally higher growth rate, 10.7 percent, than the average EDA software growth rate. The EDA market is heavily dominated by U.S.-based vendors, which held an 81 percent share of the overall European EDA software market in 1993. In 1991, this share was 68 percent. U.S.-based vendors have been steadily increasing their hold on the European EDA market. And now that Racal-Redac has become a Japanese company, the European vendors' share will plunge even further in 1994.

European CAD/CAM/CAE/GIS Market by Region

Europe is and will continue to be a number of separate countries. The economies of the different countries react very differently to recessionary pressures, despite their being flexibly linked via the so-called exchange rate mechanism of the European Community, and aim toward greater unity in the wake of the Maastricht Treaty. This difference is also reflected in the varying size and growth rates for CAD/CAM/CAE/GIS revenue.

German CAD/CAM/CAE and GIS Overview

The German CAD/CAM/CAE/GIS software market led Europe with 35.7 percent share of the European market in 1993. However, the general economic situation in Germany was bad. Large potential CAD/CAM/CAE/GIS customers had taken board-level decisions to halt investments. Customers in the medium-size independent German manufacturing

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Table 5
Top 10 EDA Software Vendors' Size and Growth in Europe

Company	1993 Revenue ($M)	Growth (%)	1992 Ranking
Cadence	46.6	-14.9	1
Mentor Graphics	40.2	13.5	2
Synopsys	17.5	64.5	5
Racal-Redac	12.2	-33.6	3
Intergraph	10.2	-6.3	4
Viewlogic Systems	9.3	2.9	6
Hewlett-Packard	9.1	7.7	8
COMPASS Design Automation	8.7	-3.2	7
Logic Modeling Corp.	8.1	104.8	15
Autodesk	7.9	4.2	9
Top 10 Companies*	169.8	10.7	
All Companies*	267.6	10.2	

*Growth rates based on ECU
Source: Dataquest (September 1994)

companies saw their orders fall by as much as 50 percent and slashed spending. Only strategic projects went ahead; replacement investments were delayed.

This was the main reason why this market dropped 2.7 percent over 1992 to DM700 million. The top 10 vendors in Germany had a particularly bad time, with their revenues declining 5.9 percent in aggregate. The decline was mainly caused by the big drop of 9.3 percent in revenue for mechanical CAD/CAM/CAE software (see Figure 3 and Table 6). These 10 vendors hold a 52 percent share of the German market. The two growth leaders among the top 10 were AEC company Nemetschek and electrical engineering vendor Wiechers Datentechnik. European and, in particular, German-based CAD/CAM/CAE and GIS software vendors are relatively strong in this country, controlling 46 percent of the market with U.S.-based vendors holding the remaining 54 percent.

Looking at the software application splits in Germany, mechanical was the largest segment with 46.5 percent, followed by AEC with 25.8 percent, EDA with 16.2 percent, and GIS with 11.5 percent.

U.K. CAD/CAM/CAE and GIS Overview

The £162.6 million U.K. market was equivalent to a 15.2 percent share of the overall European CAD/CAM/CAE/GIS software market in 1993. Software revenue in terms of U.K. pounds increased 16.2 percent, which was considerably above the European average, a strong indication that the long recession in this country is finally over. During 1993, the manufacturing industry and the electronics industry began to invest again, which also had a significant impact on the CAD/CAM/CAE/GIS software industry in the United Kingdom.

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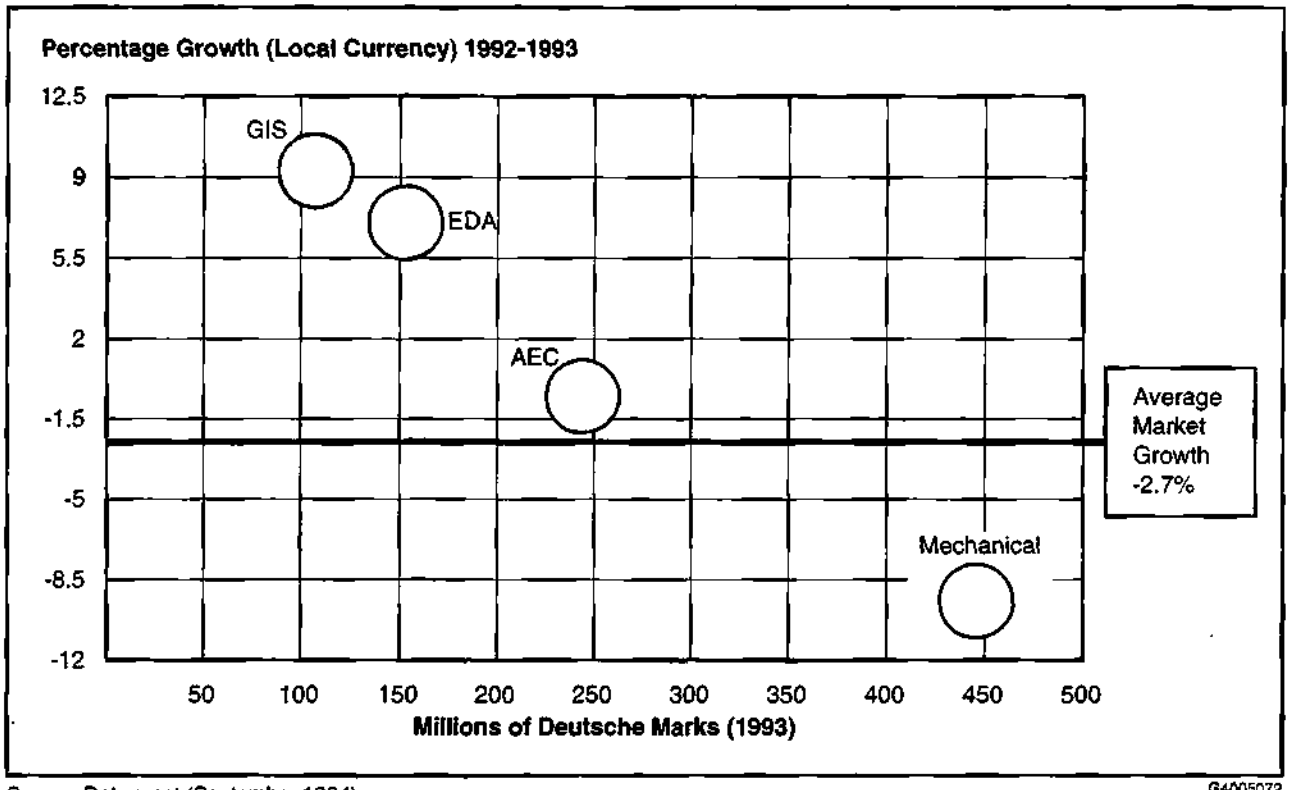
Figure 3
1993 German CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (September 1994)

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Table 6
Top 10 German CAD/CAM/CAE/GIS Software Vendors' Size and Growth

Company	1993 Revenue (DM M)	Growth (%)	1992 Ranking
IBM	98.7	7.7	2
Siemens-Nixdorf Informationssysteme	72.1	-33.0	1
Nemetschek	67.3	41.3	6
Autodesk	61.2	-13.8	3
Intergraph	46.1	-4.2	5
Computervision	45.8	-16.3	4
Hewlett-Packard	29.4	-7.2	7
Wiechers Datentechnik	25.3	35.8	11
Cadence	24.6	3.8	9
IEZ	24.5	-20.7	8
Top 10 Companies	495.0	-5.9	
All Companies	949.9	-2.7	

Source: Dataquest (September 1994)

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The leading 10 vendors in software revenue in the United Kingdom in 1993 controlled only 49 percent of the market, and these vendors' average growth rate of 11.2 percent was significantly below the country's average software growth rate (see Table 7). Growth leader among the top 10 was Parametric Technology, which, for the first time, claimed a position among the U.K. leaders. Exiting the top vendor list were GDS and Pafec.

In 1993, mechanical CAD/CAM/CAE software revenue made up 46.7 percent of the U.K. market, with GIS at 20.5 percent, EDA at 17.1 percent, and AEC at 15.7 percent. GIS was the fastest-growing application sector, with growth over 1992 at 38.4 percent (see Figure 4).

French CAD/CAM/CAE and GIS Overview

The overall French economy contracted during 1993, affecting the construction and manufacturing industries in particular. Industrial production declined sharply, resulting in a drop in investment in the manufacturing industry. This in turn affected the overall performance of the French mechanical and AEC software markets. The GIS sector, on the other hand, showed tremendous growth because of large investment by the utility and telecommunications sectors (see Figure 5).

France's share of the overall European CAD/CAM/CAE/GIS market was 14.4 percent in 1993. The French CAD/CAM/CAE/GIS software market in 1993 increased just 2.6 percent over 1992 to FF1,313 million. The top 10 vendors actually dropped 1.7 percent in aggregate and held a 61 percent share of the French market. Matra Datavision, the local matador, finally made it to the leading position. As in all European CAD/CAM/CAE and GIS markets, the French market is dominated by U.S.-based vendors, which had 71.7 percent of the software revenue with European vendors holding the remaining 28.3 percent. However, the leading two software packages sold in France in 1993 are French developments, although IBM's CATIA product is counted as a U.S. product (see Table 8).

Table 7
Top 10 U.K. CAD/CAM/CAE/GIS Software Vendors' Size and Growth

Company	1993 Revenue (£M)	Growth (%)	1992 Ranking
Computervision	14.2	-26.6	1
Intergraph	13.4	15.1	2
Autodesk	13.3	24.3	3
IBM	8.8	44.6	4
Radan Computational	5.6	19.9	5
Cadence	5.6	27.2	6
Parametric Technology	5.4	162.5	17
Mentor Graphics	5.1	20.8	7
EDS Unigraphics	4.3	60.6	13
SDRC	4.0	-5.9	8
Top 10 Companies	79.7	11.2	
All Companies	162.6	16.2	

Source: Dataquest (September 1994)

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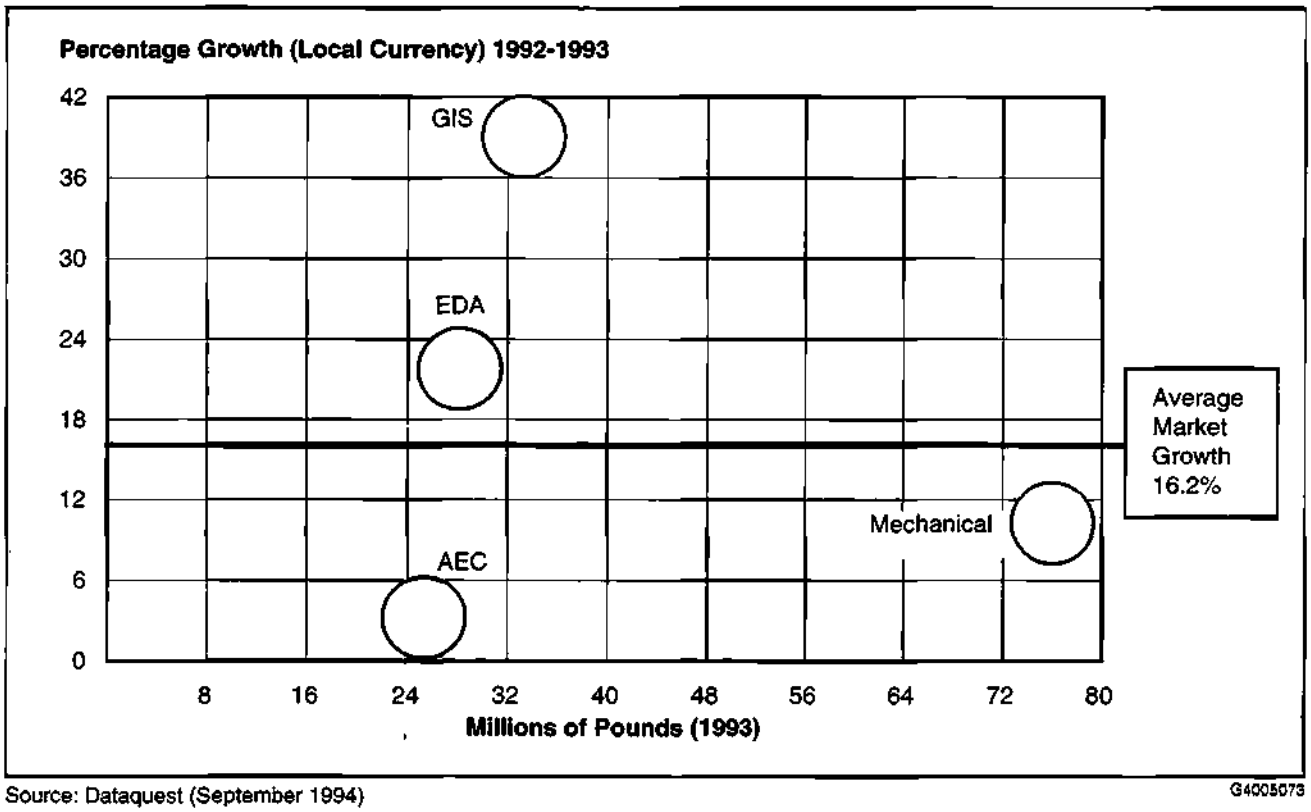
Figure 4
1993 U.K. CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (September 1994) G4005073

About 55 percent of the CAD/CAM/CAE and GIS software revenue in France came from mechanical applications, with 22 percent spent on EDA tools and only about 11.4 percent on AEC and 11.3 percent on GIS applications.

Italian CAD/CAM/CAE and GIS Overview

For years Italy had been holding a constant 10 percent share of the market, with strong, above-average growth until 1991. In 1992, owing to the overall economic and political situation, the market started to slow down. The situation became even worse in 1993, when software revenue grew only 5.8 percent, reaching L211.4 billion. Now, the Italian market only has an 8.3 percent share of the total European CAD/CAM/CAE/GIS software market. The public sector, which accounts for the majority of Italy's business, is not going to invest in anything until the corruption issues have abated. Until then, most public sector projects/investment is frozen. Looking at the market by application, mechanical had the biggest share of the total Italian CAD/CAM/CAE and GIS revenue with 62.6 percent, followed by EDA with 14.2 percent, GIS with 12 percent, and AEC with 11.2 percent (see Figure 6).

The top 10 vendors controlled 59 percent of the total Italian CAD/CAM/CAE/GIS software revenue; however, this group declined sharply at

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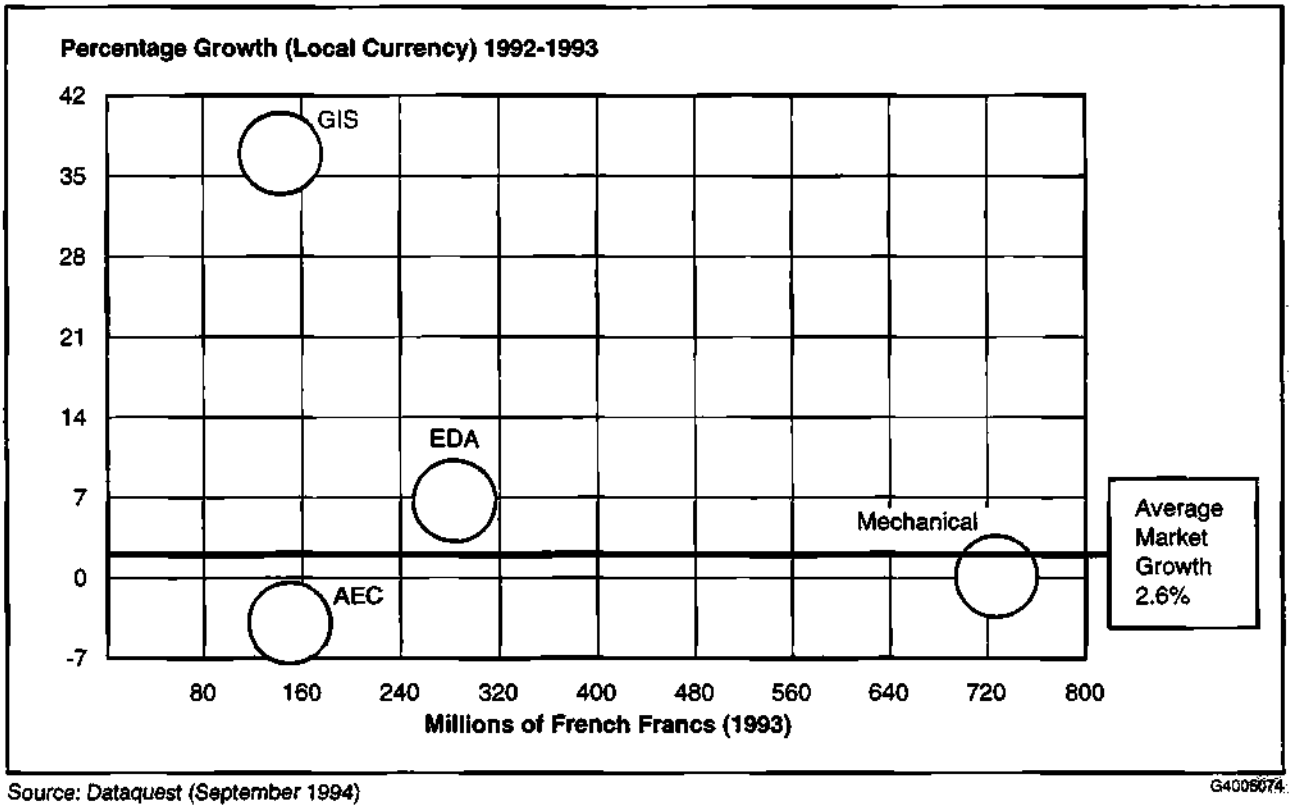
Figure 5
1993 French CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (September 1994)

G4009074

Table 8
Top 10 French CAD/CAM/CAE/GIS Software Vendors' Size and Growth

Company	1993 Revenue (FF M)	Growth (%)	1992 Ranking
Matra Datavision	135.6	18.1	3
IBM	134.4	-17.0	1
Autodesk	112.4	23.0	4
Intergraph	97.1	34.4	5
Computervision	95.0	-41.0	2
Cadence	60.6	-15.7	6
Parametric Technology	57.3	140.5	12
Cisigraph	40.1	5.2	8
Mentor Graphics	39.2	40.4	11
SDRC	35.2	-20.3	7
Top 10 Companies	806.9	-1.7	-
All Companies	1,312.5	2.6	-

Source: Dataquest (September 1994)

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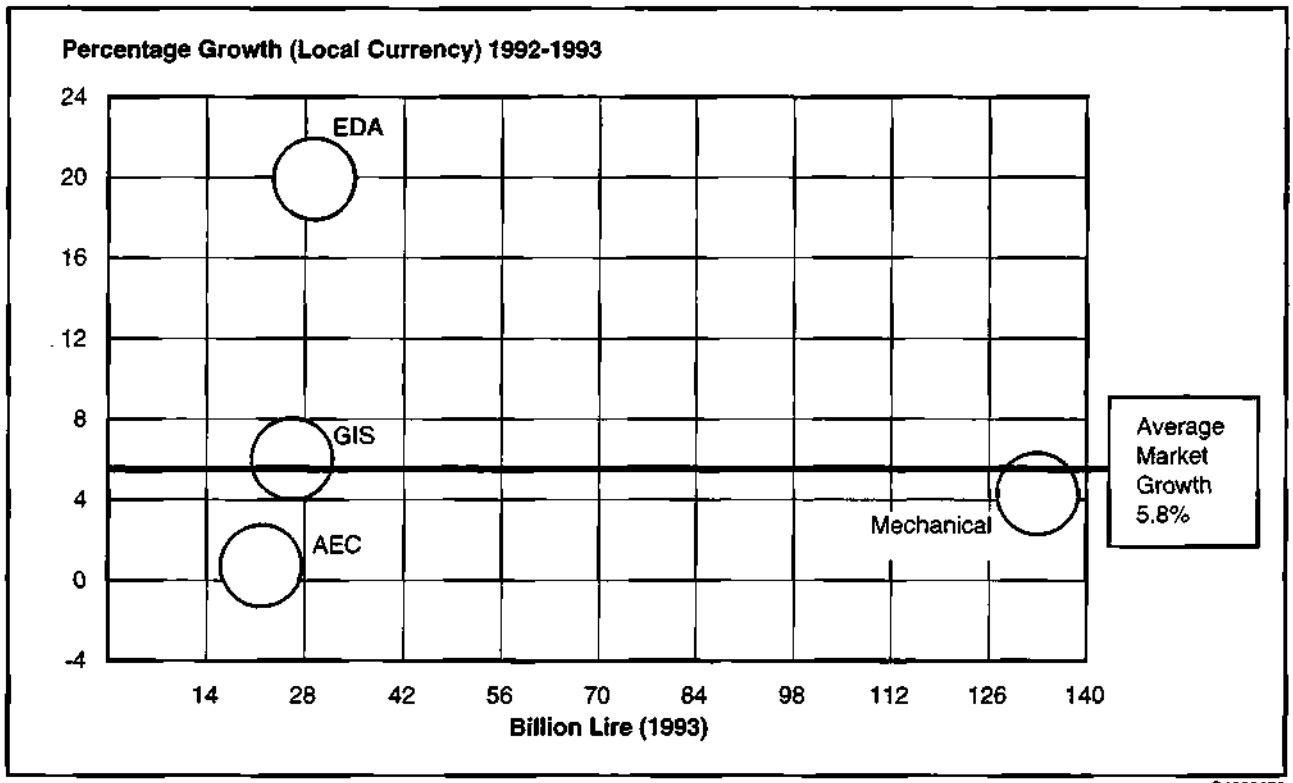
Figure 6
1993 Italian CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (September 1994) G4005075

5.1 percent (see Table 9). The losers among this group were the two leading Italian vendors, CAD.LAB and ItalCad, and Computervision. ItalCad has since been acquired by Computervision. Computervision, in particular, suffered badly from the slowdown among Italy's leading manufacturers as the company depends on their orders to a large extent. Fiat, Computervision's largest customer in Italy, drastically cut its investment in CAD/CAM/CAE software. As was the case in most European regions, U.S.-based vendors had the largest share of the market with 68.3 percent (see Table 9).

In the past, all the PC-based software vendors had problems selling to their full potential in Italy, as the country lacked proper software copyright protection laws. This changed in January 1993 when Italy introduced a new copyright protection law. It had a positive effect on companies like Autodesk.

Dataquest Perspective

Looking at the overall performance of the European CAD/CAM/CAE and GIS software industry, the dominance of U.S.-based vendors becomes obvious. Except for the AEC sector, U.S.-based vendors have continued to increase their hold on the European market. Most European vendors operate only in their country of origin and one or two other countries, and

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Table 9
Top 10 Italian CAD/CAM/CAE/GIS Software Vendors' Size and Growth

Company	1993 Revenue (Billions of Lira)	Growth (%)	1992 Ranking
IBM	21.2	1.4	2
Computervision	20.7	-36.9	1
Autodesk	19.6	60.5	5
CAD Lab	16.9	-3.9	3
ItalCad	8.4	-44.8	4
SDRC	8.2	31.2	9
Siemens-Nixdorf Informationssysteme	8.0	2.5	6
Matra Datavision	7.8	25.0	10
ESRI	7.5	145.7	15
Intergraph	7.4	12.9	8
Top 10 Companies	125.7	-5.1	-
All Companies	211.4	5.8	-

Source: Dataquest (September 1994)

these vendors suffered. Operating in a comparatively small region does not generate enough revenue to keep up the investment in R&D necessary to continue to produce competitive products. Most European vendors that have expanded their international presence have actually grown above industry average.

By Petra Gartzen

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Dataquest Perspective

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CAD/CAM/CAE/GIS Europe

In This Issue

The European CAD/CAM/CAE and GIS Software Market in 1993
The European CAD/CAM/CAE and GIS software market, which represented the world's largest regional market for this software until the beginning of 1993, suffered a setback in 1993 and lost its leading position in this market. Adverse economic conditions, which hit the manufacturing and construction industries particularly hard, were the main cause of the slowdown in revenue growth.

This *Dataquest Perspective* gives an analysis of the top-level European market share data by application and provides country focus for the four major countries in the European CAD/CAM/CAE/GIS industry: Germany, United Kingdom, France, and Italy.
By Petra Gartzen

The European CAD/CAM/CAE and GIS Software Market in 1993

Overall, the European CAD/CAM/CAE and GIS market dropped 5.6 percent, falling to $5.4 billion in total factory revenue in 1993. Software revenue dropped 5 percent to $1.6 billion. Of the total software revenue, U.S. vendors shipped 64.3 percent, and European vendors shipped 35.7 percent. The Asian vendors' share is negligible. Currency fluctuations are complicating the picture. The dollar appreciated strongly against European currencies in 1993, which had a big negative impact on growth in the European countries (see Table 1). Calculating the European revenue in European Currency Units (ECU), the market actually showed positive growth: 5.2 percent for total revenue and 5.8 percent for software revenue. The main reasons behind this slower growth rate were the continuing recessionary climate in most European countries, a decline in the manufacturing industry followed by the continuing rapid decline of hardware prices, and the repositioning of major CAD vendors like Computervision from turnkey to software vendors.

Figure 1 provides a snapshot of the activities in the European CAD/CAM/CAE/GIS software industry, indicating market size and market growth rate for each segment and each European region. In this figure, as well as in Figures 3 through 6, the heavy horizontal line indicates the industry average for software revenue growth; the positions of the bubbles indicate their segment or regional growth rates (x-axis) and segment or regional sizes (y-axis) for 1993. Growth is shown in local currency terms for CAD/CAM/CAE and GIS in Europe by region and by application. To enable a comparison between regions, the actual market sizes in Figure 1 are given in U.S. dollars. Figures 3 through 6 show the individual market sizes in local currency.

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Publication Date: September 19, 1994

Table 1
Exchange Rates between U.S. Dollars and European Currencies

Country	Currency	1990 per U.S.$	1991 per U.S.$	Change (%)	1992 per U.S.$	Change (%)	1993 per U.S.$	Change (%)
Austria	Schilling	0.08821	0.08802	-0.2	0.0916	4.1	0.08594	-6.2
Belgium	Franc	0.03002	0.0294	-2.1	0.03131	6.5	0.02889	-7.7
Denmark	Krone	0.1622	0.157	-3.2	0.1667	6.2	0.1544	-7.4
Finland	Markka	0.26233	0.24832	-5.3	0.22599	-9.0	0.17461	-22.7
France	Franc	0.18424	0.17799	-3.4	0.19022	6.9	0.17655	-7.2
Germany	D-Mark	0.6207	0.6052	-2.5	0.6446	6.5	0.6045	-6.2
Italy	Lira	0.0008368	0.0008097	-3.2	0.0008191	1.2	0.0006349	-22.5
Netherlands	Guilder	0.551	0.5372	-2.5	0.5725	6.6	0.5385	-5.9
Norway	Krone	0.1603	0.1547	-3.5	0.1622	4.8	0.1409	-13.1
Spain	Peseta	0.009833	0.009664	-1.7	0.009652	-0.1	0.007668	-20.6
Sweden	Krona	0.1691	0.1658	-2.0	0.1731	4.4	0.1282	-25.9
Switzerland	Franc	0.7239	0.6999	-3.3	0.7182	2.6	0.6759	-5.9
United Kingdom	Pound	1.7859	1.7674	-1.0	1.7694	0.1	1.5004	-15.2
European Average	ECU		1.23776		1.30102	5.1	1.16744	-10.3

Source: Dataquest (September 1994)

Applications

The proportional split of software revenue by application changed in distribution from 1992 to 1993, with actual percentages varying slightly from last year's picture (see Figure 2). In terms of actual software revenue growth based on ECU for the various applications in 1993, the GIS/mapping sector showed a 25.1 percent gain over 1992, followed by EDA applications with 10.3 percent growth. AEC grew 5.4 percent, whereas mechanical applications showed a 0.2 percent decrease.

Mechanical

The market for mechanical CAD/CAM/CAE software was badly affected during 1993 by the overall economic situation in the manufacturing industry in Europe. Because of the fall in 1992 and 1993 in industrial production throughout Europe, the level of spare capacity generated through this decline resulted in a sharp decline in machinery and equipment investment in the manufacturing industry during this period.

Mechanical applications, which totaled $782 million, had a 48.6 percent share of the total European CAD/CAM/CAE and GIS software market, compared with 51.5 percent in 1992 and 53.9 percent in 1991, and dropped 0.2 percent in software revenue based on ECU. Compared with this, the top 10 vendors actually grew 2.2 percent and now control 64 percent of this market (see Table 2). New entrants among the top 10 were Parametric Technology and MacNeal-Schwendler, which made the top 10 list at the

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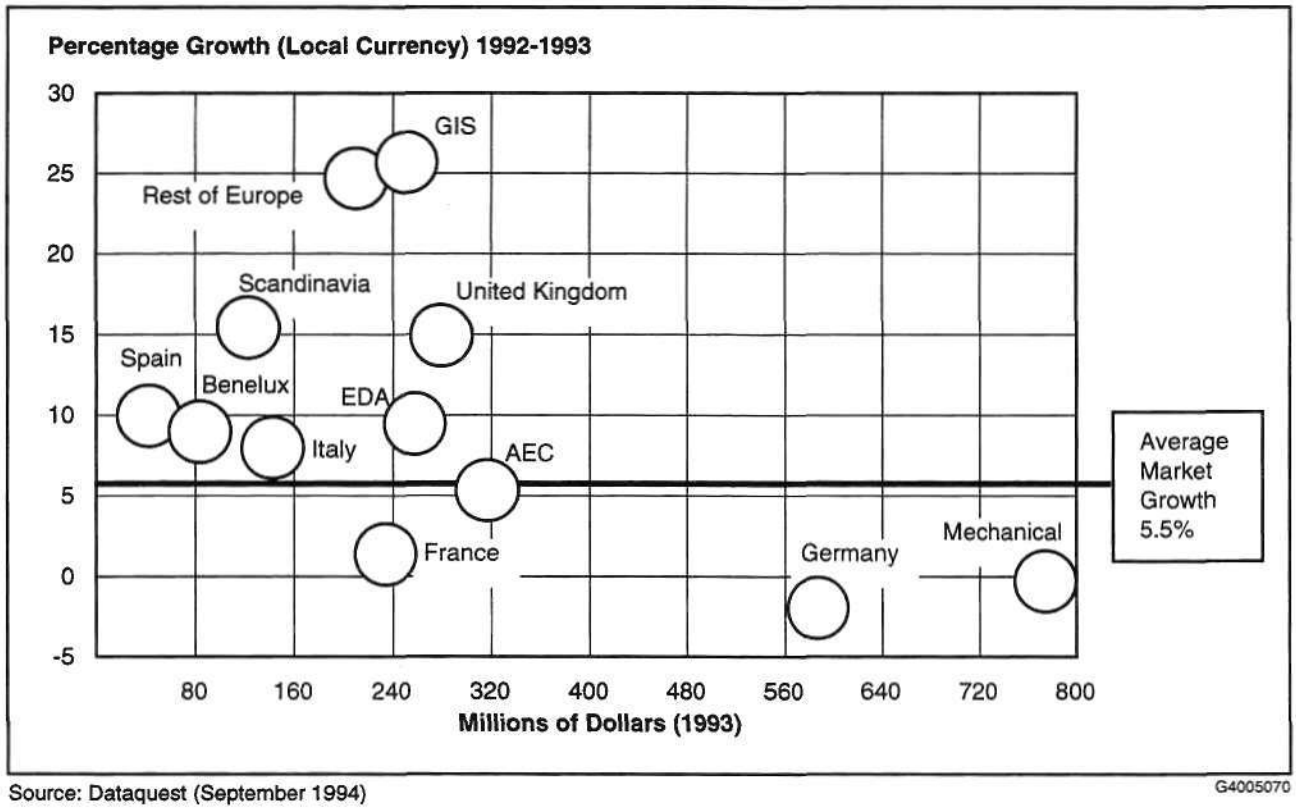
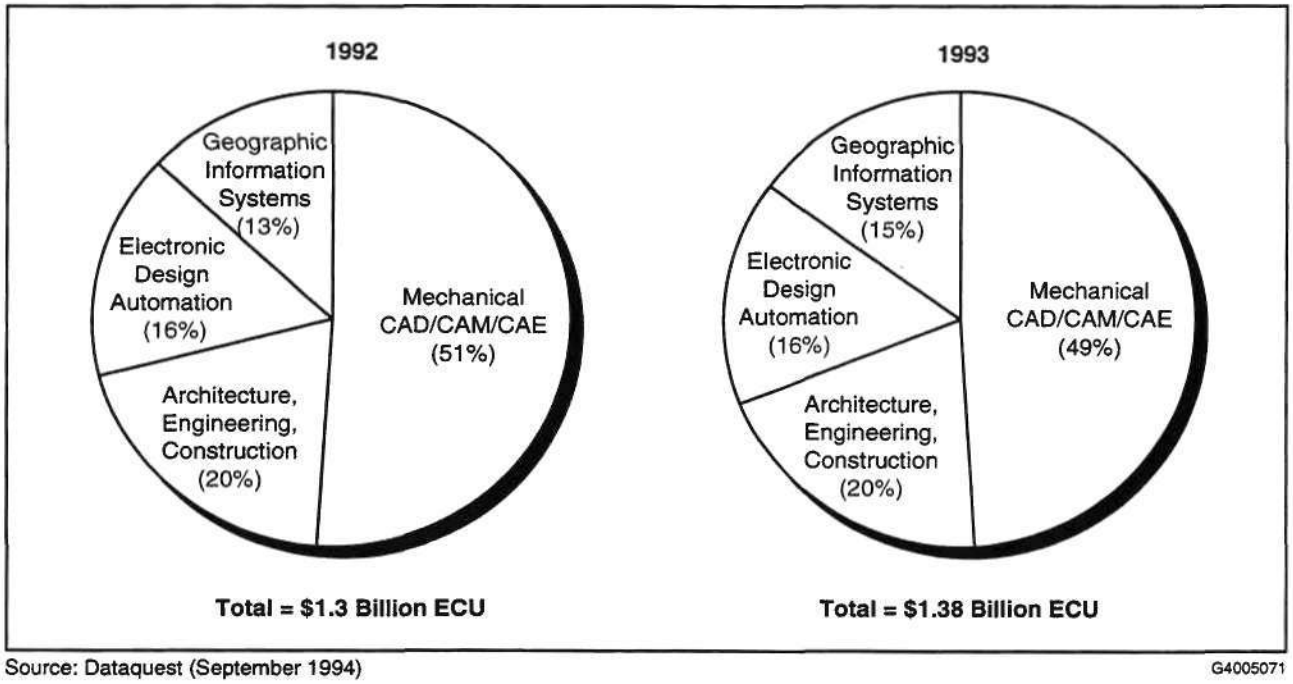
Figure 1
1993 European CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (September 1994) G4005070

Figure 2
1992 and 1993 Software Revenue Distribution by Application



Source: Dataquest (September 1994) G4005071

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Table 2
Top 10 Mechanical CAD/CAM/CAE Software Vendors' Size and Growth in Europe

Company	1993 Revenue ($M)	Growth (%)	1992 Ranking
IBM	136.4	4.1	1
Computervision	86.3	-32.0	2
Autodesk	52.9	3.8	3
Matra Datavision	43.1	0.7	5
Parametric Technology	40.4	122.9	11
Hewlett-Packard	35.8	-15.2	6
SDRC	35.0	-24.9	4
EDS Unigraphics	33.2	12.6	7
MacNeal-Schwendler	20.8	23.5	12
Intergraph	19.9	-26.9	9
Top 10 Companies*	503.8	2.2	
All Companies*	782.0	-0.2	

*Growth rates based on ECU
Source: Dataquest (September 1994)

expense of Siemens-Nixdorf and Applicon. U.S.-based vendors had 79 percent share of the mechanical CAD/CAM/CAE software market, with European vendors holding the rest. Over the last few years we have seen the share of European vendors decline in favor of U.S.-based vendors. This trend is, on the one hand, because of U.S. vendors' acquisitions of several European companies (Norsk Data, Isykon product line) and, on the other hand, because of local mergers and acquisition (Straessle acquired Nestler and Fides). Or, companies have simply pulled out of this market.

AEC

The European construction industry, like the economy of the region, was in retreat during 1993. Economic recession, high interest rates, and mounting unemployment hit exports and undermined consumer confidence. Private investment in homes and by manufacturers and service industries declined as demand for these products fell. Companies are unlikely to invest in improving premises or new buildings while their own sales remain weak, and public sector spending on construction is unlikely to see much improvement when looking at the budget deficits that most countries have accumulated. The situation has not been helped by overdevelopment of offices in the late 1980s, which has left many buildings empty.

The European AEC software market reached $313.4 million in software revenue in 1993. Based on ECU, AEC software revenue in Europe actually increased by 5.4 percent. This growth was driven by the top 10 vendors, which grew 9.1 percent in aggregate. These top 10 vendors now control 71 percent of this market segment with 6 European companies among the top 10 (see Table 3). In the AEC segment, European vendors keep gaining market share and now control 56.2 percent of the market, with U.S.-based vendors controlling the rest in terms of software revenue. This compares with a 52.7 share for European vendors in 1991.

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Table 3
Top 10 AEC Software Vendors' Size and Growth in Europe

Company	1993 Revenue ($M)	Growth (%)	1992 Ranking
Autodesk	56.9	3.9	1
Nemetschek	44.7	37.6	3
Intergraph	40.1	-8.0	2
IEZ	27.8	5.9	4
IBM	13.0	-13.1	6
Soft-Tech Software Technologies	11.4	9.8	8
Computervision	7.6	-58.1	5
Han Dataport	6.5	0.5	11
RIB/Bausoftware	6.1	13.8	12
CADCentre	7.6	-30.4	9
Top 10 Companies*	221.7	9.1	
All Companies*	313.4	5.4	

*Growth rates based on ECU
Source: Dataquest (September 1994)

GIS

There is a tendency around Europe to make the public sector smaller. In countries where, for example, the utility sector was privatized, we have seen a surge in GIS spending as almost a direct result. Also, the telecommunications sector is becoming increasingly deregulated, and in order for telecommunications companies to have a competitive edge, they have had to become more efficient in managing territories. This trend has resulted in large orders for GIS by, for instance, German Telekom and France Telecom.

Growth in Europe for GIS software accelerated in 1993 to 25.1 percent based on the ECU, reaching $246 million in revenue. The top 10 vendors, which control 73 percent of this market segment, increased their software revenue by 43 percent in aggregate (see Table 4). Compared with 1991, when European vendors held a 52 percent share of the European GIS software market, the roles have now switched, with U.S.-based vendors holding 55 percent of the market in 1993 despite the fact that there are 6 European vendors among the top 10.

EDA

The main investment in EDA software in Europe during 1993 came from the telecommunications sector, which continues to dominate electronic design in Europe. Forty percent of the EDA software revenue generated in Europe came from the telecommunications sector. In addition to this sector, the semiconductor and even the defense industries in Europe increased their investment in EDA software tools. Several North American and Japanese semiconductor companies established operations in Europe during the past year. These new operations boosted the sale of CAE and IC layout tools in particular.

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Table 4
Top 10 GIS Software Vendors' Size and Growth in Europe

Company	1993 Revenue ($M)	Growth (%)	1992 Ranking
Siemens Nixdorf Informationssysteme	48.2	-4.1	1
Intergraph	43.0	19.0	2
ESRI	36.0	54.1	3
Autodesk	14.5	3.9	4
Smallworld Systems	13.8	138.6	6
Straessle Informationssysteme	6.5	142.2	14
Sysdeco Ltd.	5.9	270.6	19
Genasys II	4.4	11.2	8
Laser-Scan	4.2	22.0	9
APIC Systemes	4.0	24.5	13
Top 10 Companies*	180.5	43.1	
All Companies*	246.0	25.1	

* Growth rates based on ECU
Source: Dataquest (September 1994)

Based on these trends, the European EDA software market showed relatively healthy growth. Overall EDA software revenue growth in Europe was 10.3 percent based on ECU. In U.S. dollars, the market reached a size of $267.6 million. The top 10 vendors had a 63 percent share of the total EDA software market. The positions of these vendors changed significantly in 1993 compared with 1992 (see Table 5). When compared with the other application sectors, these top 10 vendors had only a marginally higher growth rate, 10.7 percent, than the average EDA software growth rate. The EDA market is heavily dominated by U.S.-based vendors, which held an 81 percent share of the overall European EDA software market in 1993. In 1991, this share was 68 percent. U.S.-based vendors have been steadily increasing their hold on the European EDA market. And now that Racal-Redac has become a Japanese company, the European vendors' share will plunge even further in 1994.

European CAD/CAM/CAE/GIS Market by Region

Europe is and will continue to be a number of separate countries. The economies of the different countries react very differently to recessionary pressures, despite their being flexibly linked via the so-called exchange rate mechanism of the European Community, and aim toward greater unity in the wake of the Maastricht Treaty. This difference is also reflected in the varying size and growth rates for CAD/CAM/CAE/GIS revenue.

German CAD/CAM/CAE and GIS Overview

The German CAD/CAM/CAE/GIS software market led Europe with 35.7 percent share of the European market in 1993. However, the general economic situation in Germany was bad. Large potential CAD/CAM/CAE/GIS customers had taken board-level decisions to halt investments. Customers in the medium-size independent German manufacturing

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Table 5
Top 10 EDA Software Vendors' Size and Growth in Europe

Company	1993 Revenue ($M)	Growth (%)	1992 Ranking
Cadence	46.6	-14.9	1
Mentor Graphics	40.2	13.5	2
Synopsys	17.5	64.5	5
Racal-Redac	12.2	-33.6	3
Intergraph	10.2	-6.3	4
Viewlogic Systems	9.3	2.9	6
Hewlett-Packard	9.1	7.7	8
COMPASS Design Automation	8.7	-3.2	7
Logic Modeling Corp.	8.1	104.8	15
Autodesk	7.9	4.2	9
Top 10 Companies*	169.8	10.7	
All Companies*	267.6	10.2	

*Growth rates based on ECU
Source: Dataquest (September 1994)

companies saw their orders fall by as much as 50 percent and slashed spending. Only strategic projects went ahead; replacement investments were delayed.

This was the main reason why this market dropped 2.7 percent over 1992 to DM700 million. The top 10 vendors in Germany had a particularly bad time, with their revenues declining 5.9 percent in aggregate. The decline was mainly caused by the big drop of 9.3 percent in revenue for mechanical CAD/CAM/CAE software (see Figure 3 and Table 6). These 10 vendors hold a 52 percent share of the German market. The two growth leaders among the top 10 were AEC company Nemetschek and electrical engineering vendor Wiechers Datentechnik. European and, in particular, German-based CAD/CAM/CAE and GIS software vendors are relatively strong in this country, controlling 46 percent of the market with U.S.-based vendors holding the remaining 54 percent.

Looking at the software application splits in Germany, mechanical was the largest segment with 46.5 percent, followed by AEC with 25.8 percent, EDA with 16.2 percent, and GIS with 11.5 percent.

U.K. CAD/CAM/CAE and GIS Overview

The £162.6 million U.K. market was equivalent to a 15.2 percent share of the overall European CAD/CAM/CAE/GIS software market in 1993. Software revenue in terms of U.K. pounds increased 16.2 percent, which was considerably above the European average, a strong indication that the long recession in this country is finally over. During 1993, the manufacturing industry and the electronics industry began to invest again, which also had a significant impact on the CAD/CAM/CAE/GIS software industry in the United Kingdom.

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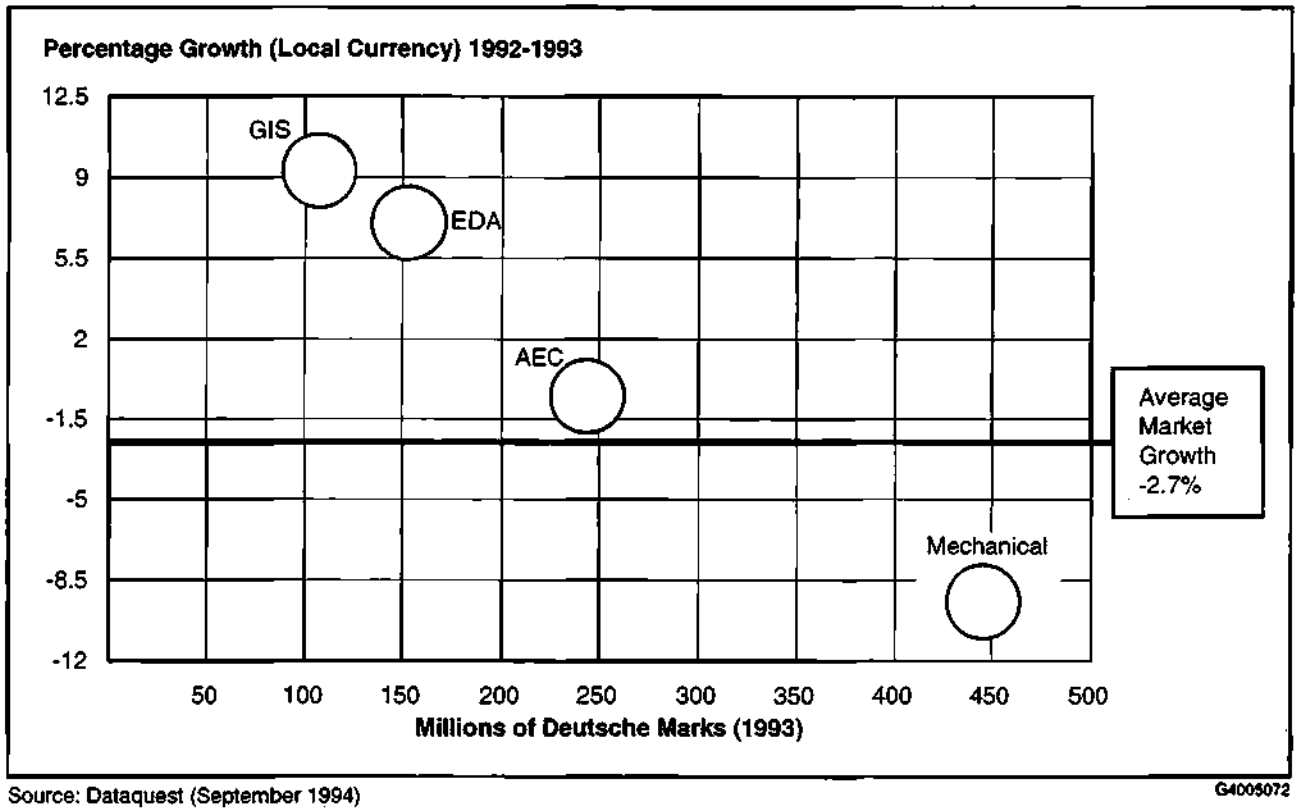
Figure 3
1993 German CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (September 1994)

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Table 6
Top 10 German CAD/CAM/CAE/GIS Software Vendors' Size and Growth

Company	1993 Revenue (DM M)	Growth (%)	1992 Ranking
IBM	98.7	7.7	2
Siemens-Nixdorf Informationssysteme	72.1	-33.0	1
Nemetschek	67.3	41.3	6
Autodesk	61.2	-13.8	3
Intergraph	46.1	-4.2	5
Computervision	45.8	-16.3	4
Hewlett-Packard	29.4	-7.2	7
Wiechers Datentechnik	25.3	35.8	11
Cadence	24.6	3.8	9
IEZ	24.5	-20.7	8
Top 10 Companies	495.0	-5.9	
All Companies	949.9	-2.7	

Source: Dataquest (September 1994)

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The leading 10 vendors in software revenue in the United Kingdom in 1993 controlled only 49 percent of the market, and these vendors' average growth rate of 11.2 percent was significantly below the country's average software growth rate (see Table 7). Growth leader among the top 10 was Parametric Technology, which, for the first time, claimed a position among the U.K. leaders. Exiting the top vendor list were GDS and Pafec.

In 1993, mechanical CAD/CAM/CAE software revenue made up 46.7 percent of the U.K. market, with GIS at 20.5 percent, EDA at 17.1 percent, and AEC at 15.7 percent. GIS was the fastest-growing application sector, with growth over 1992 at 38.4 percent (see Figure 4).

French CAD/CAM/CAE and GIS Overview

The overall French economy contracted during 1993, affecting the construction and manufacturing industries in particular. Industrial production declined sharply, resulting in a drop in investment in the manufacturing industry. This in turn affected the overall performance of the French mechanical and AEC software markets. The GIS sector, on the other hand, showed tremendous growth because of large investment by the utility and telecommunications sectors (see Figure 5).

France's share of the overall European CAD/CAM/CAE/GIS market was 14.4 percent in 1993. The French CAD/CAM/CAE/GIS software market in 1993 increased just 2.6 percent over 1992 to FF1,313 million. The top 10 vendors actually dropped 1.7 percent in aggregate and held a 61 percent share of the French market. Matra Datavision, the local matador, finally made it to the leading position. As in all European CAD/CAM/CAE and GIS markets, the French market is dominated by U.S.-based vendors, which had 71.7 percent of the software revenue with European vendors holding the remaining 28.3 percent. However, the leading two software packages sold in France in 1993 are French developments, although IBM's CATIA product is counted as a U.S. product (see Table 8).

Table 7
Top 10 U.K. CAD/CAM/CAE/GIS Software Vendors' Size and Growth

Company	1993 Revenue (£M)	Growth (%)	1992 Ranking
Computervision	14.2	-26.6	1
Intergraph	13.4	15.1	2
Autodesk	13.3	24.3	3
IBM	8.8	44.6	4
Radan Computational	5.6	19.9	5
Cadence	5.6	27.2	6
Parametric Technology	5.4	162.5	17
Mentor Graphics	5.1	20.8	7
EDS Unigraphics	4.3	60.6	13
SDRC	4.0	-5.9	8
Top 10 Companies	79.7	11.2	
All Companies	162.6	16.2	

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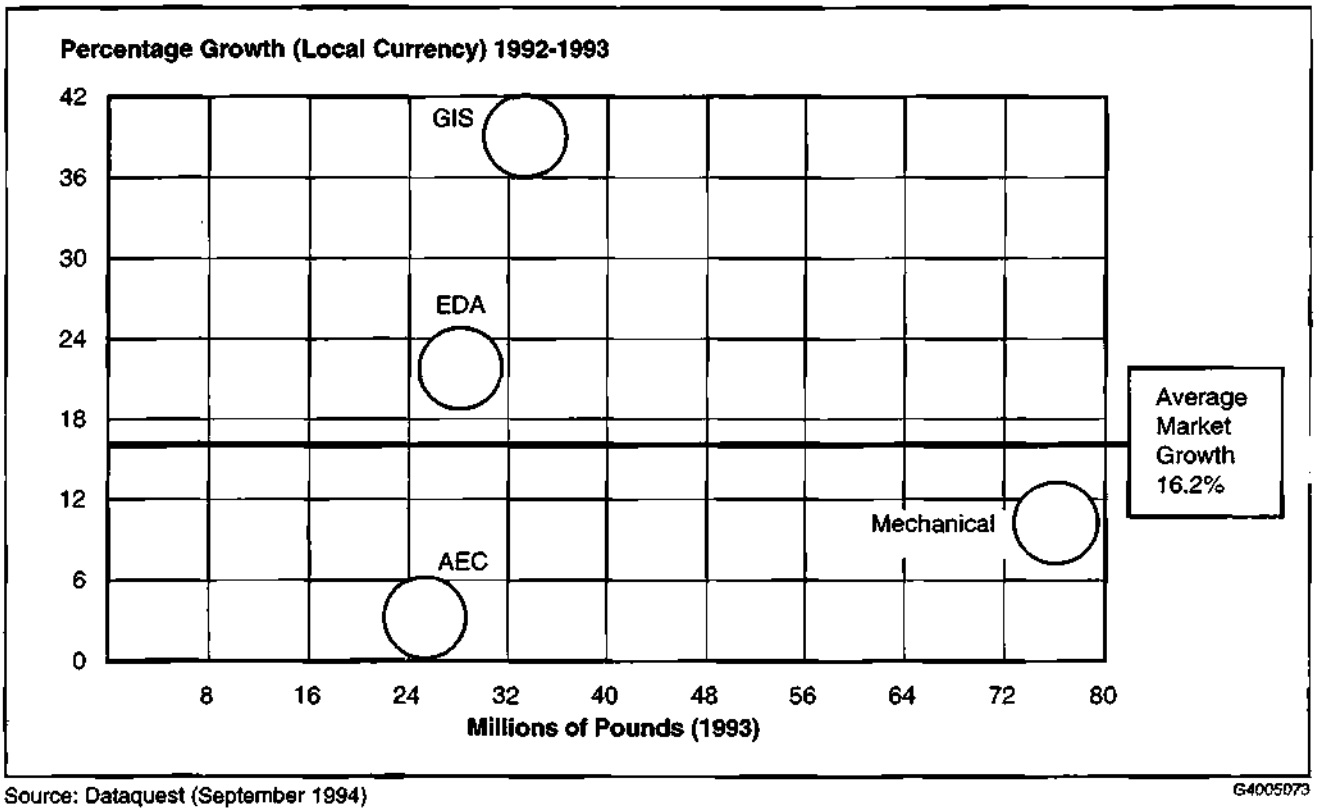

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Italian CAD/CAM/CAE and GIS Overview

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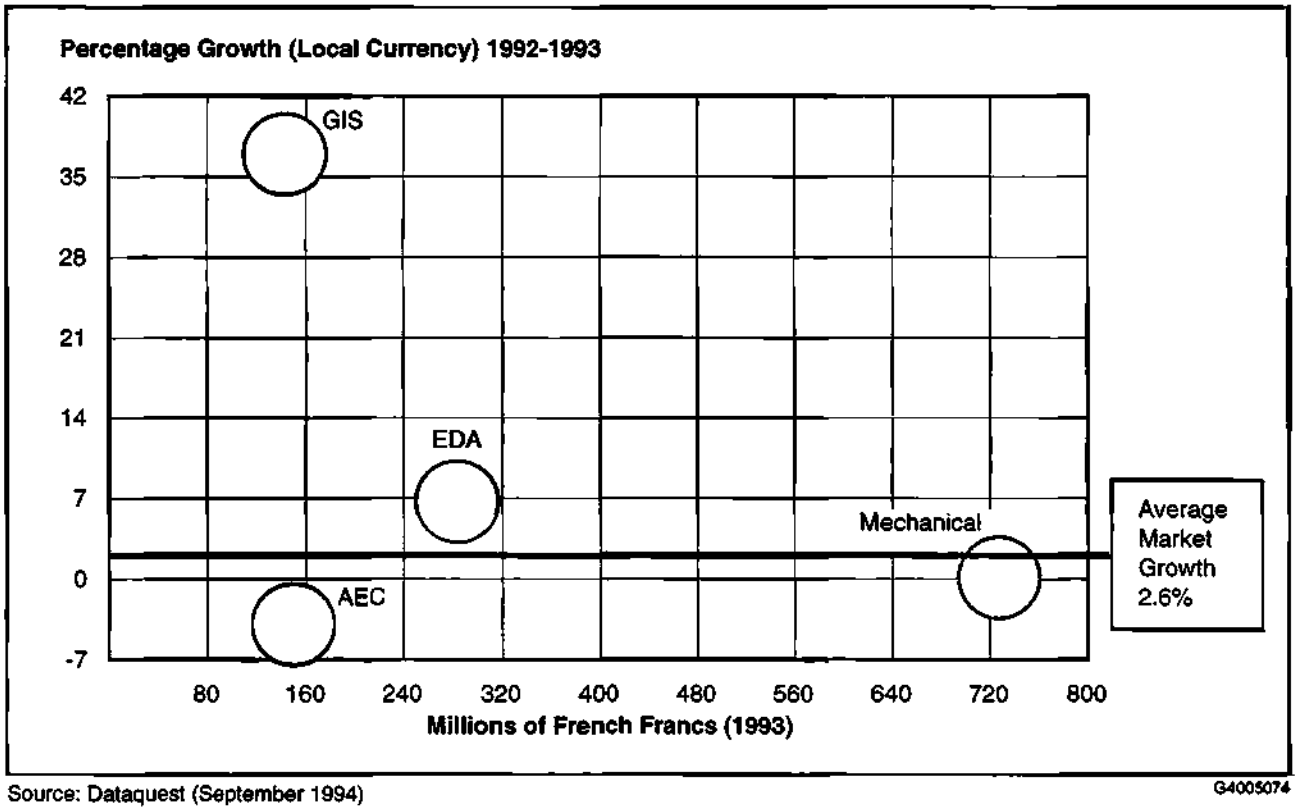

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Matra Datavision	135.6	18.1	3
IBM	134.4	-17.0	1
Autodesk	112.4	23.0	4
Intergraph	97.1	34.4	5
Computervision	95.0	-41.0	2
Cadence	60.6	-15.7	6
Parametric Technology	57.3	140.5	12
Cisigraph	40.1	5.2	8
Mentor Graphics	39.2	40.4	11
SDRC	35.2	-20.3	7
Top 10 Companies	806.9	-1.7	-
All Companies	1,312.5	2.6	-

Source: Dataquest (September 1994)

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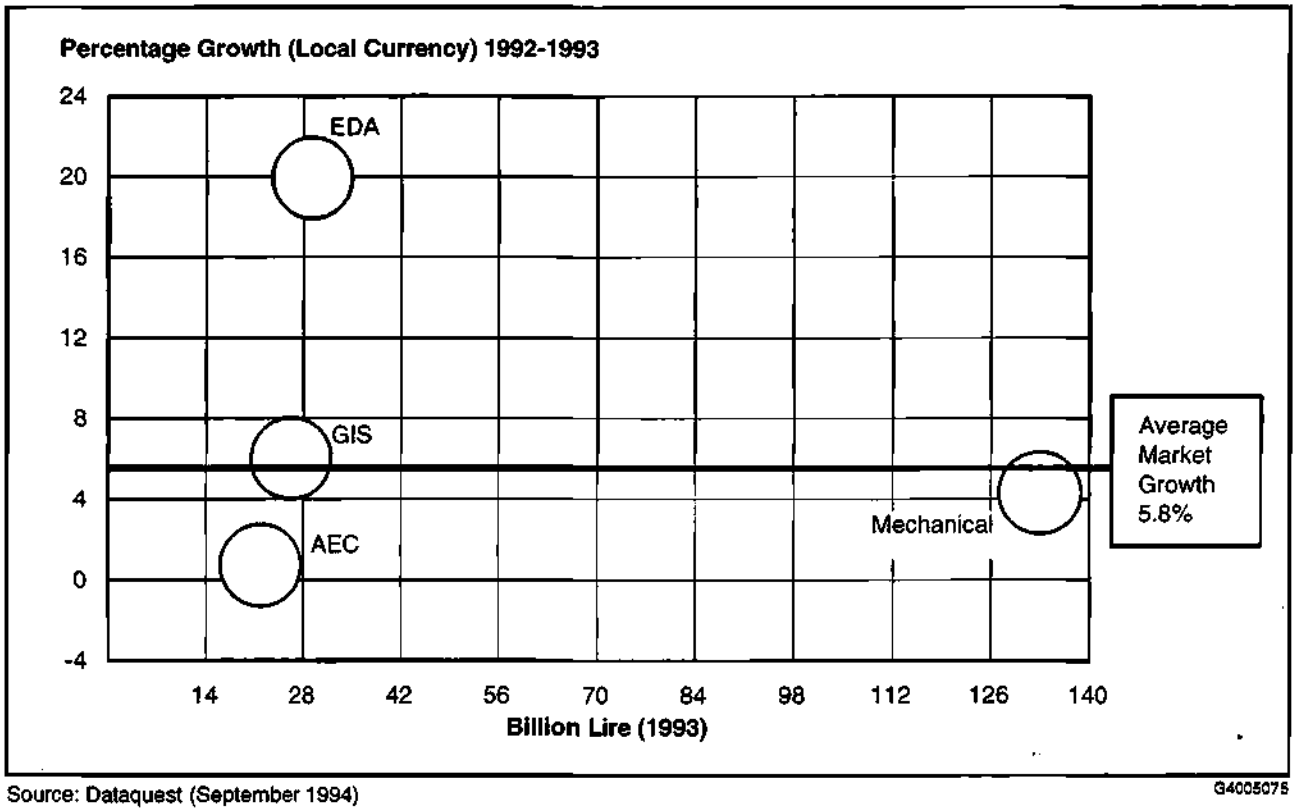
Figure 6
1993 Italian CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (September 1994) G4005075

5.1 percent (see Table 9). The losers among this group were the two leading Italian vendors, CAD.LAB and ItalCad, and Computervision. ItalCad has since been acquired by Computervision. Computervision, in particular, suffered badly from the slowdown among Italy's leading manufacturers as the company depends on their orders to a large extent. Fiat, Computervision's largest customer in Italy, drastically cut its investment in CAD/CAM/CAE software. As was the case in most European regions, U.S.-based vendors had the largest share of the market with 68.3 percent (see Table 9).

In the past, all the PC-based software vendors had problems selling to their full potential in Italy, as the country lacked proper software copyright protection laws. This changed in January 1993 when Italy introduced a new copyright protection law. It had a positive effect on companies like Autodesk.

Dataquest Perspective

Looking at the overall performance of the European CAD/CAM/CAE and GIS software industry, the dominance of U.S.-based vendors becomes obvious. Except for the AEC sector, U.S.-based vendors have continued to increase their hold on the European market. Most European vendors operate only in their country of origin and one or two other countries, and

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Table 9
Top 10 Italian CAD/CAM/CAE/GIS Software Vendors' Size and Growth

Company	1993 Revenue (Billions of Lira)	Growth (%)	1992 Ranking
IBM	21.2	1.4	2
Computervision	20.7	-36.9	1
Autodesk	19.6	60.5	5
CAD Lab	16.9	-3.9	3
ItalCad	8.4	-44.8	4
SDRC	8.2	31.2	9
Siemens-Nixdorf Informationssysteme	8.0	2.5	6
Matra Datavision	7.8	25.0	10
ESRI	7.5	145.7	15
Intergraph	7.4	12.9	8
Top 10 Companies	125.7	-5.1	-
All Companies	211.4	5.8	-

Source: Dataquest (September 1994)

these vendors suffered. Operating in a comparatively small region does not generate enough revenue to keep up the investment in R&D necessary to continue to produce competitive products. Most European vendors that have expanded their international presence have actually grown above industry average.

By Petra Gartzen

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Company Profiles

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Dataquest Company Profile

Software

CAD/CAM/CAE/GIS Europe

Hewlett-Packard—Mechanical Design Division

Corporate Statistics

Corporate Headquarters	Hanover Street 3000 Palo Alto, CA 94304-1181 USA Telephone: (+1) 415-857-1501 Fax: (+1) 415-857-4586
MDD Headquarters	Herrenberger Straße 130 71034 Böblingen Germany Telephone: +49-7031-14-0 Fax: +40-7031-14-2999
General Manager MDD	Peter Bohn
Number of MDD Employees	135 (excluding sales, administration, and support)
Corporate Revenue	$20.3 billion in 1993, $25.0 billion in 1994
MDD Software Revenue 1993	$70.8 million (Dataquest estimate)
R&D Investment	15 percent of MDD turnover
Fiscal Year-End	October 31
Company Founded	1939
HP Entering MCAD Market	1985

Hewlett-Packard Company's Mechanical Design Division (MDD) provides 2-D and 3-D design, drafting, and documentation systems plus product data management (PDM) solutions for the mechanical CAD/CAM market.

Corporate Overview

Hewlett-Packard's MDD was founded in Böblingen, Germany, in 1985. In 1986, the company introduced ME30, a 3-D modeling, design, and drafting CAD system. To manage the data generated by companies using ME10 and ME30, HP developed the engineering data management system HP-DMS.

In 1989, MDD was established as an independent division within HP, and that same year MDD started development of its next-generation product, PE/SolidDesigner, which was released in spring 1993.

In 1991, MDD acquired ABB Cade, the Swiss-German electrical engineering CAD company. The product DDS-C is now part of MDD's overall product offering.

In 1994, HP announced an OEM partnership with Cisigraph of France to develop PE/SurfaceStyler, a surface modeling application. In October, MDD announced version 3.0 of its PE/SolidDesigner product.

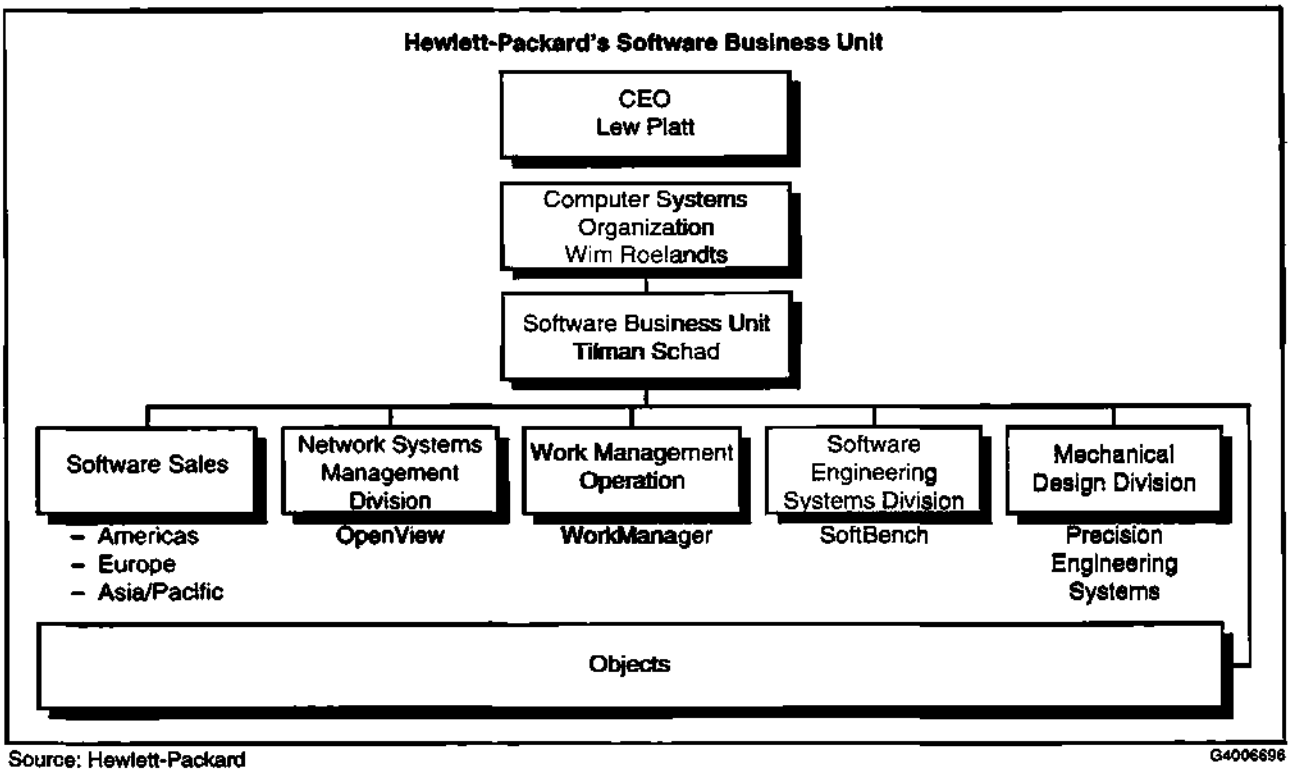
Organization

HP's MDD is a separate entity within the Software Business Unit (SBU), and like most HP divisions, it has its own profit and loss responsibility.

HP's SBU is headed by General Manager Tilman Schad, who previously held the position of General Manager, MDD. SBU consists of separate software development entities ranging from CASE and network and systems management to MCAD and PDM. See Figure 1 for SBU's organization chart.

WorkManager, which was developed out of the need for CAD data and workflow management, led to the establishment of a new division called

Figure 1
Hewlett-Packard's Software Business Unit



Source: Hewlett-Packard G4006696

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WorkManagement Operation (WMO) in November 1993. WMO also resides in the SBU. This means that MDD's solutions are closely linked to products offered by HP's WMO. Common charters for MDD and WMO support the development of software across multiple platforms.

All aspects of the SBU are also of strategic importance to HP as a whole, because the company uses the SBU's products for its internal product development in many divisions. See Figure 2 for the distribution of mechanical CAD software seats used internally at HP.

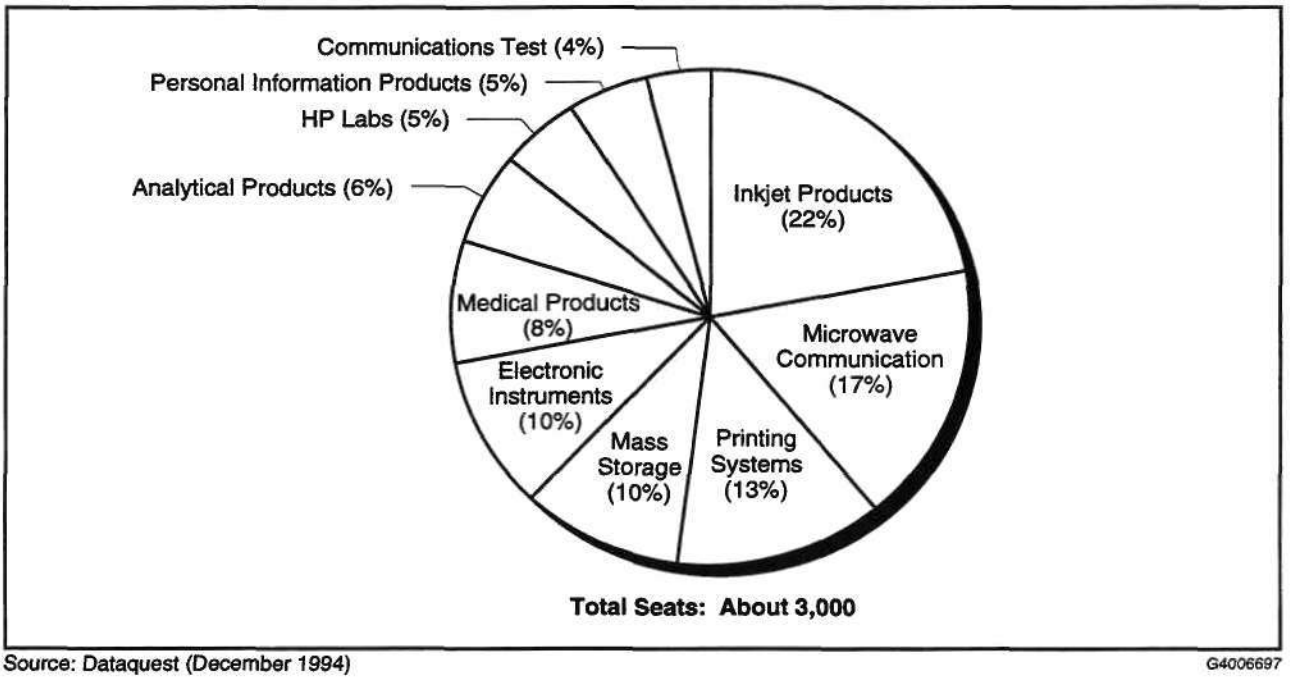
In December 1993, Peter Bohn was appointed general manager of MDD; Bohn had previously held several leading positions in software-related divisions within HP.

MDD's sales are divided into the three major world regions: Europe, United States, and Asia/Pacific. The product development and marketing areas are divided into two entities: one is in charge of the 2-D business, and the other focuses on the product modeling business.

Mission Statement

Because of the organizational structure, both the SBU's statement and MDD's individual statement apply.

Figure 2
MDD Mechanical Software Seats Shipped into Hewlett-Packard Business Group in 1993



Source: Dataquest (December 1994) G4006697

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The SBU's mission statement is as follows:

> Provide software foundations and solutions that our customers need to re-engineer their business processes for improved competitiveness.

Areas of Focus:

- Managing the new computing environment
- Workflow and information management
- Software application development environments
- Mechanical product design
- Object-oriented technologies

MDD's mission statement is as follows:

> Improve customer competitiveness by providing to them the highest quality and leading capability software products, services, and consulting in order to increase the effectiveness and efficiency of their product development process.

Market Position

Worldwide, mechanical CAD/CAM/CAE software revenue reached a total of $2.3 billion in 1993. MDD had a 3.1 percent share of that total, which placed the company in the No. 8 position among the top 10 MCAD software vendors (see Table 1). Market growth for mechanical CAD software slowed down in 1993, reaching a growth rate of just under 6 percent over 1992. In Germany, MDD's most important regional market, the market for MCAD applications actually declined by a huge 9.3 percent based on local currency.

MDD claims to have installed more than 50,000 mechanical CAD seats worldwide. Approximately 13 percent of these seats are 3-D products (mainly ME30, but a growing proportion of SolidDesigner), and the rest are ME10 seats (2-D). This is also reflected in the company's turnover in 1993, where the majority of the revenue came from PDM and ME10/ME30 sales. SolidDesigner started shipping in the spring of 1993.

In terms of regional distribution of the aforementioned installed seats, 55 percent are in Europe, 30 percent in Japan, and 15 percent in the United States. The largest proportion, more than half of MDD's turnover and installations in Europe, is generated in Germany. The rest of the installed seats and turnover in Europe is divided among France, the United Kingdom, and Italy. (See Figures 3 and 4.)

Looking at the company's position by industry sector, the company believes that it has a leading position in the machinery and fabricated metal industries in Germany. In Japan it also holds a leading position in those two industries and is also a major player in electronic packaging.

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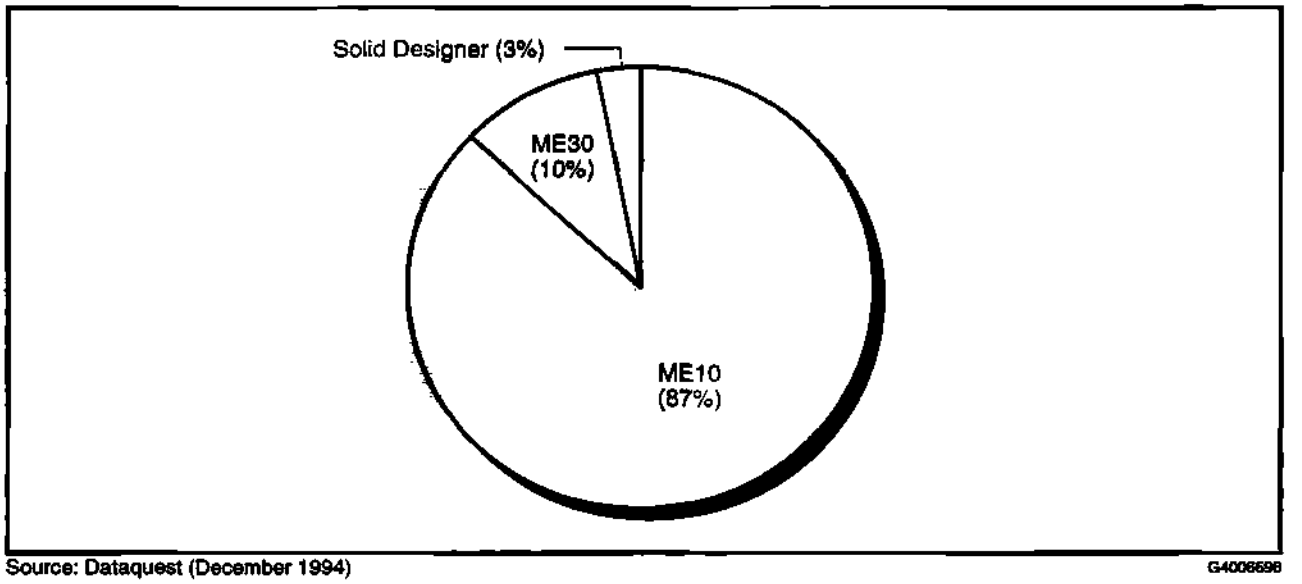
Table 1
Top 10 MCAD Software Vendors

	1992 Software Revenue ($M)	1992 Share of Market (%)	1993 Software Revenue ($M)	1993 Share of Market (%)	Software Revenue (%)
IBM	308.7	14.2	325.5	14.2	5.4
Autodesk	136.5	6.3	160.2	7.0	17.4
Parametric Technology	81.2	3.7	151.0	6.6	85.9
Computervision	193.6	8.9	147.5	6.4	-23.8
EDS Unigraphics	106.9	4.9	129.2	5.6	20.9
SDRC	94.4	4.3	120.7	5.3	27.9
MacNeal-Schwendler	59.5	2.7	74.1	3.2	24.6
Hewlett-Packard	72.8	3.4	70.8	3.1	-2.8
Intergraph	72.6	3.3	70.5	3.1	-2.8
Fujitsu	46.9	2.2	67.4	2.9	43.8
Top 10 Companies	1,173.0	54.0	1,316.9	57.4	12.3
All Companies	2,170.4	100.0	2,294.7	100.0	5.7

Source: Dataquest (December 1994)

Figure 3
Installed Seats by Product



Source: Dataquest (December 1994) G4006698

Electronic packaging is a bigger industry in Japan than the machinery sector, whereas in Germany, the machinery sector is dominant. These sectors use ME10 to a large extent rather than solid modeling technology. Figure 5 shows MDD's 1993 worldwide software revenue distribution by industry sector. In each of the four major industry segments displayed in Figure 5, MDD is among the top 10 in software market share ranking (see Table 2).

In terms of mechanical subapplications, the largest portion of MDD's software revenue comes from documentation/drafting applications. This

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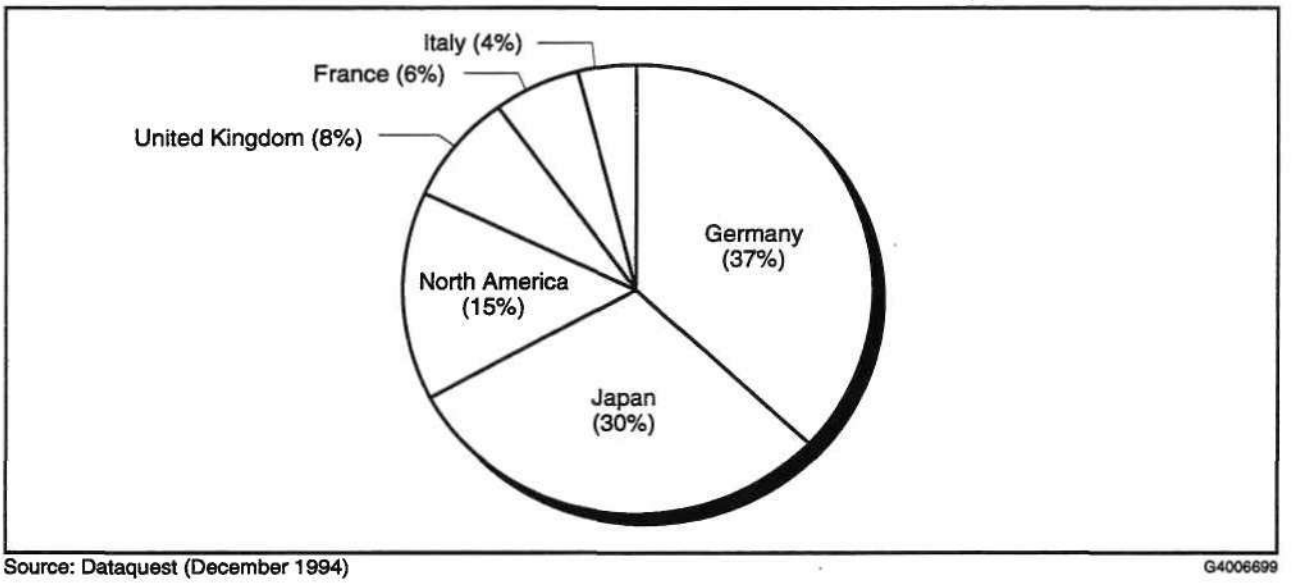
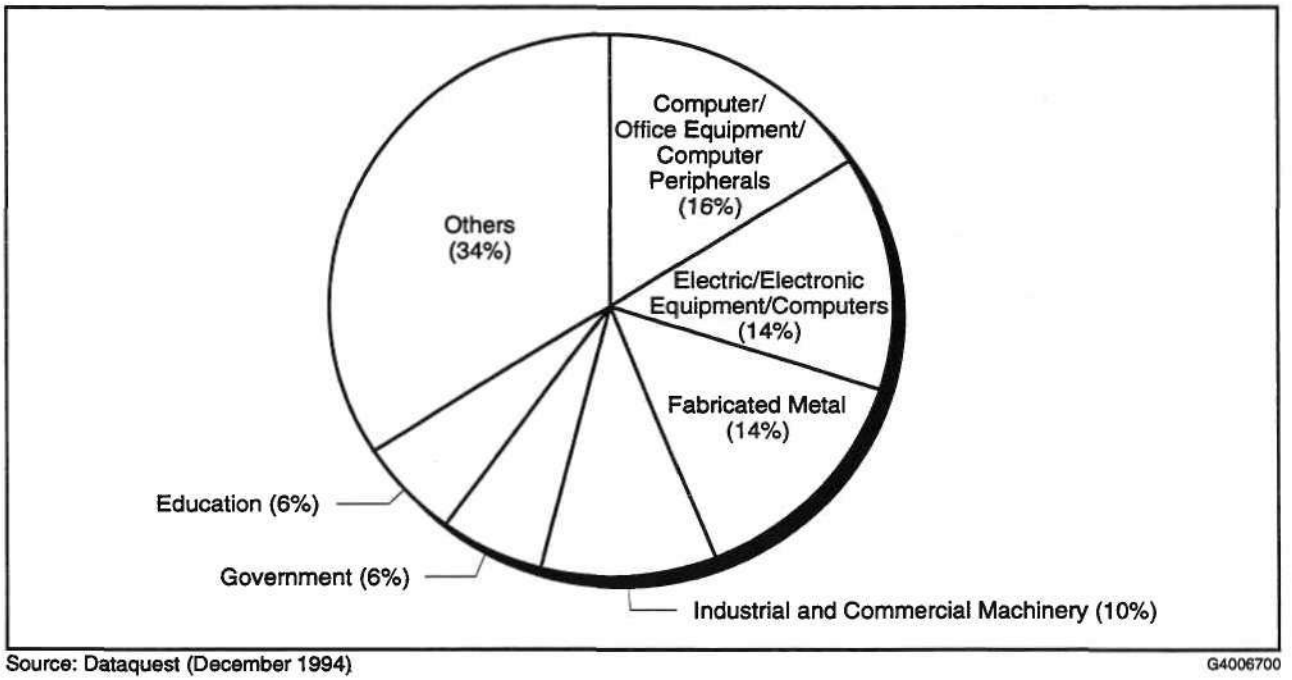
Figure 4
Installed Seats by Region



Source: Dataquest (December 1994) G4006699

Figure 5
Software Revenue by Industry



Source: Dataquest (December 1994) G4006700

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Table 2
MDD's Market Ranking by Industry Sector

Industry Sector	Ranking
Computers/Office Equipment/Computer Peripherals	4
Electrical/Electronic Equipment/Semiconductors	5
Fabricated Metal Products (except Machinery and Transportation)	4
Industrial and Commercial Machinery	10

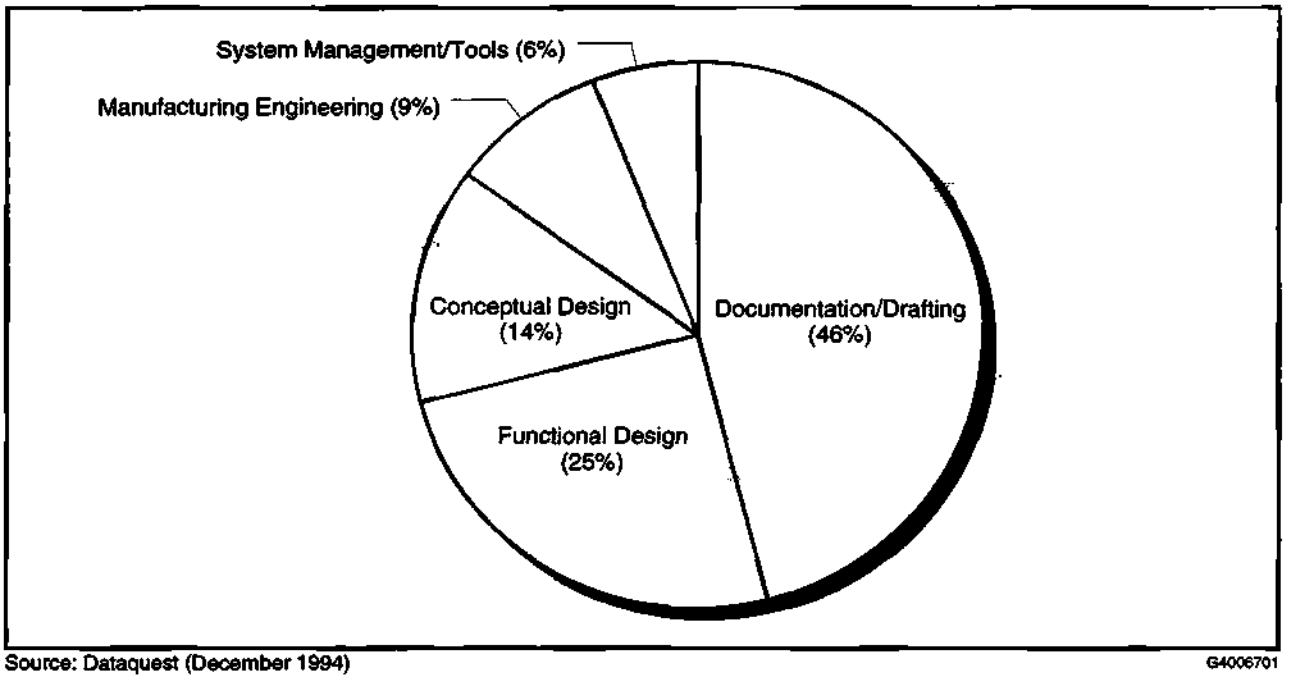
Source: Dataquest (December 1994)

application is also the largest subapplication sector for mechanical software as a whole. MDD holds the number 5 position in this sector, which underlines the strength of its ME10 product. See Figure 6 for MDD's software revenue distribution by mechanical subapplication.

Product and Marketing Strategy

The family for all MDD's products is Precision Engineering Systems. MDD's product offering includes HP PE/SolidDesigner for product modeling design; HP PE/ME10 for 2-D design, drafting, and documentation; HP PE/ME30 for 3-D modeling, design, and drafting; HP PE/SheetAdvisor for sheet metal design; HP PE/DDS-C for electromechanical design; and HP/PE WorkManager for product data and workflow management. This product portfolio will increase soon with the introduction of PE/SurfaceStyler, the surface modeler based on Cisigraph's Strim 100 product. In addition to its own developments, MDD has also teamed up with a variety of software partners in areas such as CAM. See Figure 7 for MDD's product portfolio.

Figure 6
Software Revenue by Subapplication



Source: Dataquest (December 1994) G4006701

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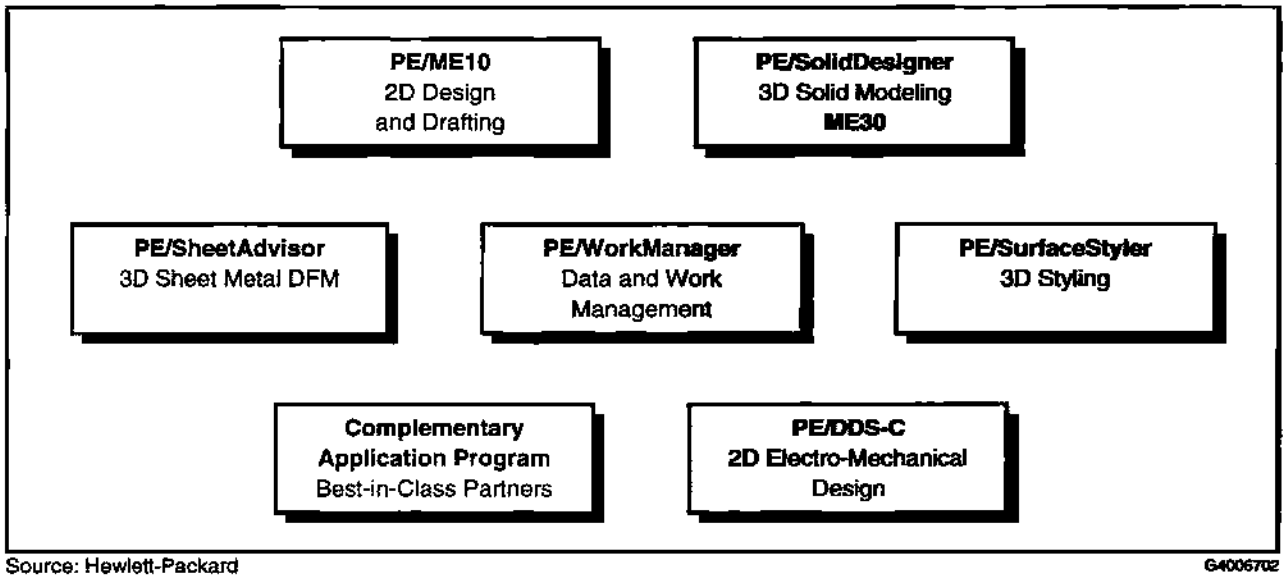
Figure 7
MDD Products



Source: Hewlett-Packard G4006702

The strength of MDD's product line rests largely with ME10, because 2-D software is preferred in the industry sectors in which MDD operates in Germany and Japan.

In 1989, development of the next-generation product PE/SolidDesigner began. MDD still sells ME30, but PE/SolidDesigner is now the mainstream product.

PE/ME10

HP PE/ME10, a 2-D design, drafting, and documentation system targeted at mechanical and electromechanical design, is MDD's most successful product so far, with nearly 45,000 installations worldwide. The product is very popular with the user community, as a recent Dataquest Mechanical CAD/CAM/CAE systems user survey revealed. Users in Europe and the United States gave HP's Precision Engineering products the highest ratings in terms of ease of use and overall software quality. The user responses focused primarily on the 2-D ME10 package. HP tied with Matra Datavision for highest software quality and had the No. 1 rating for ease of use (see Table 3).

Table 3
User Satisfaction Ratings for Mechanical CAD/CAM/CAE Software

Satisfaction with Ease of Use	Rating	Satisfaction with Software Quality	Rating
HP MDD (Mostly ME10)	4.33	HP MDD (Mostly ME10)	4.0
Adra Systems	3.82	Matra Datavision	4.0
CADAM	3.69	Autodesk	3.88
EDS UG	3.59	Adra Systems	3.82
PTC	3.55	Applicon, CADAM, PTC	3.5

Source: Dataquest (December 1994)

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The PE/ME10 product is sold standalone, but is also integrated with PE/SolidDesigner to provide 3-D-to-2-D associativity to automatically update 3-D changes on related 2-D documentation.

In August, MDD announced HP PE/ME10 for MS Windows and Windows NT. The new software release supports Windows-specific data-exchange capabilities, such as cut and paste, and dynamic data exchange (DDE). The Windows-based product is competitively priced and is sold through the dealer channel.

PE/ME30

PE/ME30 is an integrated solid modeling, design, and drafting system. Its user interface is identically structured to PE/ME10 to enable a smooth migration from 2-D to 3-D. The product is targeted at users who want to migrate from ME10 to take the first step into solid modeling.

PE/SolidDesigner

SolidDesigner is an ACIS-based solid modeler and is the most interesting modeling technology to emerge to date. It has some very strong underlying concepts, such as dynamic labeling and modification without history trees or constraints, flexible workplane construction techniques, and dynamic feature recognition and manipulation.

Version 1.0 of SolidDesigner was announced in March 1992, but because of functionality and reliability problems, it was never aggressively marketed. PE/SolidDesigner Version 2.0, a much-improved and reliable system, was finally released at the end of 1993. However, as a competitive CAD product, even version 2.0 did not have the breadth of applications that some of the competition have, such as free-form surfacing and complex filleting and blending. The latest announcements are addressing exactly these issues.

Version 3.0 has improved IGES import capabilities that enable both surface and wire-frame data to be transferred into PE/SolidDesigner. Surface and solid data can also be imported via STEP. Once transferred, this data can coexist with PE/SolidDesigner data and can be manipulated accordingly. SolidDesigner also enables solid parts and assemblies to be exported to the object-oriented, geometric modeler ACIS-based systems using Version 1.5 of the ACIS SAT file format. This feature also provides a direct link to other ACIS-based systems. The other major enhancements in version 3.0 are variable radius blending and mass property capabilities. It also incorporates interference-checking capabilities, which allow the detection of interference, face touching, and noninterference of assemblies and part combinations.

MDD is now on schedule with its strategy of releasing two major releases of PE/SolidDesigner each year, which seems to indicate that the division is beginning to get the underlying technology under control. The next major release is planned for the second quarter of 1995.

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With SolidDesigner, HP hopes to penetrate the market segments that are migrating from 2-D to solid modeling applications. The product has been criticized for being a single-platform modeler that is available only for the HP workstation. The latest announcement of porting the product to Sun and Silicon Graphics Inc. (SGI) workstations will address this criticism.

PE/SurfaceStyler

HP PE/SurfaceStyler is an engineering styling application based on the 3-D surface modeling software STRIM 100 from the French company Cisigraph.

A bidirectional data link to SolidDesigner allows the user to use the surfaces in SolidDesigner to create and modify solid models and to further detail and complete the mechanical design. However, the recent acquisition of Cisigraph by Matra Datavision puts a question mark on this OEM agreement with MDD. It remains to be seen how Matra will approach this issue.

PE/SheetAdvisor

HP PE/SheetAdvisor features design for manufacturability practices to aid engineers designing sheet metal parts and assemblies. By identifying possible manufacturing design flaws and providing cost and tooling information early in the design process, the product can help to reduce design iterations and to minimize human error. The product's main features are:

- Design for manufacturability
- Online cost estimation
- Predefined library of tools and online guidance to preferred materials
- 2-D flat generation for flats from the 3-D model

PE/DDS-C

In 1991, MDD acquired ABB CADE. ABB CADE was mainly active in the German-speaking markets with its products DDS-C, an electrical wiring system and a knowledge-based engineering shell. The electrical engineering product has since been integrated into the overall MDD product offering. The main users for this kind of technology are electrical engineering companies like ABB and Siemens, along with manufacturers of construction and machine tools, specialty machinery, electrical power utilities, mining, and automotive industries. These are also the industry sectors currently using the ME10/ME30 products.

PE/WorkManager

HP PE/WorkManager, which integrates with HP's CAD solutions, is an enterprisewide PDM solution with workflow capabilities. It is used as a framework for the product development process and to ensure the security, accuracy, and accessibility of the product development information.

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Platform Strategy

For mission-critical applications in design and manufacturing, users expect to have the required software available on the optimal combination of hardware configurations. This forces the leading ISVs to be on all the leading hardware platforms. The PE/SolidDesigner product supports only HP's workstations, but the announcement that the software will be available on Sun and SGI next year will help overcome that weakness.

The porting activity for HP is even more important because of the mix of applications offered. The product modeling and documentation applications have been the focal point in the past. Now, the additional offering of an integrated product data and workflow management application increases the value of multiple platform porting. See Table 4 for the hardware platforms supported by the various MDD products.

Table 4
Platform Strategy

Product	Computer Platforms Supported
PE/ME10	HP, Sun, MS Windows, NEC, Toshiba, SGI (Q1/95)
	MS Windows, MS Windows NT
PE/SolidDesigner	HP, Sun (Q1/95), SGI (Q1/95)
PE/SheetAdvisor	HP, Sun (Q2/95), SGI (Q2/95)
PE/DDS-C	HP, IBM, DEC, Sun (UNIX platforms)
	MS Windows
PE/SurfaceStyler	HP
PE/WorkManager	HP, Sun, MS Windows

Source: Dataquest (December 1994)

Partnerships/Sales and Distribution

The final component of the HP PE/Systems solution is the PE/Complementary Application Program (CAP), a joint R&D and marketing program that enables HP to deliver additional functionality to its customers. HP continues to specialize in 2-D and 3-D mechanical design and workflow solutions, while partnering with other vendors to offer capabilities in applications such as numerical control (NC) machining, analysis (FEA), and electronic design automation (EDA). HP has relationships with about 70 companies worldwide, covering approximately 200 applications. Some of these are listed in Table 5.

A set of test suites is used to qualify products for joining the CAP. Integration of these products is based on standards such as ACIS, PDES/STEP, and IGES.

In addition to partnering with other vendors, HP MDD has a worldwide network of value-added resellers (VARs) and independent software vendors (ISVs) that, together with HP's own sales force, offer MDD's products to end users.

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Table 5
MDD Complementary Application Partners (CAP)*

Application Area	Partner	Product
CAM	CAMAX Manufacturing Technologies	Camax, SmartCAM
	Cisigraph	NC Strimstation
	CADCentre	Solid Mill
	Cimalog	Cimalog
	Sapex	PAM-X
Analysis	Rasna	MECHANICA
	Framasoft+CSI	Mosaic
	Ansys Inc.	ANSYS
	Cisigraph	FE Strimstation
EDA	Mentor Graphics Corp.	Boardstation

*Selection only: There are approximately 200 applications available.
Source: Hewlett-Packard, Dataquest (December 1994)

Standards

MDD is committed to supporting international standards such as STEP and is implementing STEP-based data exchange. HP has also participated in ProSTEP for the automotive industry and in CAD Data Exchange (CADEX) and Product Data Exchange (PRODEX) established by the European Community's ESPRIT projects. HP PE/SolidDesigner supports the following standards-based technologies:

- OSF/Motif in the user interface
- Spatial Technology's ACIS Geometric Kernel as the open modeling kernel technology
- STEP protocol for 3-D solid data exchange
- Other open data exchange standards (IGES, ACIS SAT)

Major Customers

MDD has over 50,000 seats at customers in Europe, Japan, and North America. Customers include Panasonic, Duracell, Fujitsu, Motorola, and NEC (see Table 6 for profiles of some of MDD's customers). In addition, MDD's systems are installed at 56 internal HP divisions, totaling more than 3,000 users (see Figure 2).

Dataquest Perspective

Being part of HP is a strong advantage for MDD. It will be hard to find a competitor with such a broad spectrum of products, customer support centers, and training, among other offerings. However, it nonetheless seems that HP has been unable to establish worldwide awareness of its MCAD products.

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Table 6
Major Customer Profiles

Company	Country	Industry Sector	Implementation
Jordan Grand-Prix	United Kingdom	Formula One racing cars	PE/SolidDesigner, PE/ME10
Toshiba	Japan	Power-plant turbines	PE/ME10
Leica	Germany	Optical instruments	PE/SolidDesigner, PE/ME10 HP DMS, Stereolithography
Hendry	United States	Sheet metal parts for telecommunications industry	PE/SheetAdvisor, PE/ME10 NC link
Leviton	United States	Electrical/electronic devices	PE/ME30, PE/SolidDesigner FEA, Stereolithography
Playmobil	Germany	Plastic toys	PE/SolidDesigner, PE/ME10 Stereolithography
RKS	United States	Industrial design for consumer electronics, computer equipment, medical/scientific equipment	PE/SolidDesigner, PE/ME30 PE/ME10, Rapid Prototyping
Sennheiser	Germany	Audio equipment	PE/SolidDesigner, PE/ME30 PE/ME10, Stereolithography
S.G. Hauser	United States	Industrial design for medical, consumer electronics, computer industry	PE/SolidDesigner, PE/ME10 CNC link, Rapid Prototyping
IDEO	United States	Industrial design, consumer design	PE/ME10, PE/ME30 PE/SolidDesigner
TRIM-C-O	United States	Sheet metal parts	PE/ME10, PE/ME30 PE/SolidDesigner PE/SheetAdvisor
Motorola	United States	Computers, components	PE/ME10, PE/ME30, PE/SheetAdvisor
Oki	Japan	Consumer electronics	PE/ME10
Panasonic	Japan	Consumer electronics	PE/ME10
Schindler	Germany	Elevator manufacturing	PE/ME10
Trumpf	Germany	Machine tools	PE/ME10, PE/ME30
Gildemeister	Germany	Machine tools	PE/ME10, PE/ME30
Festo	Germany	Machine tools, machinery	PE/ME10, PE/SolidDesigner

Source: Hewlett-Packard, Dataquest (December 1994)

One of the strong success stories of HP has been the ME10 product, which is one of the best 2-D mechanical CAD products around. Users confirmed this in a Dataquest survey of mechanical CAD/CAM/CAE end users. ME10 had the No. 1 position in terms of software quality and ease of use. This product has never had the praise that it deserves.

We also believe that HP's lack of financial commitment to marketing is responsible for the lower penetration rates outside of Germany and Japan. The marketing behind the company's MCAD products is not sufficient in the face of products like AutoCAD and Parametric Technology.

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SolidDesigner, MDD's flagship product, could be one of the best, if not the best, modelers available if the development group can maintain a rapid, ongoing development of the code, offer a styling/surfacing solution soon, and maintain the functionality and modeling approach. It took a long time for SolidDesigner to become salable, and this certainly had a negative impact on the product's reputation. The latest release should help to overcome this and enable MDD to increase SolidDesigner's share of MDD's installed base in the coming year.

In summary, we believe that the company's major advantages are the ME10 product's high user rating, a large installed base of the ME10 product in Germany and Japan, and PE/SolidDesigner's unconstrained modeling approach and data exchange capabilities. However, MDD faces some major challenges: to grow the share of its business outside of Germany and Japan, to integrate surfacing technology, and to increase the user base of its PE/SolidDesigner product.

By Petra Gartzen

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Software

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European CAD/CAM/CAE/GIS

Market Trends

1994

Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MT-9401
Publication Date: October 24, 1994

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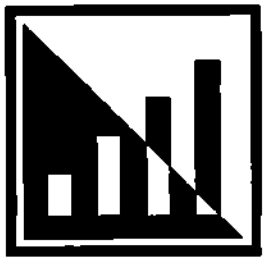
Software

European CAD/CAM/CAE/GIS



Market Trends

1994

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Chapter 1
Report Overview

The European CAD/CAM/CAE/GIS 1994 Market Trends book presents the results of Dataquest's research and analysis in the 1993 European CAD/CAM/CAE/GIS market. The remainder of this report is divided into the following chapters:

- Chapter 2, Executive Summary: An overview of the major findings of the report
- Chapter 3, Trends Analysis: Definitions, discussions, and analyses of the major trends and issues driving the market
- Chapter 4, Market Analysis: An analysis of Dataquest's 1993 European market survey results, by region and application
- Appendix A, European CAD/CAM/CAE/GIS Market Statistics: Tables from *Source: Dataquest* market share used in reference in the text of the document
- Appendix B, Methodology: Market definitions

Methodology

The market and trends analysis is based upon many years of industry experience in the CAD/CAM/CAE/GIS group. We use the results of primary research to define, measure, and estimate the significant parameters of the market. Vendor- and user-based surveys are conducted to gain further insight into significant market dynamics. First-hand discussions with end users, investors, and vendors are used to verify assumptions and to check analysis results.

Project Analyst: Petra Gartzen

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Chapter 2
Executive Summary

The European CAD/CAM/CAE/GIS market, which represented the world's largest regional market for this segment in terms of total revenue and software revenue until the beginning of 1993, suffered a setback in 1993 and lost its leading position. The region accounted for 33 percent of total CAD/CAM/CAE/GIS product sales in 1993 and 32 percent of software revenue. More details can be found in chapters 3 and 4.

Major Trends and Issues

Major trends and issues include the following:

- The economy: Adverse economic conditions, which hit the manufacturing and construction industries particularly hard, and a stronger dollar throughout 1993, were the main causes of the slowdown in revenue growth.
- End-user industries: The major European end-user industries are undergoing significant changes that will affect CAD/CAM/CAE/GIS sales into the various industries in one way or another.
- Central and eastern Europe: Dataquest believes that central and eastern Europe is a major growth area for CAD/CAM/CAE/GIS tools. Privatization and the formation of new companies are key drivers in this region.
- Dollar exchange rates: The dollar appreciated strongly against European currencies in 1993, which had a major negative impact on dollar revenue growth in the European countries.

The Market

The following bullet points characterize the European CAD/CAM/CAE/GIS market in 1993:

- Overall, the European CAD/CAM/CAE/GIS market dropped 5.6 percent, falling to $5.4 billion in total factory revenue in 1993. Calculated in European Currency Units (ECU), the market grew 5.2 percent.
- CAD/CAM/CAE/GIS software revenue dropped 5 percent to $1.6 billion. Based on ECU, software revenue grew 5.8 percent.
- U.S.-based vendors shipped 64.3 percent of the CAD/CAM/CAE/GIS software revenue, compared with 35.7 percent generated by European vendors; however, several leading products sold by U.S. vendors are being developed in Europe.
- The top 10 European CAD/CAM/CAE/GIS software market share rankings remained fairly stable through 1993. The group accounted for 51 percent of the total in 1992, dropping to 49 percent in 1993, which translates to $782 million in revenue.

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- A view of the European CAD/CAM/CAE/GIS market by platform shows the importance of the technical workstation. More than 66 percent of the software revenue came from technical workstations, slightly down from 68 percent in 1992.
- The largest regional market in 1993 was Germany, with $574 million in software revenue, representing nearly 36 percent of the total European CAD/CAM/CAE/GIS software market.
- The largest application sector in Europe is the mechanical segment, having some 49 percent of the total European CAD/CAM/CAE/GIS software market.
- The fastest-growing segment in 1993 was GIS, with 12 percent software revenue growth.

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Chapter 3
Trends Analysis

Introduction

The postwar years in Europe have witnessed tremendous change in political and economic divisions, moving toward a single, stronger market. The European single market is strengthening the 12 European Union (EU) members at a cost to the political autonomy of the members. The European Economic Community (EEC) was established in January 1958 in Rome to create a common market. In July 1968, a customs union was achieved among the six member countries, which shared a common external tariff with the other countries. The United Kingdom originally refused to play a part in the EEC but was a founding member of the European Free Trade Association (EFTA), set up in 1960. In 1961, however, the United Kingdom applied for membership to the EEC. Other countries followed suit, and by 1986 the EEC had 12 members.

The Single European Act (SEA) planned the introduction of a single unified internal market by the beginning of 1993, thereby giving a longer-term direction to the building of Europe. The SEA was to offer freedom of movement for people, goods, services, and capital. The realization of this huge economic unit required the removal of numerous obstacles and barriers that expend time and money, hinder development of international competitiveness, and curb economic growth and social progress. The activities are financed by a central fund for the community, with many loans granted by the European Investment Bank. See Figure 3-1 for the major stages of the SEA.

European Economy

Year-end 1992 and all of 1993 were characterized by declining consumer and business confidence, weaker than expected economic activity, and considerable tensions in the foreign exchange markets. Somewhat better economic data is expected for 1994. According to the International Monetary Fund's (IMF) latest World Economic Outlook, the broadening and strengthening of recovery in the industrialized countries marks the end of the long and unusually severe downturn in recent years. Continental Europe shows stronger signs of a turnaround, which was partly delayed by German interest rate and exchange rate policy. Much of the improvement comes in a sharp upward revision in growth projections for the EU, with the United Kingdom, France, and Germany at the forefront of the recovery.

After a low point toward the end of 1993, industrial output is now turning positive for the first time since early 1992. Revival of activities is feeding into property values, which appear to be leveling out after the steep decline since 1991. However, Germany's recovery, much of which has relied on exports, is expected to be slow. Germany faces problems associated with the financing of the former East Germany and has continued to lose competitiveness within Europe. Attempts to redress this have

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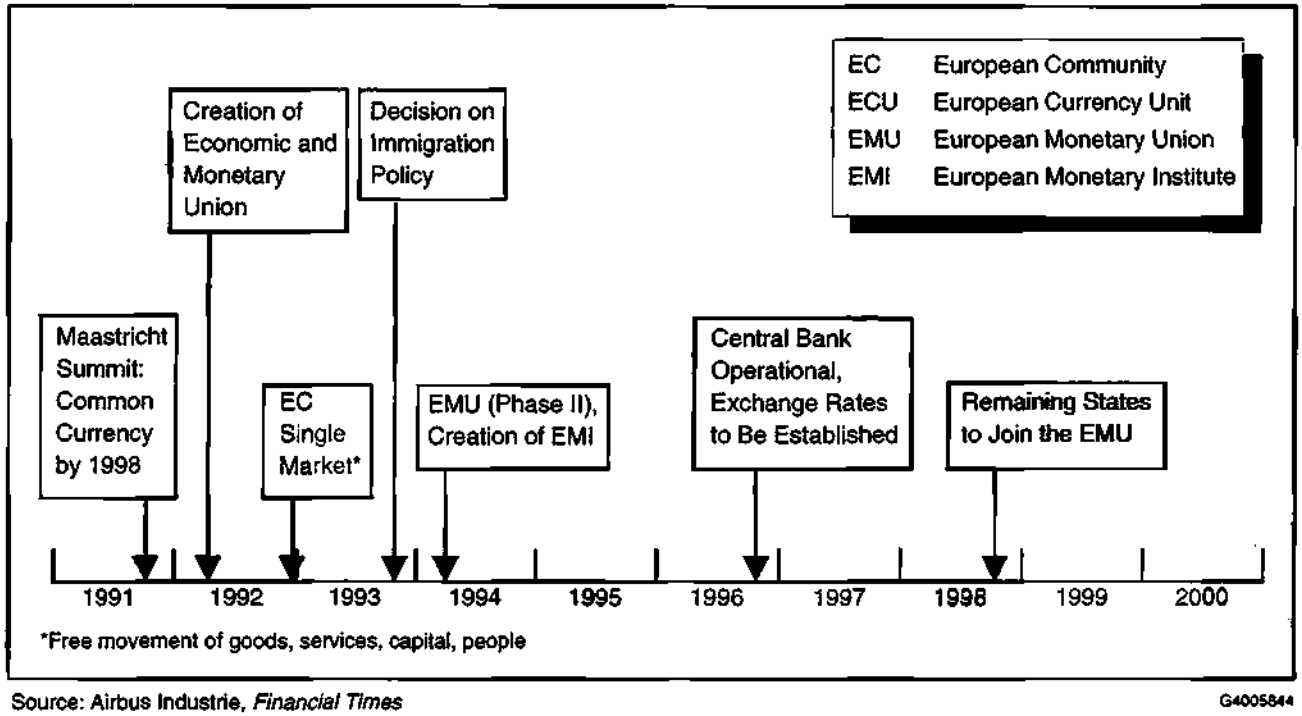
Figure 3-1
The European Community Timetable



Source: Airbus Industrie, *Financial Times* G4005844

only just begun. Europe's dependence on the German recovery will make it difficult for the rest of Europe to return to high growth. Also, despite the upbeat message from the IMF, manufacturing investment intentions across most of Europe show a further fall after last year's sharp decline. A strong upswing will require a substantial recovery in overall corporate profitability. There is still much work to be done in restraining budget deficits and reforming labor markets. The continuing high deficits in the public sectors of the industrialized nations have contributed to declining investment in many countries. Unemployment, which is Europe's big problem, will need fundamental labor market reforms. More liberalization of markets is needed. Exports will play an important role in a general economic recovery in Europe, and the signs for this are good as the Pacific Rim countries and China step up investment.

Looking at the emerging markets of central and eastern Europe, it becomes evident that those former communist countries such as the Baltic states, the Czech Republic, Hungary, Poland, the Slovak Republic, and Slovenia, that implemented market reforms are now growing or appear to be on the threshold of recovery, and prospects for continued growth are good. Enormous difficulties must still be faced over structural reform in, for example, Russia and the Ukraine, where output remains in severe decline, and it may well be a further two years before the decline there bottoms out.

Following are a set of figures showing the major economic indicators for the various European countries (see Figures 3-2, 3-3, 3-4, 3-5, and 3-6).

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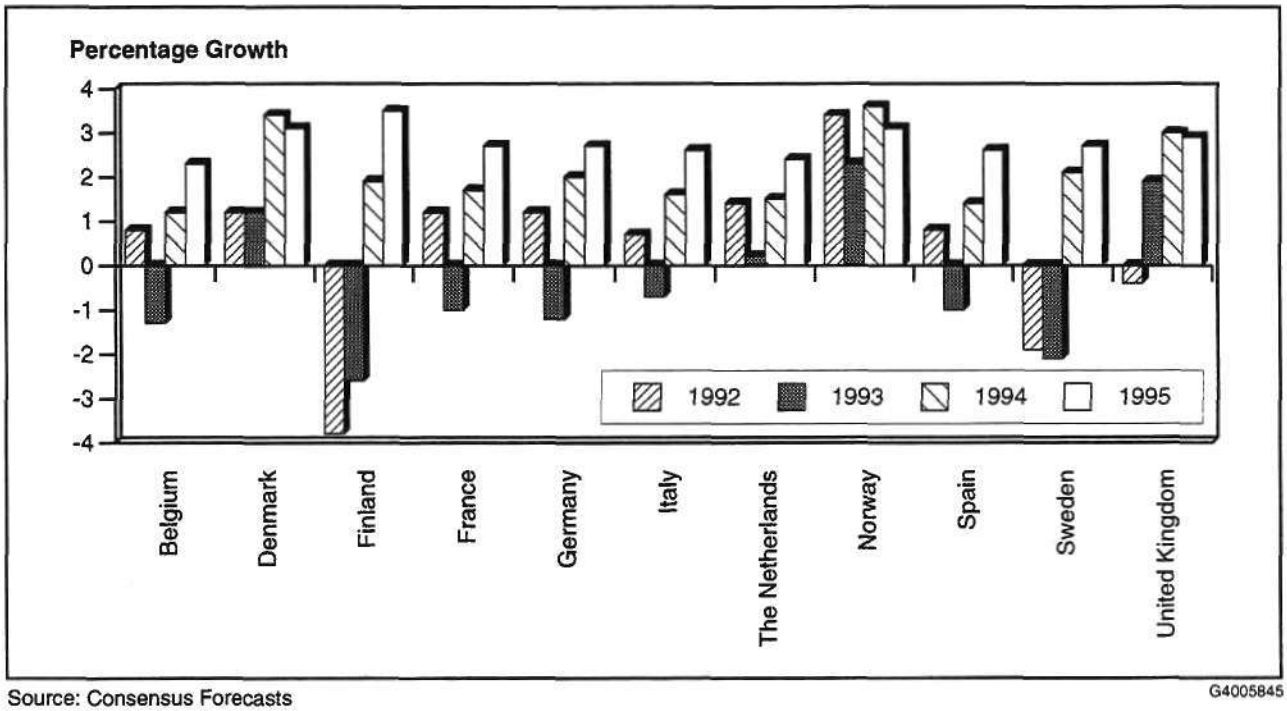
Figure 3-2
GDP Growth by European Country



Source: Consensus Forecasts

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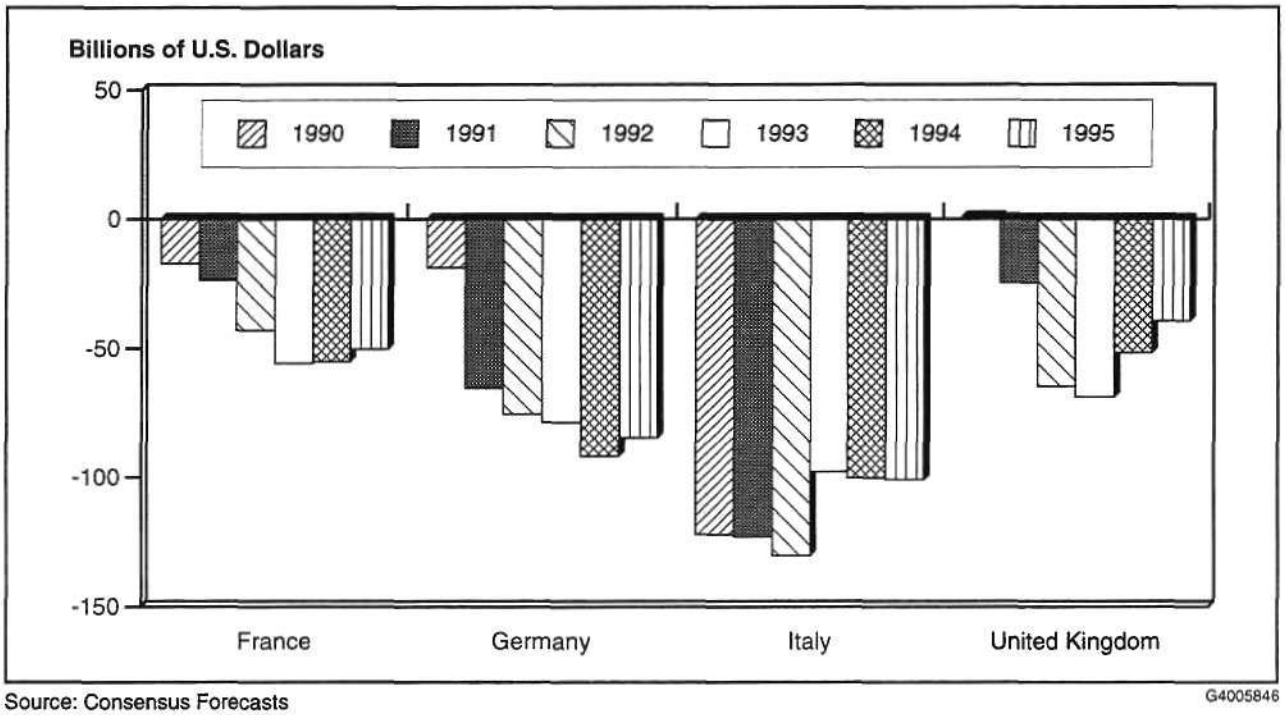
Figure 3-3
Government Budget Balance



Source: Consensus Forecasts

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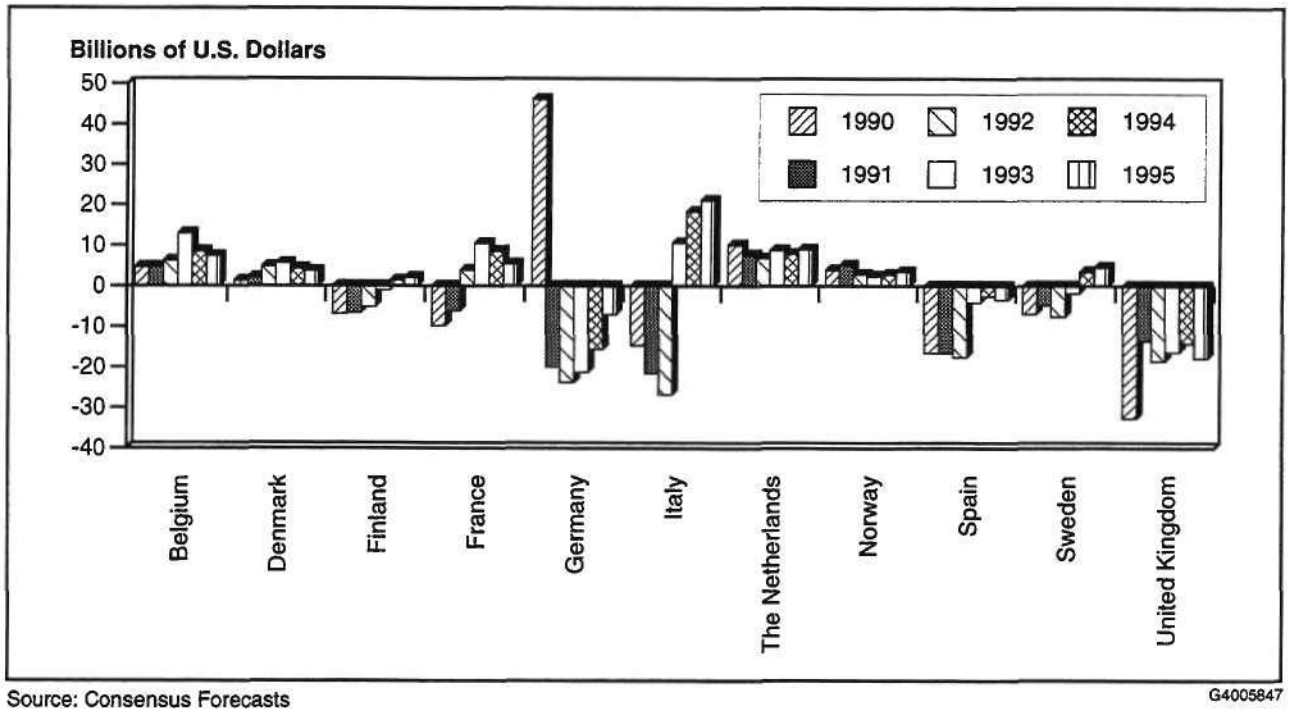
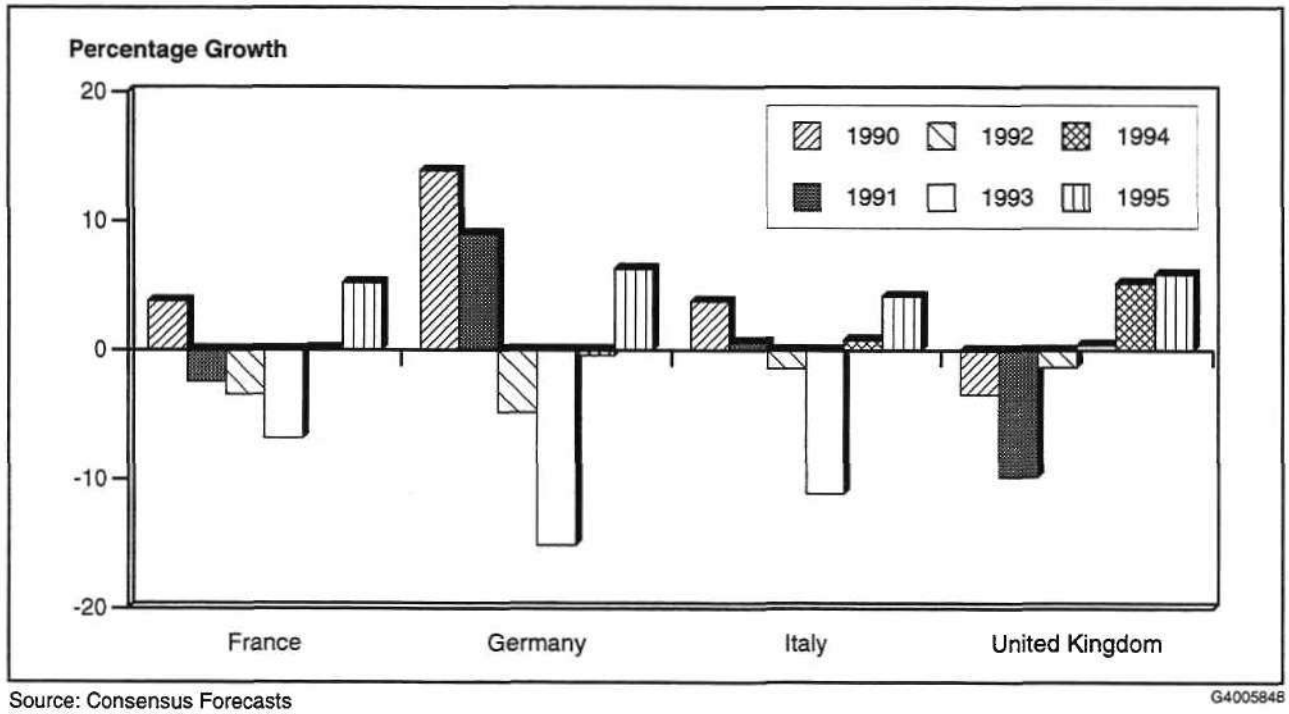
Figure 3-4
Current Account by European Country



Source: Consensus Forecasts G4005847

Figure 3-5
Business Investment by European Country



Source: Consensus Forecasts G4005848

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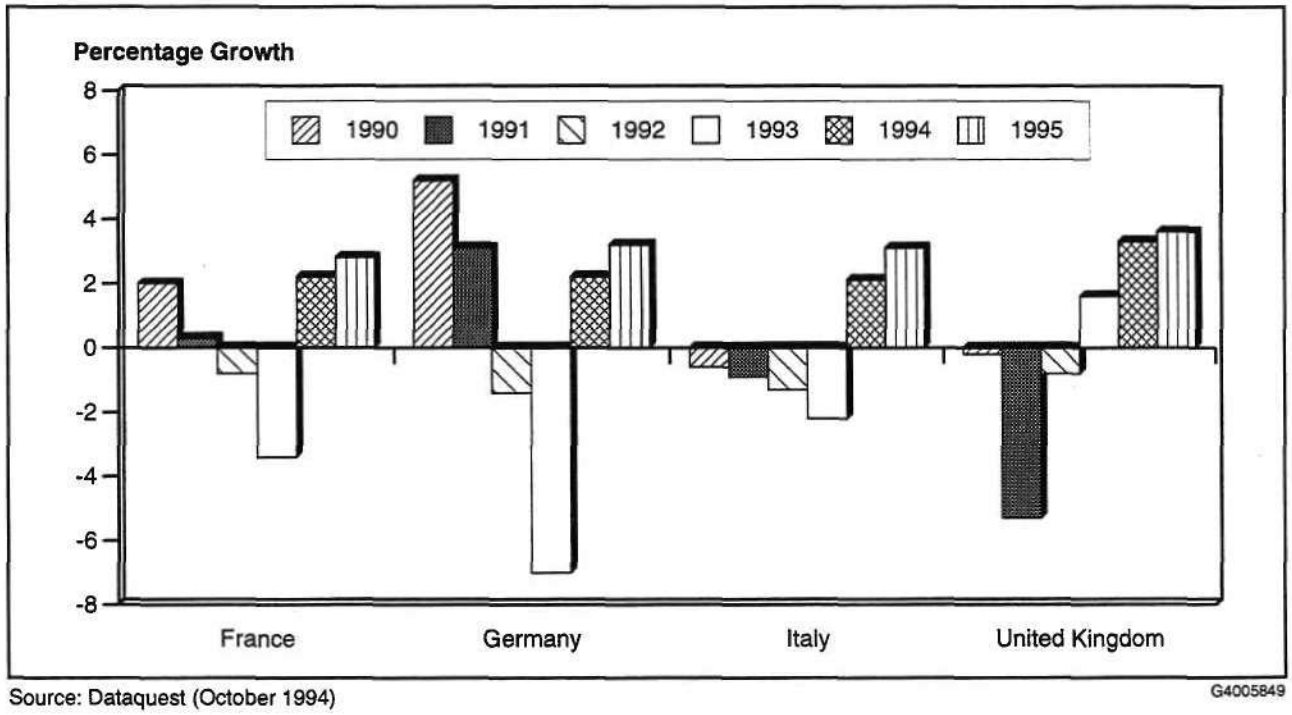
Figure 3-6
Industrial Production by European Country



Source: Dataquest (October 1994)

European End-User Industries

Since 1992, all the major European end-user industries have been undergoing profound changes that have had a significant effect on the growth rates for the various applications of the CAD/CAM/CAE/GIS industry. The following bullet points and accompanying figures provide a snapshot of what has happened in these end-user industries:

- Like the industry worldwide, the aerospace sector was hit by the coincidence of a sharp recession in civil aviation and drastic cuts in defense spending, as governments sought to reap the dividends of the end of the Cold War. Europe could lose its access to a vast area of vital high technology if it allows the aerospace sector to be marginalized. European governments must be prepared to back the industry with indirect support—through defense spending and subsidies for research and development—as the U.S. government does for its aerospace manufacturers.
- The electronics industry, from computers to semiconductors to consumer electronics, is troubled.
- The state of the German economy has brought its machine tools industry to a complete halt. However, we do expect to see somewhat better results in 1994 and a recovery in this sector in 1995.

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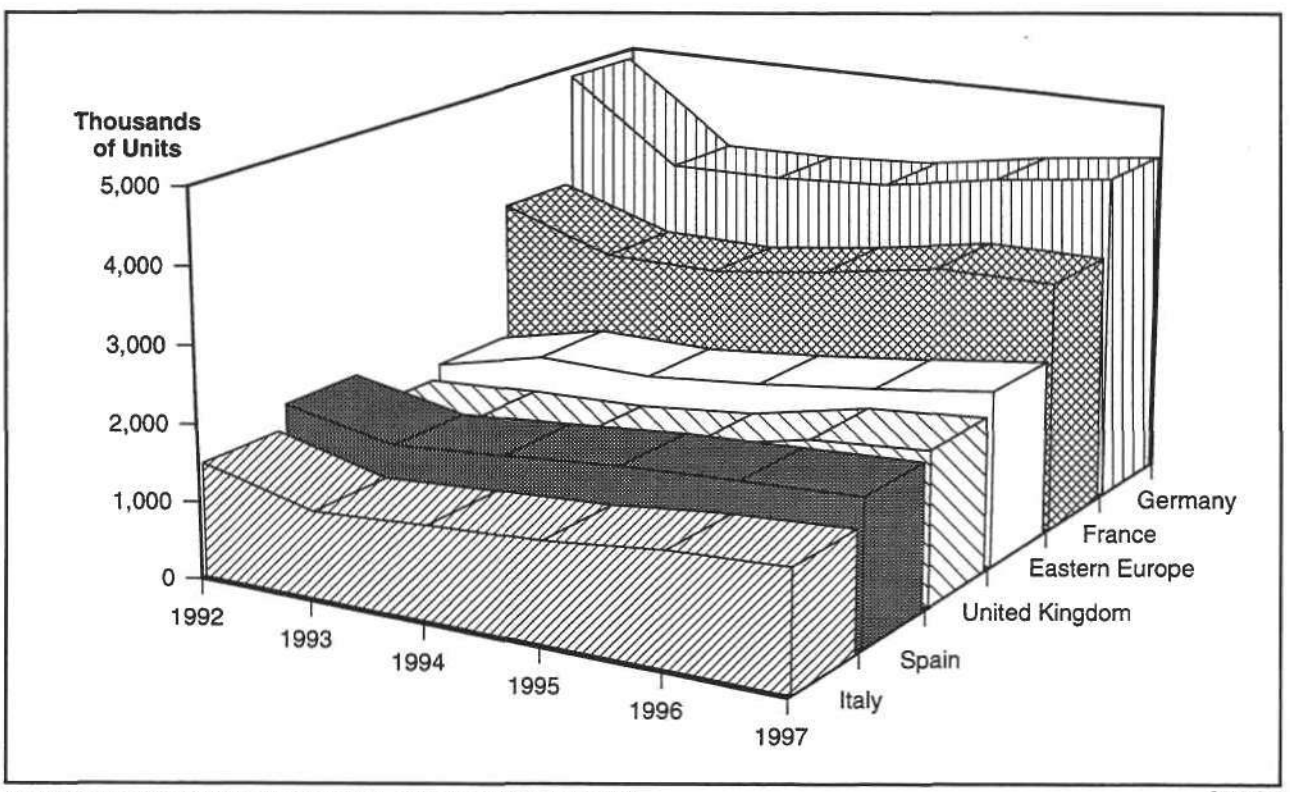
- Power-generating equipment producers are currently prospering from growing demand in the western world for new, cleaner generating methods. In eastern Europe, there is likely to be plenty of work for western companies retrofitting Soviet-designed nuclear power stations. The heavy capital investment required to rebuild eastern Europe's industries and businesses, along with the continuing investment need in western Europe, should get the machinery sector moving.
- The transportation industry in Europe offers good growth potential for CAD/CAM/CAE/GIS tools. The overstretched road network in most European regions needs sorting out, and the railway industry in particular is undergoing a renaissance.
- The automotive industry suffered from recession in the U.S. and European markets as well as from mounting Japanese competition. Markets in countries such as Germany, France, Italy, and Spain were hit by plunging sales during 1993, while the United Kingdom showed a small upturn. Figures for 1994 are expected to be somewhat better, with a sharper increase to follow in 1995 (see Figures 3-7 and 3-8).
- The building/construction industry in Europe is in deep recession, with the exception of Germany, where this industry is benefiting from the effects of reunification (see Figure 3-9).

Figure 3-7
European Car and Production Forecast



Source: DRI World Automotive Forecast, Dataquest (October 1994)

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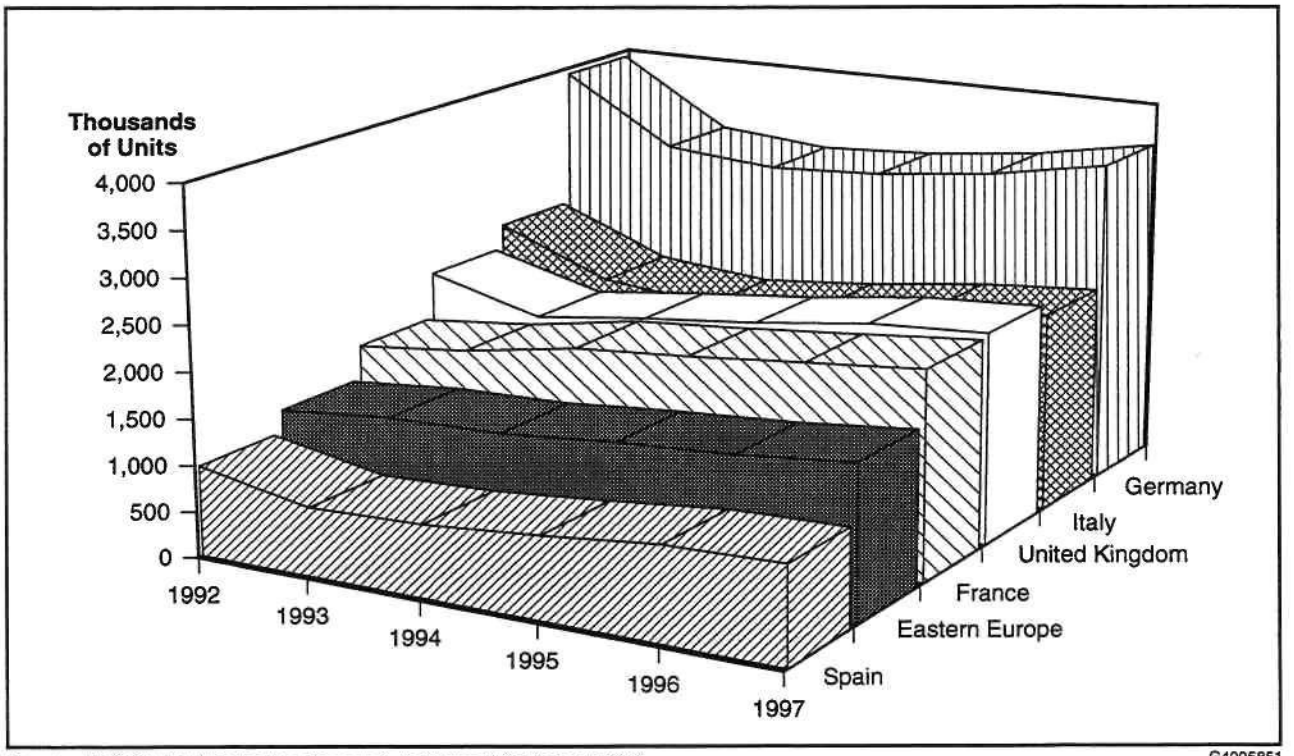
Figure 3-8
European New Car Sales Forecast



Source: DRI World Automotive Forecast, Dataquest (October 1994)

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Eastern Europe

Eastern Europe's conversion to capitalism has been immense, with the removal of communist regimes and the introduction of privatization, but political strife is smoldering everywhere. The eastern countries are heavily in debt, and this will take some time to correct and will cause instability. The entire region is vulnerable to all of the international banking whims. Also, the strength of the single market has caused nonmembers to conform to many of the de facto standards set up by the members, and this enables nonmembers to trade with members. However, conforming is difficult for the central and eastern European countries at such an early stage in their metamorphosis from centralized planning to a market-driven economy, and the varying economies of each European country also makes unity difficult.

The situation in this part of Europe is turbulent and changing almost daily as these countries gradually open up to international markets and competition. Infrastructure developments are given a very high priority, with telecommunications equipment receiving a greater emphasis than most other developments.

High-technology trade restrictions are no longer preventing the sale of satellite equipment, computers, chips, plant equipment, and so on. The dissolving of the Co-ordinating Committee for Multilateral Export

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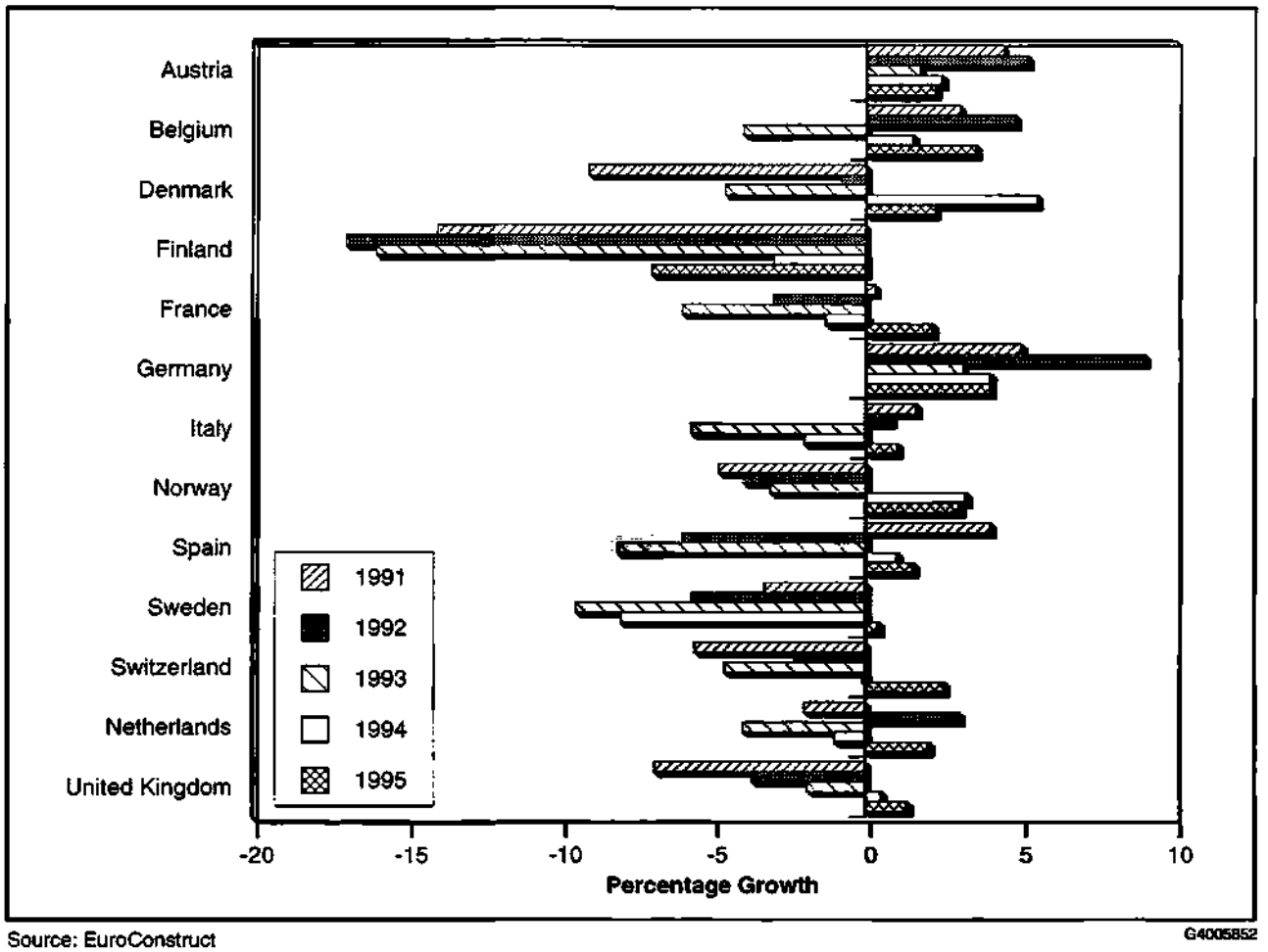
Figure 3-9
Building/Construction Industry Forecast



Source: EuroConstruct

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Control (CoCom) earlier this year was the final step in an already accelerating process that stripped away virtually all remaining controlled exports. Trade restrictions were one of the major barriers for investment. Perhaps most important, these developments would have been impossible were it not for the speed at which organizations are maturing as businesses. Local companies are now taking on a greater degree of managerial and financial responsibility, which makes the organization of true joint ventures more realistic. This is partly because of the growing number of people who have experience in the west and who have some training in western management styles.

There may be considerable economic problems in central and eastern Europe, but there is certainly no shortage of optimism there. This is definitely one of the major future growth areas for CAD/CAM tools. Privatization and the formation of new companies are key drivers in this region. Financing can be found, especially for public and large-scale infrastructure projects. Telecom is a critical need in this part of the world, and the development of industry will follow. High-quality international and

intercity telecommunications links already exist via high-speed digital optical fiber links. Now only the cities themselves need to be modernized.

The region is very much a Windows-based market, but piracy has been a big problem. Many suppliers have preferred to supply customized software rather than packages to overcome piracy problems. Overall, some eight illegal copies of software exist for every legal copy, but this is changing now that a legal framework exists. There are now channels consisting of sophisticated distributors and value-added resellers (VARs). Computer 2000 and Autodesk have pioneered market entry into some of these countries.

The size of these countries, measured both in square kilometers and in population, varies enormously, as does the time scale over which the country will become developed as a market for high-tech goods such as CAD/CAM/CAE/GIS products.

Central European countries emerged first from the eastern bloc. These are the countries that offer the greatest short-term opportunities.

Sources used for this report include the following:

- Financial Times
- Consensus Forecasts
- EuroConstruct
- DRI World Automotive Forecast
- World Bank
- OECD
- IMF
- DTI
- Barclays Bank
- EBRD

Dollar Exchange Rate

Dataquest does not forecast exchange rates, but we do use the best information available. We assume that the June 1994 exchange rate will continue in the future. The annual exchange rate is the arithmetic mean of the 12-month exchange rate, assuming the June exchange rate for the remainder of the year. Since March 1994, the U.S. dollar has weakened against most foreign currencies, so the same growth abroad in March translates into inflated growth in the U.S. dollar in June. Table 3-1 provides the currency exchange rates used for our 1993 market share and for our forecasts.

Compared with the weakening of the dollar in 1994, the dollar appreciated against all European currencies throughout 1993. This has shown a corresponding decrease in the growth of the European CAD/CAM/CAE/GIS markets. Table 3-1 highlights the effect that the fluctuations in the dollar exchange rate had on the results of European CAD/CAM/CAE/GIS vendors. Most U.S.-based vendors report to us in dollars using their own internal conversion rate, which is fixed for several years.

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Table 3-1
Exchange Rates

		Actual				Year-to-Year Change (%)		
Country	Currency	1990	1991	1992	1993	1990-1991	1991-1992	1992-1993
Austria	Schilling	0.088	0.088	0.092	0.086	-0.2	4.1	-6.2
Belgium	Franc	0.03	0.029	0.031	0.029	-2.1	6.5	-7.7
Denmark	Krone	0.162	0.157	0.167	0.154	-3.2	6.2	-7.4
Finland	Markka	0.262	0.248	0.226	0.175	-5.3	-9.0	-22.7
France	Franc	0.184	0.178	0.19	0.177	-3.4	6.9	-7.2
Germany	D-Mark	0.621	0.605	0.645	0.605	-2.5	6.5	-6.2
Italy	Lira	8E-04	8E-04	8E-04	6E-04	-3.2	1.2	-22.5
Netherlands	Guilder	0.551	0.537	0.573	0.539	-2.5	6.6	-5.9
Norway	Krone	0.16	0.155	0.162	0.141	-3.5	4.8	-13.1
Spain	Peseta	0.01	0.01	0.01	0.008	-1.7	-0.1	-20.6
Sweden	Krona	0.169	0.166	0.173	0.128	-2.0	4.4	-25.9
Switzerland	Franc	0.724	0.7	0.718	0.676	-3.3	2.6	-5.9
United Kingdom	Pound	1.786	1.767	1.769	1.5	-1.0	0.1	-15.2
Europe Average	ECU	NM	1.238	1.301	1.167	NM	5.1	-10.3

NM = Not meaningful
Source: Dataquest (October 1994)

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Chapter 4
Market Analysis

The European CAD/CAM/CAE/GIS Market

Europe comprises many countries, each with unique market characteristics. Europe accounts for 33 percent of the world's total CAD/CAM/CAE/GIS product sales and 32 percent of software sales for 1993. Overall, the European CAD/CAM/CAE/GIS market dropped 5.6 percent in 1993, falling to $5.4 billion in total factory revenue. Software revenue dropped 5 percent to $1.6 billion. Currency fluctuations are complicating the picture. The dollar appreciated strongly against European currencies in 1993, which had a big negative impact on growth in the European countries (see Table 3-1). Calculating the European revenue in European Currency Units (ECU), the market actually showed positive growth: 5.2 percent for total revenue and 5.8 percent for software revenue.

Each European country represents a different market, requirements, languages, and so on. This makes it more difficult, slower, and more expensive for vendors to sell products in Europe—and that means that these markets mature more slowly in Europe. Figures 4-1 and 4-2 provide a look at the activities in the European CAD/CAM/CAE/GIS software industry, indicating market size and market growth rate for each segment and each European region. In Figure 4-1, as well as the remaining software market portfolios throughout this document, the heavy horizontal line indicates the industry average for software revenue growth; the positions of the bubbles indicate their segment or regional growth rates (x-axis) and segment or regional sizes (y-axis) for 1993. Growth is shown in local currency terms for CAD/CAM/CAE/GIS in Europe by region and application. To enable comparison between the regions, the actual market sizes in Figure 4-1 are given in U.S. dollars. The remaining software market portfolios show the individual market sizes in local currency.

Of the total European CAD/CAM/CAE/GIS software revenue, U.S.-based vendors had 64 percent and European vendors 36 percent in 1993. This indicates a gain of market share for U.S.-based vendor over 1992, when the distribution was 63.1 percent for U.S.-based vendors versus 36.8 percent for European vendors; the Asian vendors' share was negligible. However, when looking at this distribution we have to remember that several of the products sold by U.S.-based vendors are actually developed in Europe. The leading example of this is the CATIA system, developed by Dassault Systemes, for which IBM has the sole distribution rights. Other examples include Computervision's Medusa product, HP's Precision Engineering products, GDS, and the solid modelers Acis and Parasolids.

The share of European vendors is declining for many reasons. First, it is much more difficult to find venture capital or other start-up funding in many countries of Europe than it is in North America. Much of the U.S. CAD/CAM/CAE/GIS industry is driven by people leaving one company

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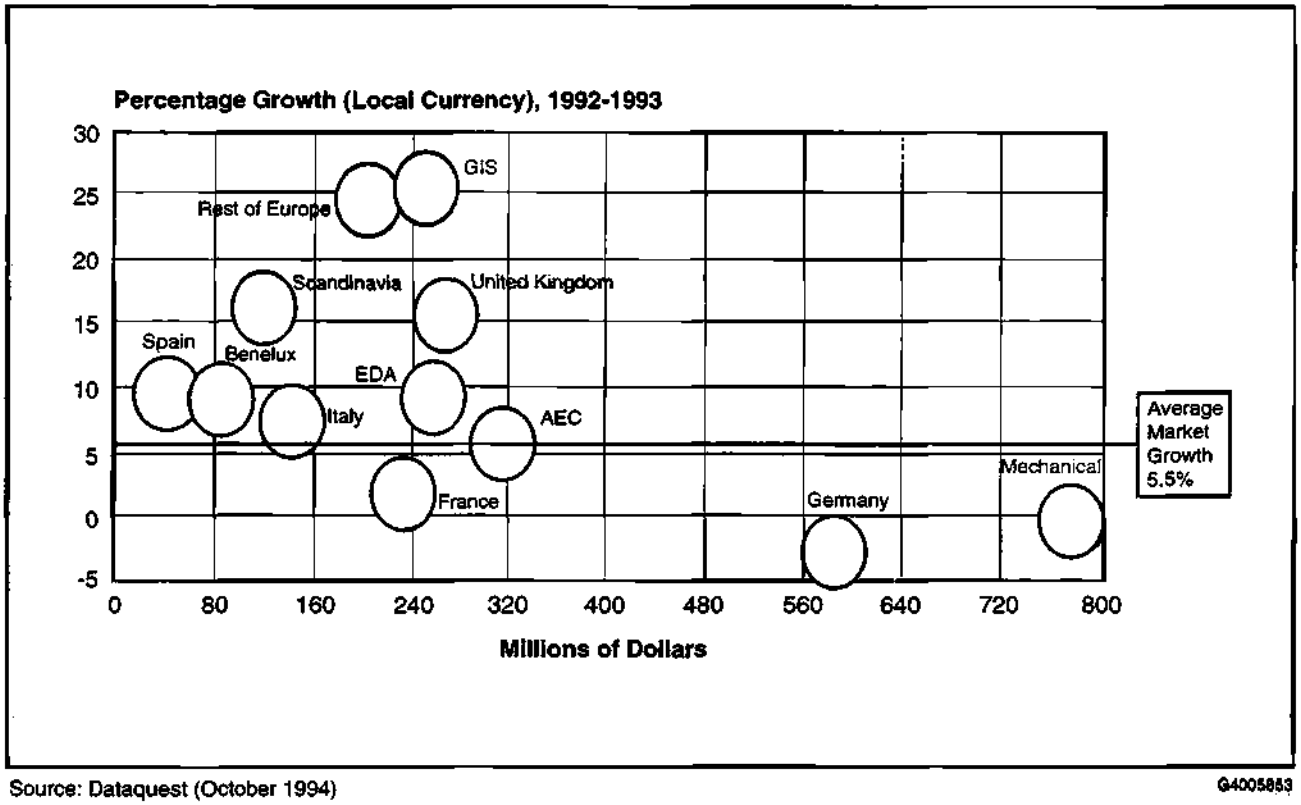
Figure 4-1
1993 European CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (October 1994) G4005853

and starting a new company with new ideas. These start-ups often include veterans of the vendor and user companies. This happens to a greater extent in the United States because of the critical mass and partnership situation that exists there. Marketing is another issue, and many European companies are extremely reluctant to invest in the right kinds of marketing organizations. Marketing, market research, and press relations all cost money, and companies must be prepared to pay for these things. A third factor is that many European vendors operate only in their country of origin and one or two other countries, and these vendors have suffered. Operating in a comparatively small region does not generate enough revenue to keep up the R&D investment necessary to continue to produce competitive products.

The main reasons for the reduced growth rates experienced in Europe throughout 1993 were the continuing recessionary climate in most European countries, a decline in the manufacturing industry followed by a rapid decline in hardware prices, and the repositioning of major CAD vendors like Computervision from turnkey to software vendors.

Dataquest expects the European CAD/CAM/CAE/GIS market to show relatively low growth again in 1994: 4 percent in total revenue and 7.6 percent in software revenue. We expect the market to return to somewhat higher growth in 1995. Until 1998, we anticipate a compound annual growth rate (CAGR) of 5 percent for total CAD/CAM/CAE/GIS revenue and a 7 percent CAGR for software revenue (see Figure 4-3).

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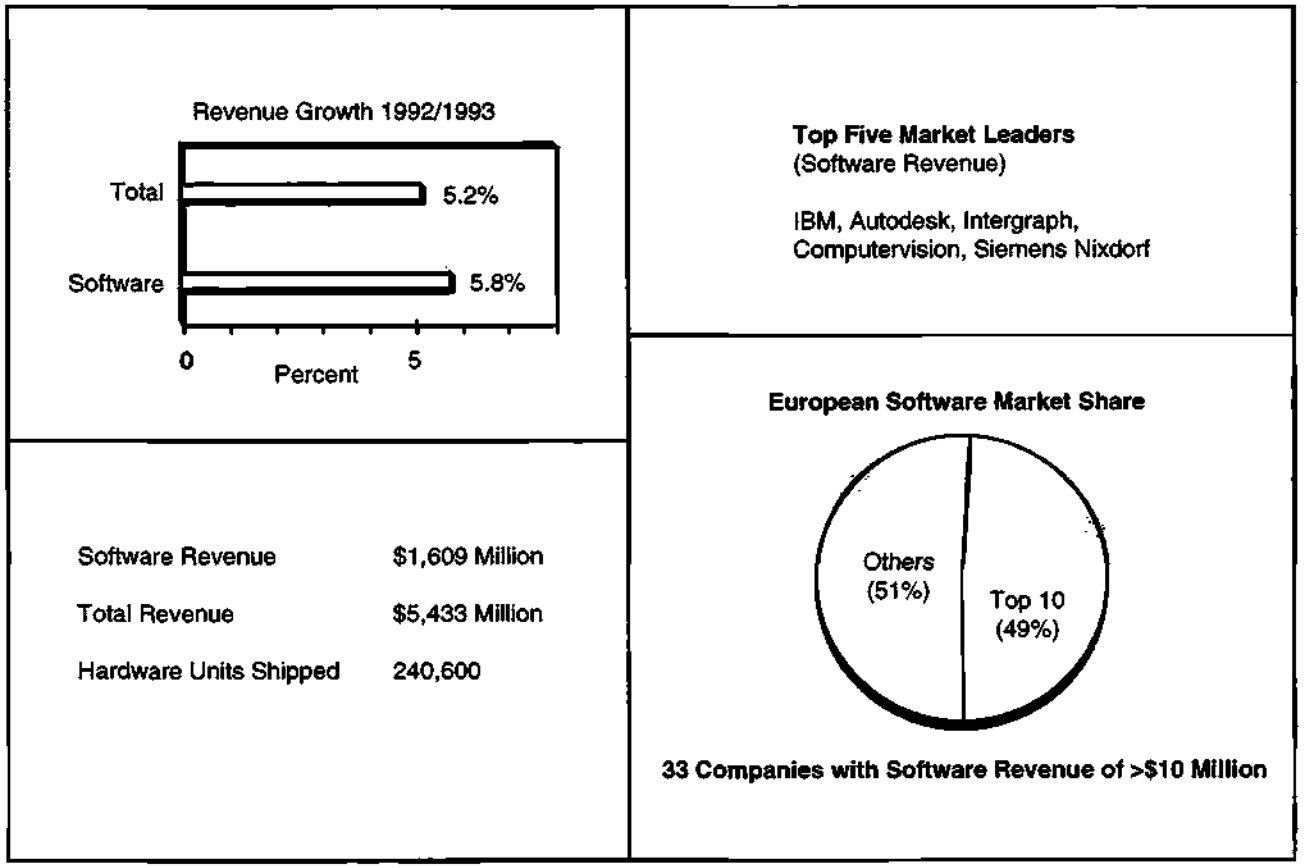
Figure 4-2
European CAD/CAM/CAE/GIS Market Snapshot



Source: Dataquest (October 1994) G4005854

In terms of market share, the position of the top 10 CAD/CAM/CAE/GIS software vendors changed somewhat from 1992. As a group, these top vendors lost market share and accounted for only 49 percent of the total European software revenue, compared with 51 percent in 1992. New entrants among the top 10—and growing high above the market average—were Nemetschek and Parametric Technology, which replaced SDRC and Mentor Graphics (see Table 4-1). Many of the large vendors suffered lower growth, especially because these companies tended to focus on key accounts. As these large accounts deferred purchases, it became vital for the vendors to look to smaller companies for business. However, some vendors have little or no experience in selling to small and medium-size companies, and this lack of experience posed a big problem.

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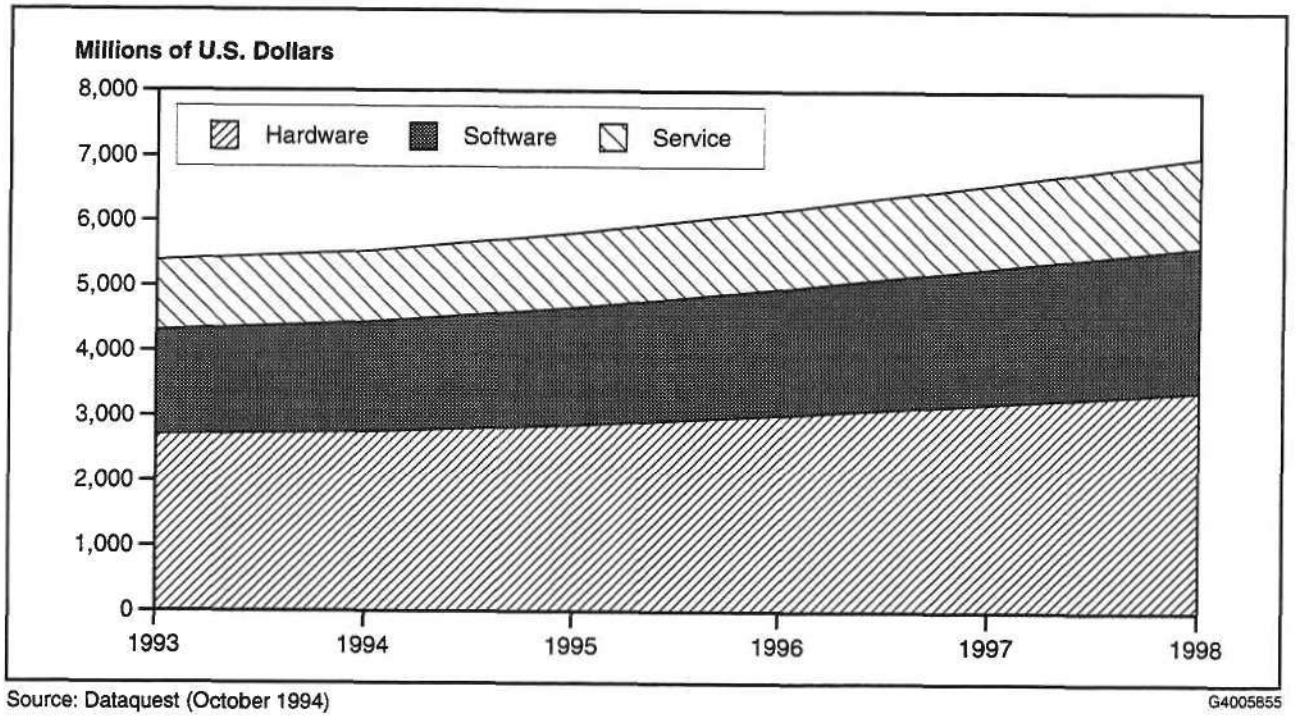
Figure 4-3
European CAD/CAM/CAE/GIS Forecast by Component



Source: Dataquest (October 1994) G4005855

Table 4-1
Top 10 CAD/CAM/CAE/GIS Software Vendors' Size and Growth in Europe

Ranking 1993	Company	1993 ($M)	Growth (%)	Ranking 1992
1	IBM	156.9	2.06	1
2	Autodesk	132.2	3.87	3
3	Intergraph	113.2	-4.0	4
4	Computervision	96.4	-35.9	2
5	Siemens Nixdorf Informationssysteme	63.4	-30.1	5
6	Cadence	46.6	-14.9	6
7	Hewlett-Packard	45.0	-11.4	7
8	Nemetschek	44.7	37.6	11
9	Matra Datavision	43.6	0.1	9
10	Parametric Technology	40.4	122.9	17
	Top 10 Companies	782.1	0.1	
	All Companies	1,608.9	5.9	

Source: Dataquest (October 1994)

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CAD/CAM/CAE/GIS Forecast Assumptions

The following is a list of assumptions we used to arrive at the overall growth figures for the CAD/CAM/CAE/GIS market until 1998.

Technology

Computing performance is continuing to improve at an exponential rate. The resulting technological improvements drive further demand for improved software solutions.

Indispensability

As complexity increases in both the design and the design process, the benefits of automation improve dramatically. This, coupled with market pressures to produce higher quality products and to reduce cycle time, is making CAD/CAM/CAE/GIS a necessity.

Late Buyers

A significant pool of untapped users still exists in mechanical, AEC, and GIS applications, driving additional growth. These conservative buyers will favor market leaders and installed systems for compatibility. For vendors, therefore, the value of high market share and customer satisfaction will increase.

Desktop Dominance

The turf war for desktop dominance is building steam with the introduction of the Pentium chip and Windows NT, which will fight to take market share from the higher-priced, multiple UNIX operating systems with RISC technology. The decline of host-dependent systems is also continuing, with replacements going to networked, desktop systems. Vendors whose business models depend on high-priced workstations are threatened by these powerful new PCs. At the same time, the replacement of host systems provides them with opportunity for growth.

Unbundling of Software

Software vendors are porting to multiple platforms. The market is quickly moving from proprietary to open systems, resulting in a shift from bundled to unbundled software.

Replacement Market

The replacement market is gaining importance, as illustrated by the fact that over 50 percent of all seats sold in 1993 were replacement seats. Over the next five years, owing to the aging installed base of these technical markets, replacements will dominate sales at over 60 percent. Except for the GIS/mapping market, early adoptions are complete.

Mergers and Acquisitions

The continuing lust for market share, the increased demand for better software solutions, and the pressure to develop new channels of distribution are driving a parade of acquisitions and mergers.

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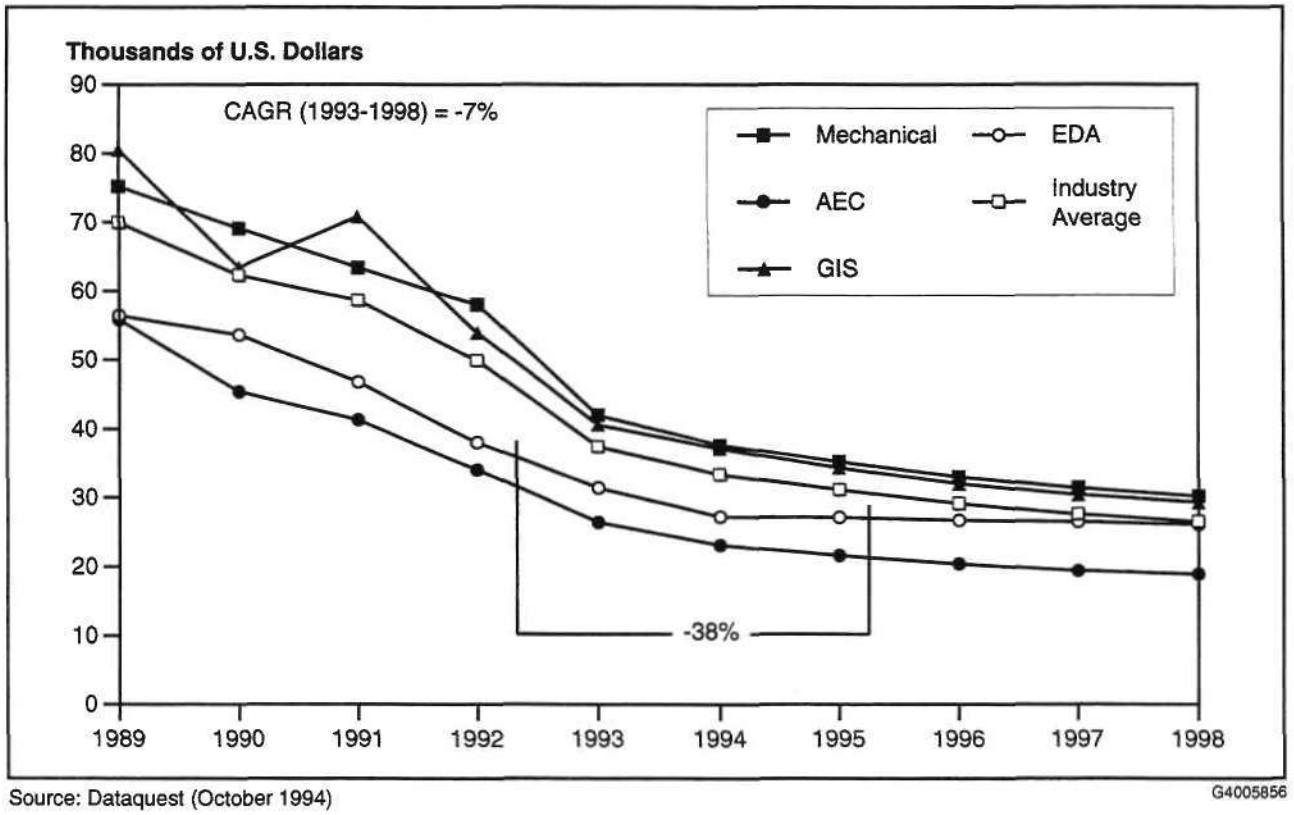
Average Selling Price

The average price per CAD/CAM/CAE/GIS seat continued to fall in 1993 (see Figure 4-4). Over the last five years, the average seat price for a turnkey system declined by 14 percent compounded annually. Dataquest forecasts that the average turnkey system seat price in Europe will decline by a further 7 percent compounded annually to $26,500 in 1998 from $37,400 in 1993. This means that vendors will have to sell more than 12 percent more systems to maintain 1994 revenue at the 1993 level, a difficult task in the current economic climate.

European Service Revenue

We have also seen, as with some other parts of the world, a reduction in service revenue—in spite of the fact that we now include consulting firms and other professional services in this figure. This reduction is a result of several factors, including improved reliability of software, less-frequent software updates, a more educated and experienced user base, and short-term waivers of maintenance charges.

Figure 4-4
Average CAD/CAM/CAE/GIS Seat Price for Turnkey Systems



Source: Dataquest (October 1994)

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Changing Distribution Models

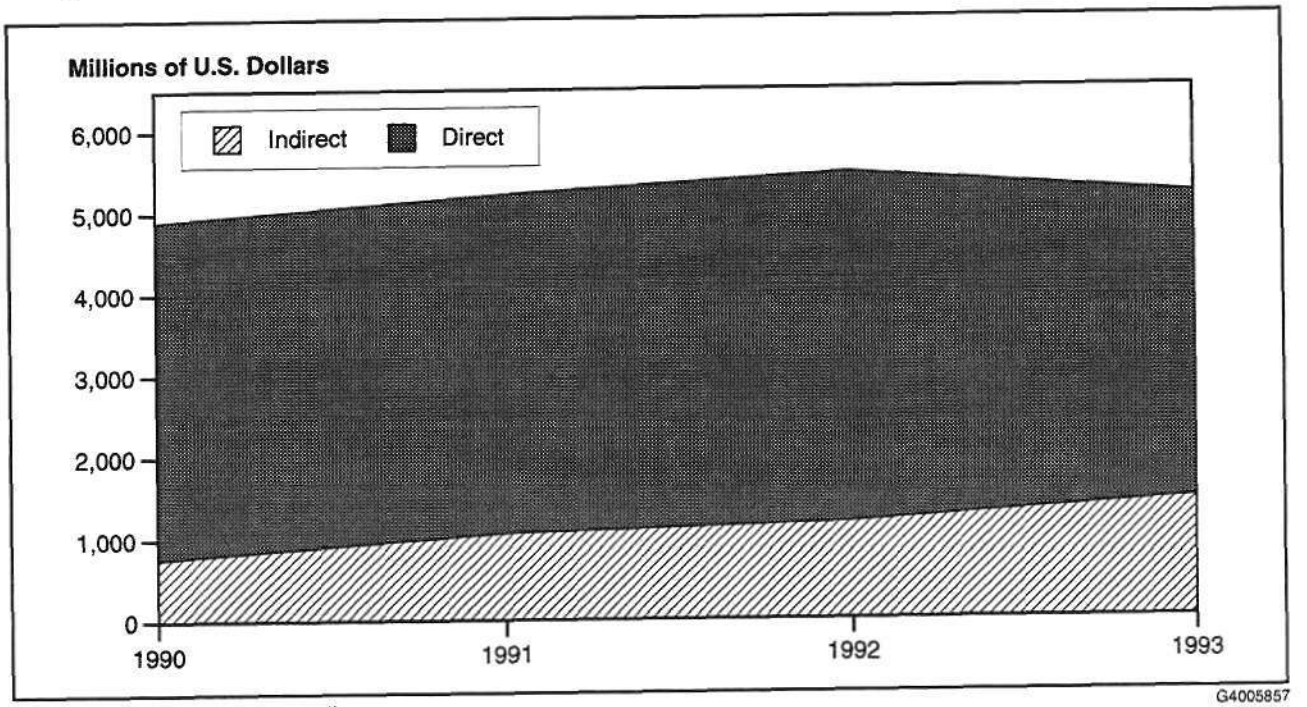
Because Europe comprises a number of separate countries, each with its own language and culture, distribution and support become key issues. It is not possible to emulate a typical U.S. situation and install a single toll-free number as a support hotline for the whole of Europe. Support must be closer to the customer. Each country needs its own sales and support office staffed with people speaking the local language. For that reason, it costs more to do business in Europe.

In general, most vendors (certainly the larger ones) use a direct sales force to reach large companies within the larger markets, and indirect channels (dealers and distributors) to reach smaller companies in more distributed, fragmented markets.

These distribution efforts resulted in a 13 percent decline through direct channels in 1993 and 23 percent growth through indirect channels (see Figure 4-5). It is true that direct channels offer greater margins when the business is available, but they are also where the greatest costs can be found.

This slowdown of the direct channel reflects the relative saturation and retrenchment of large companies.

Figure 4-5
European CAD/CAM/CAE/GIS Revenue: Direct versus Indirect Sales Channels



Source: Dataquest (October 1994)

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Quite a number of small VARs have been making good business out of combining in-house software with tools from several sources and selling the solutions to small and medium-size companies.

A myriad of small companies in Europe are involved in mechanical, electronic, and architectural design. These companies do not have big budgets and they represent a very fragmented market that is expensive to penetrate. The cost of sales as a percentage of the sale value is much higher than selling to a big company.

The requirements of many small companies are quite different than those of large companies. Small companies do not have internal CAD/CAM/CAE support groups, so they need good local support. They often provide subassemblies to larger companies and therefore need to demonstrate compatibility with the larger companies' CAD/CAM/CAE tools.

These small companies offer advantages to the CAD/CAM/CAE vendor. The small-company sector is less penetrated than the large company sector, so the market is wide open for all kinds of tool sales. And many of the larger companies have been hit the hardest by recession. These large companies have more tools than they know what to do with, and they are cutting costs, laying off employees, and restructuring.

Also, small companies may have difficulty finding money, but there is much less bureaucracy involved in getting them to spend that money. If it makes sense for the business, the company will find the money. Large companies are much less flexible in their financing.

Major Market Segments

Following is a brief analysis of the CAD/CAM/CAE/GIS market in Europe by application. Because the drivers for each of these applications differ, depending on regional, economic, and cultural differences, it is more meaningful to analyze these drivers on a regional level. (Appendix A highlights leading vendors in the various European regions in terms of total revenue and software revenue.)

The proportional split of software revenue by application changed in distribution from 1992 to 1993, with actual percentages varying by only 1 percentage point or less from last year's picture or from the general worldwide pattern. Mechanical lost 2 percentage points, and it is expected that the share for mechanical applications will decrease to 42 percent of the total CAD/CAM/CAE/GIS software market by 1998. GIS software gained 2 percentage points over 1992, and its share will increase to 20 percent by 1998. AEC and EDA applications remained almost static and are expected to continue to grow at the average market growth rate until 1998 (see Figure 4-6). In terms of actual software revenue growth based on ECU for the various applications in 1993, the GIS/mapping sector showed a 25.1 percent gain over 1992, followed by EDA applications with 10.3 percent growth. AEC grew 5.4 percent, and mechanical applications decreased by 0.2 percent (see Figure 4-1).

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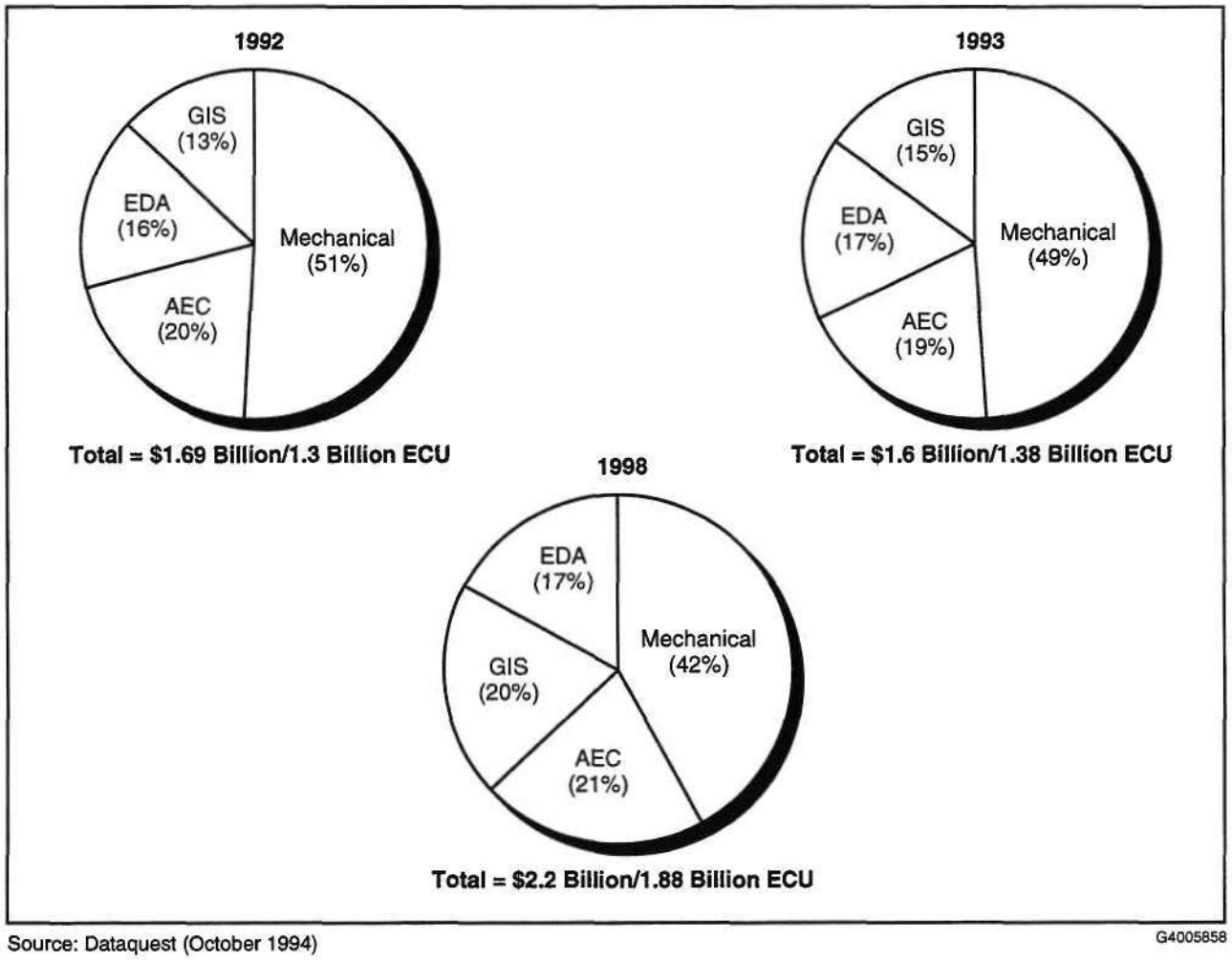
Figure 4-6
Software Revenue Distribution by Application



Source: Dataquest (October 1994) G4005858

Mechanical

The market for mechanical CAD/CAM/CAE software was badly affected during 1993 by the overall economic situation in the manufacturing industry in Europe. The spare capacity generated by the decline in industrial production throughout Europe in 1992 and 1993 resulted in a sharp decline in machinery and equipment investment in the manufacturing industry during this period. The German manufacturing industry in particular, which is the largest consumer of mechanical CAD/CAM/CAE products in Europe, was badly affected, and this dragged down the growth rate of the overall European mechanical CAD/CAM/CAE software market (see Figure 4-7).

Mechanical applications, which totaled $782 million, had a 48.6 percent share of the total European CAD/CAM/CAE/GIS software market in 1993, compared with 51.5 percent in 1992 and 53.9 percent in 1991, and dropped 0.2 percent in software revenue based on ECU in 1993. The top 10 vendors actually grew 2.2 percent and now control 64 percent of this

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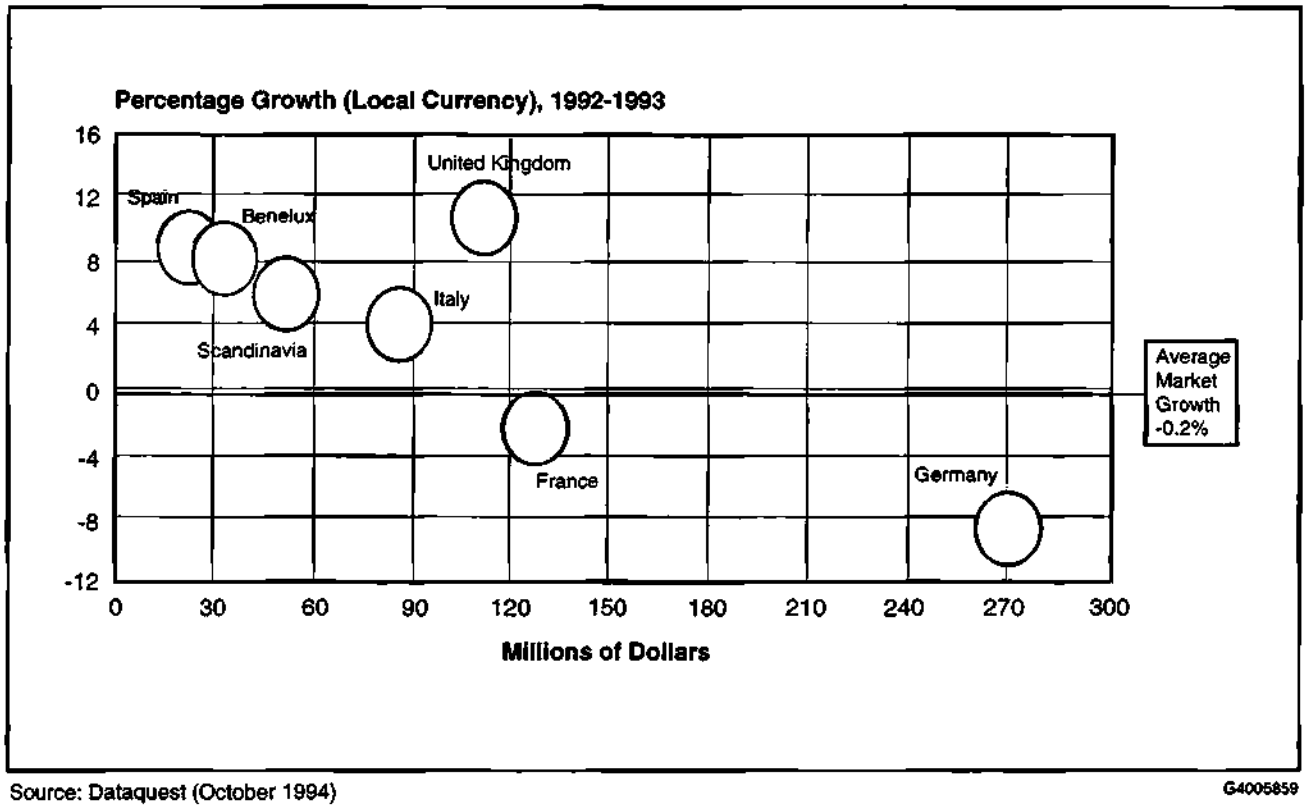
Figure 4-7
1993 European Mechanical CAD/CAM/CAE Software Market Portfolio



Source: Dataquest (October 1994)

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market, compared with 63 percent in 1992 (see Table 4-2). New entrants among the top 10 were Parametric Technology and MacNeal-Schwendler, which made the top 10 list at the expense of Siemens Nixdorf and Applicon. U.S.-based vendors had a 70 percent share of the mechanical CAD/CAM/CAE software market, with European vendors holding the rest. Over the last few years we have seen the share of European vendors decline in favor of U.S.-based vendors. This trend is caused by three factors: U.S. vendors' acquisitions of several European companies (Norsk Data, Isykon product line), local mergers and acquisitions (Straessle acquired Nestler and Fides), and the fact that companies have simply pulled out of this market.

The recovery of the European manufacturing industry, which started again in 1994, will gather momentum in 1995. Overall investment in the manufacturing industry is still somewhat sluggish; however, the pace is expected to accelerate through 1995, which in turn will also give a boost to investment in mechanical CAD/CAM/CAE tools. For 1994 we expect mechanical software revenue to show slight positive results, with growth of 1.3 percent expected. In 1995 growth should accelerate to nearly 5 percent over 1994. The CAGR for software revenue until 1998 will be about 4 percent (see Figure 4-8). Figure 4-9 shows mechanical CAD market growth by European region.

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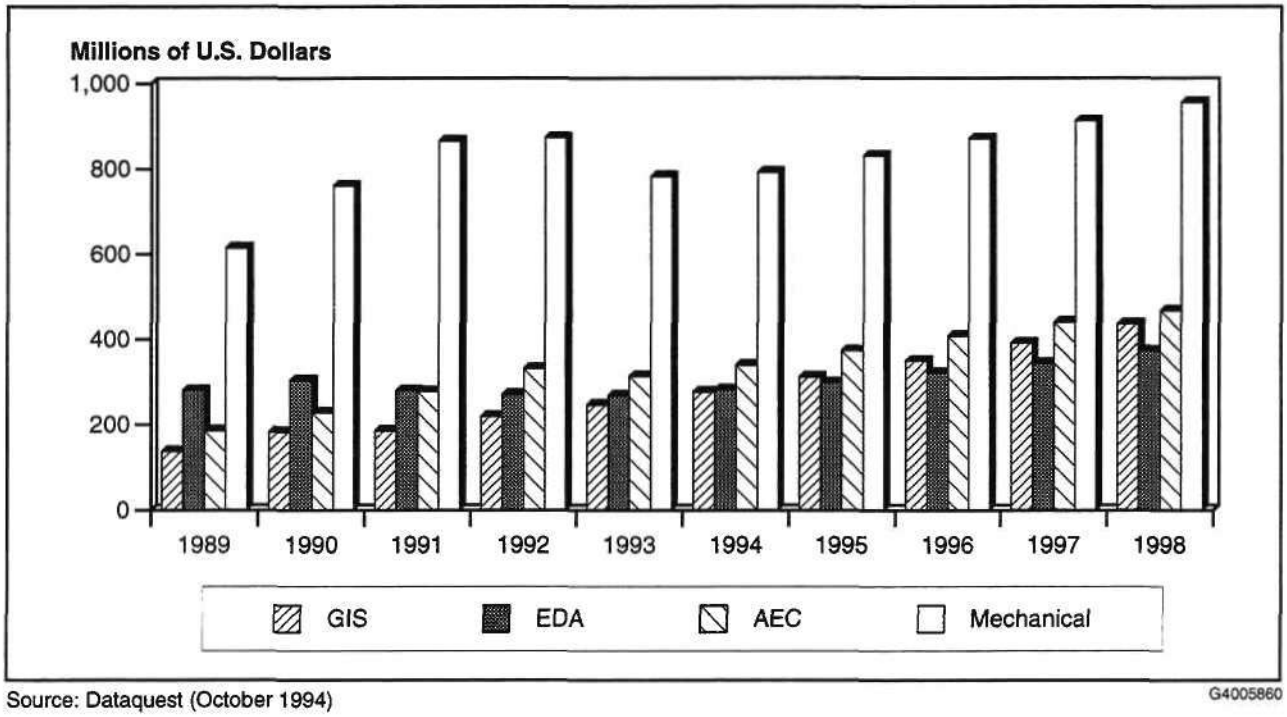
Table 4-2
Top 10 Mechanical CAD/CAM/CAE Software Vendors' Size and Growth

Ranking 1993	Company	1993 ($M)	Growth (%)	Ranking 1992
1	IBM	136.4	4.1	1
2	Computervision	86.3	-32.0	2
3	Autodesk	52.9	3.8	3
4	Matra Datavision	43.1	0.7	5
5	Parametric Technology	40.4	122.9	11
6	Hewlett-Packard	35.8	-15.2	6
7	SDRC	35.0	-24.9	4
8	EDS Unigraphics	33.2	12.6	7
9	MacNeal-Schwendler	20.8	23.5	12
10	Intergraph	19.9	-26.9	9
	Top 10 Companies	503.7	2.2	
	All Companies	782.0	-0.2	

Source: Dataquest (October 1994)

Figure 4-8
European CAD/CAM/CAE/GIS Software Revenue Forecast by Application



Source: Dataquest (October 1994)

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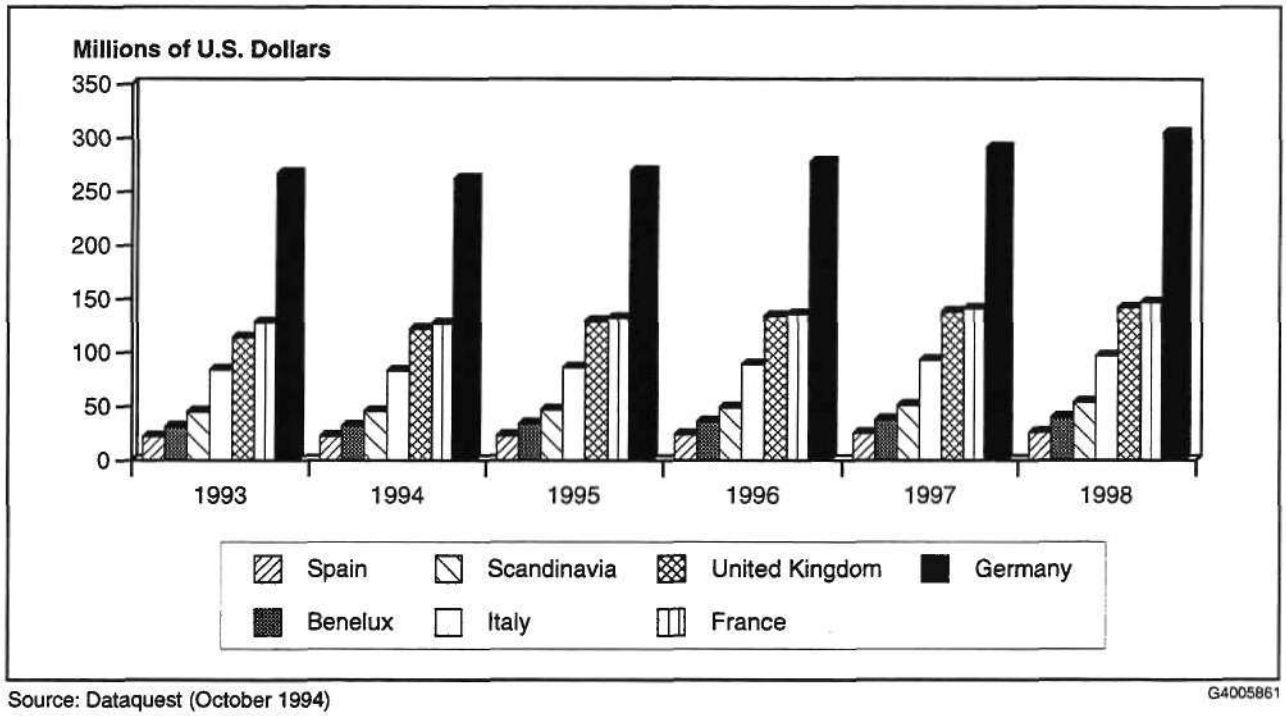
Figure 4-9
European Mechanical CAD/CAM/CAE Software Revenue Forecast by Region



Source: Dataquest (October 1994)

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In general, other factors influencing the performance of the mechanical CAD/CAM/CAE market are the drop in average turnkey system prices of 19 percent based on ECU in 1993, compared with a 16 percent drop in average system price for the overall CAD/CAM/CAE/GIS industry (see Figure 4-4). Also, unlike the other applications segments in the CAD/CAM/CAE/GIS software industry, host-dependent solutions still have a small but significant share of the mechanical software market, and this share is expected to continue to decline. As these host-based installations are replaced with lower-cost software, revenue performance is held down (see Figure 4-10).

An initiative that has the potential to transform the European manufacturing industry came to life at the end of 1993. Advanced Information Technology in Design and Manufacturing (AIT), headed up by Daimler Benz, is intended to strengthen the competitiveness of European key manufacturing industries (automotive, aerospace, component supplier, machine-tools/equipment, and so on). It aims to achieve this goal via two consecutive actions initiated by industry with support of the European Commission. The first is a consensus among the European users and suppliers of information technology (IT) for the most important future requirements on design and manufacturing practice; the second is an IT R&D initiative to support these commonly defined requirements.

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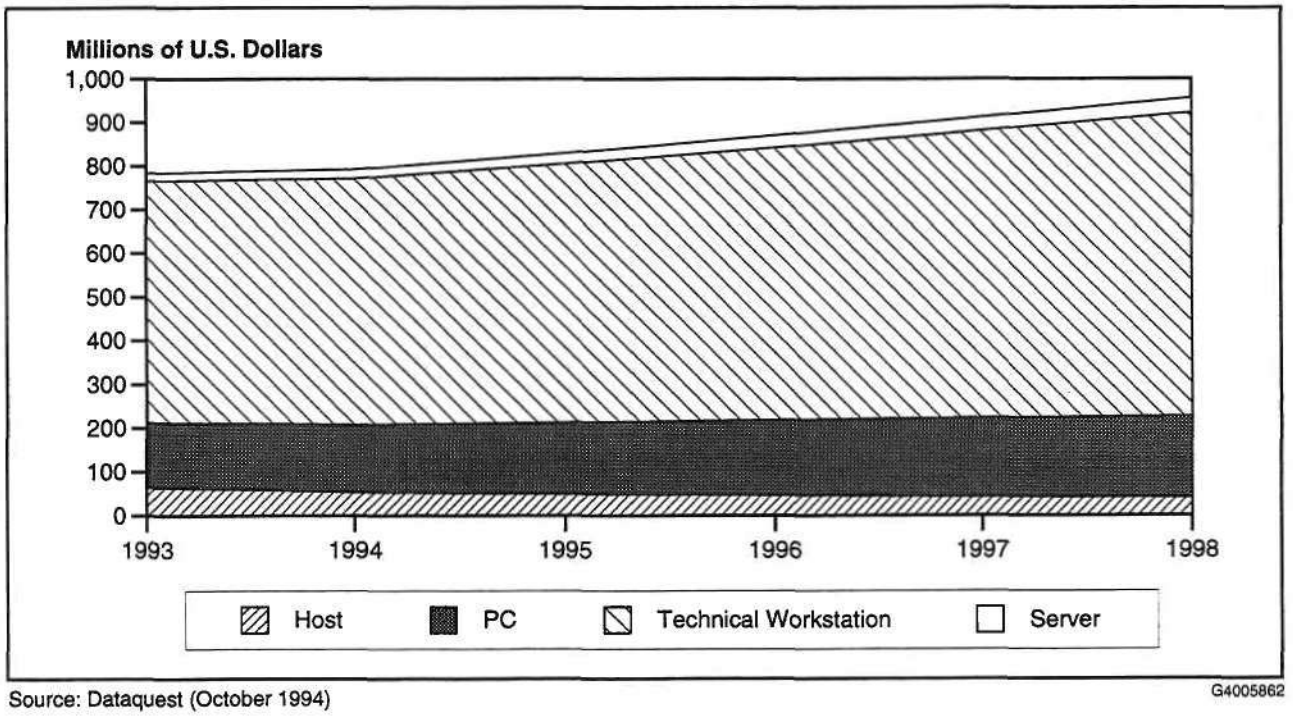
Figure 4-10
Mechanical CAD/CAM/CAE Software Revenue Forecast by Platform in Europe



Source: Dataquest (October 1994)

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These trends give a clear indication that the European manufacturing industry is going through a major transformation to remain competitive in a more and more global economy.

AEC

The European construction industry, like the economy of the region, was in retreat during 1993. Economic recession, high interest rates, and mounting unemployment have hit exports and undermined consumer confidence. Private investment, which accounts for 60 percent of the European building/construction industry, has declined as demand for these products has fallen. Companies are unlikely to invest in improved premises or new buildings when their own sales remain weak, and public-sector spending on construction is unlikely to see much improvement in light of the budget deficits most countries have accumulated. The situation has not been helped by overdevelopment of offices in the late 1980s; many office buildings remain empty.

The European AEC software market reached $313.4 million in software revenue in 1993. Based on ECU, AEC software revenue in Europe actually increased by 5.4 percent. This growth was driven by the top 10 vendors, which grew 9.1 percent in aggregate. These top 10 vendors, 6 of which are European companies, control 71 percent of this market segment (see Table 4-3). In the AEC segment, European vendors keep gaining market share and now control 56.2 percent of the market; U.S.-based vendors control the rest in terms of software revenue. This compares with a 54.4 percent share for European vendors in 1992 and 52.7 percent in 1991.

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Table 4-3
Top 10 AEC Software Vendors' Size and Growth in Europe

Ranking 1993	Company	1993 ($M)	Growth (%)	Ranking 1992
1	Autodesk	56.9	3.9	1
2	Nemetschek	44.7	37.6	3
3	Intergraph	40.1	-8.0	2
4	IEZ	27.8	5.9	4
5	IBM	13.0	-13.1	6
6	Soft-Tech Software Technologies	11.4	9.8	8
7	Computervision	7.6	-58.1	5
8	Han Dataport	6.5	0.5	11
9	RIB/Bausoftware	6.1	13.8	12
10	CAD Centre	7.6	-30.4	9
	Top 10 Companies	221.7	9.1	
	All Companies	313.4	5.4	

Source: Dataquest (October 1994)

Dataquest expects growth for AEC software to pick up again in 1994, reaching 8 percent as most European economies emerge from the recession. Until 1998, we expect a CAGR of 8 percent in software revenue (see Figure 4-11).

The largest regional market for AEC software is Germany, which absolutely dominates this market segment in Europe with a 47 percent share of the total European AEC software revenue. Among the top 10 European AEC software vendors, 5 are German companies (see Figure 4-12).

The AEC market segment is dominated by PC-based solutions, not only in terms of unit shipments, which accounted for 86 percent of all seats shipped in Europe throughout 1993, but also in terms of software revenue, which accounted for 51 percent of the total European AEC software revenue (see Figure 4-13).

A similar initiative to AIT in the discrete manufacturing industry was established in 1994 for the European process industry. The Process Industries Manufacturing Advantage through IT (PRIMA) project aims to set up a network of process industries companies in Europe to establish the mid- and long-term requirements for IT (including standards) of many of the industries using continuous or batch processes for manufacturing or for the provision of services. The project will establish a dialogue between these process sectors and the IT vendors as well as with the relevant European R&D programs. Its output will be a description of how key business requirements for the future can be translated into projects and systems using the mechanisms of EU R&D programs.

GIS

There is a tendency around Europe to make the public sector smaller. In countries where, for example, the utility sector was privatized, we have

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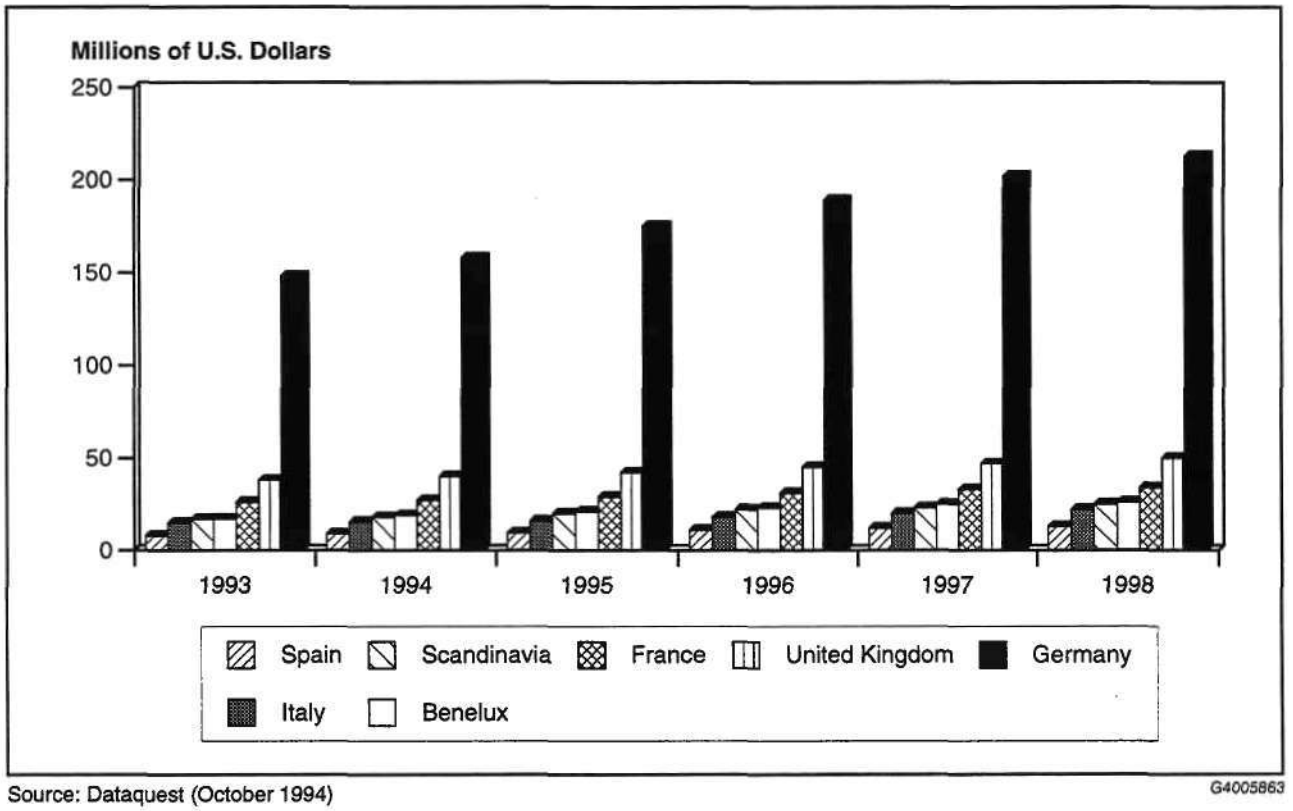
Figure 4-11
European AEC Software Revenue Forecast by Region



Source: Dataquest (October 1994)

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seen a surge in GIS spending almost as a direct result. Also, the telecommunications sector is becoming increasingly deregulated, and in order for telecommunications companies to have a competitive edge, they have had to become more efficient in managing territories. This trend has resulted in large orders for GIS from German Telekom and France Telecom, among others.

Growth in Europe for GIS software accelerated in 1993 to 25.1 percent based on the ECU, reaching $246 million in revenue. Although Germany is again the largest region in terms of software revenue size, its lead in this market is not as large as in the other applications (see Figure 4-14). The top 10 vendors, which control 73 percent of this market segment, increased their software revenue by 43 percent in aggregate (see Table 4-4). European vendors held a 52 percent share of the European GIS software market in 1991; in 1993, U.S.-based vendors hold 55 percent of the market despite the fact that there are 6 European vendors among the top 10.

In terms of software revenue, the European GIS market is very much dominated by technical workstation-based solutions. PC-based solutions are constantly gaining more ground, and host-based solutions have almost become extinct (see Figure 4-15). In terms of actual GIS seats shipped in 1993, 37 percent were workstation based, compared with 58 percent PC-based solutions.

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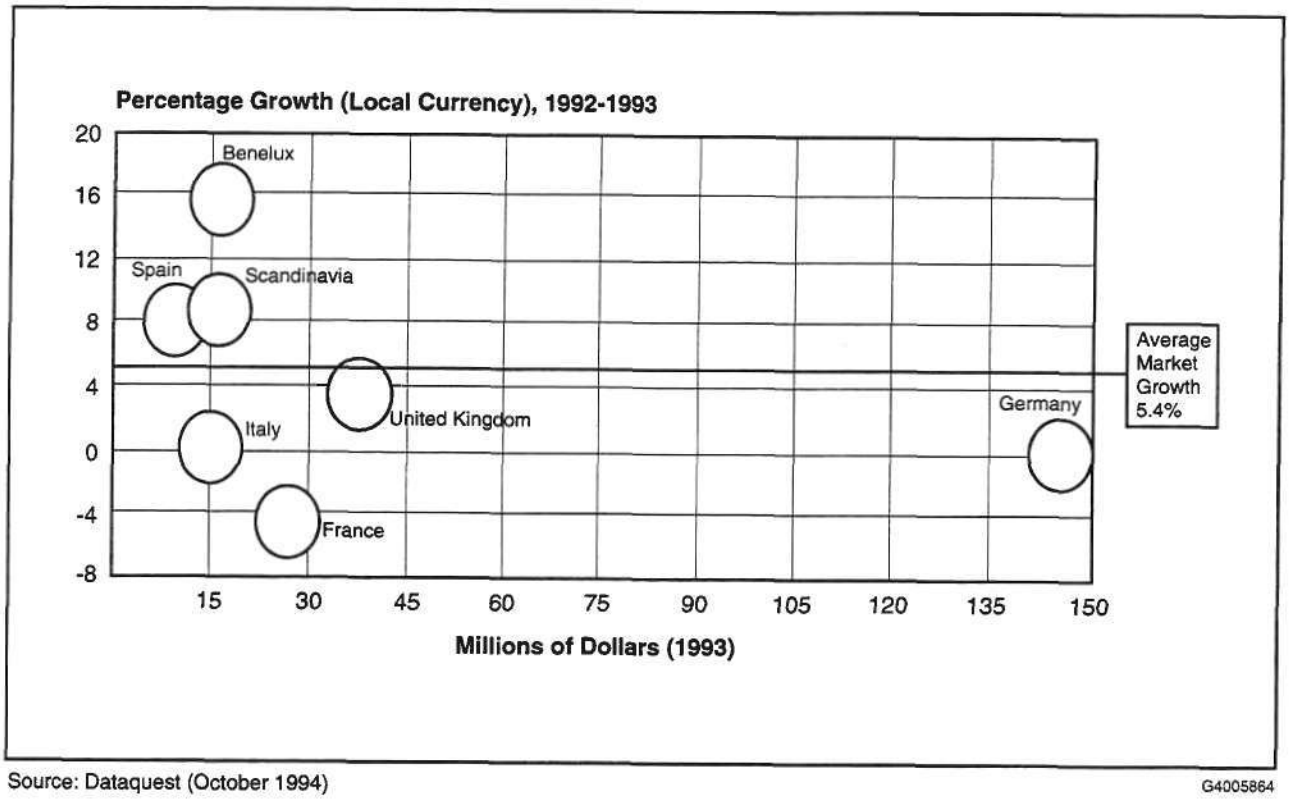
Figure 4-12
European AEC Software Market Portfolio



Source: Dataquest (October 1994)

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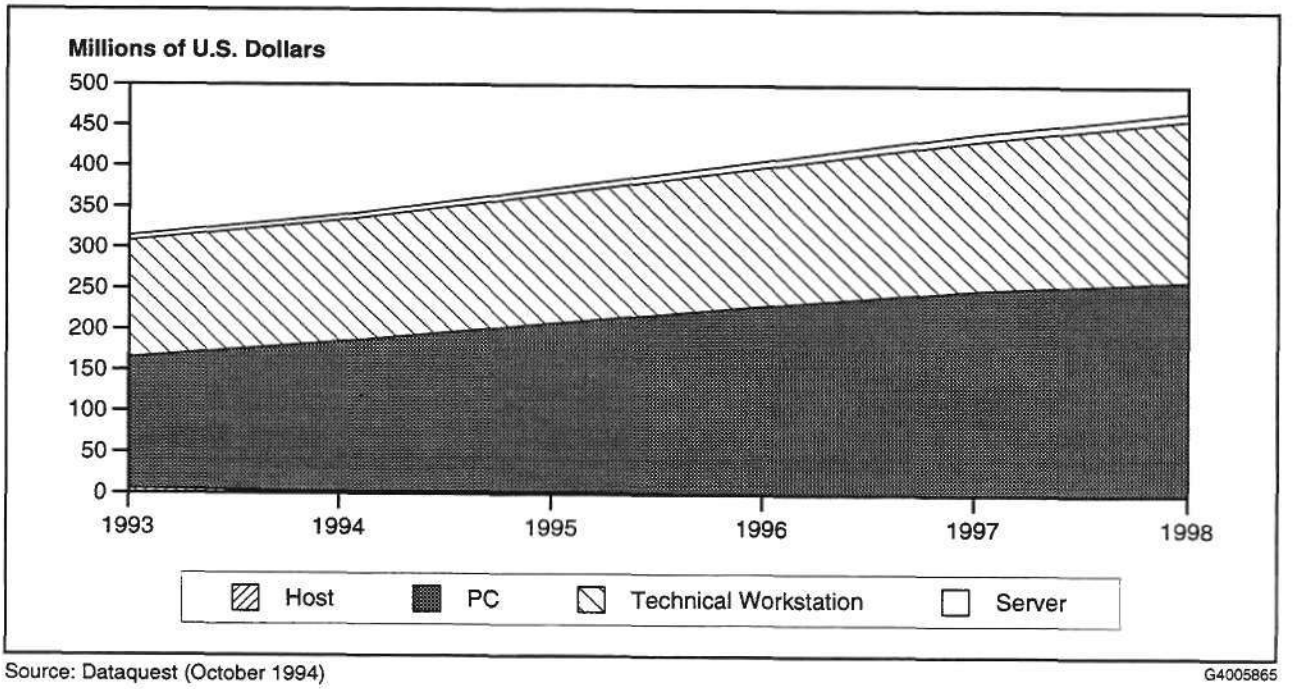
Figure 4-13
AEC Software Revenue Forecast by Platform in Europe



Source: Dataquest (October 1994)

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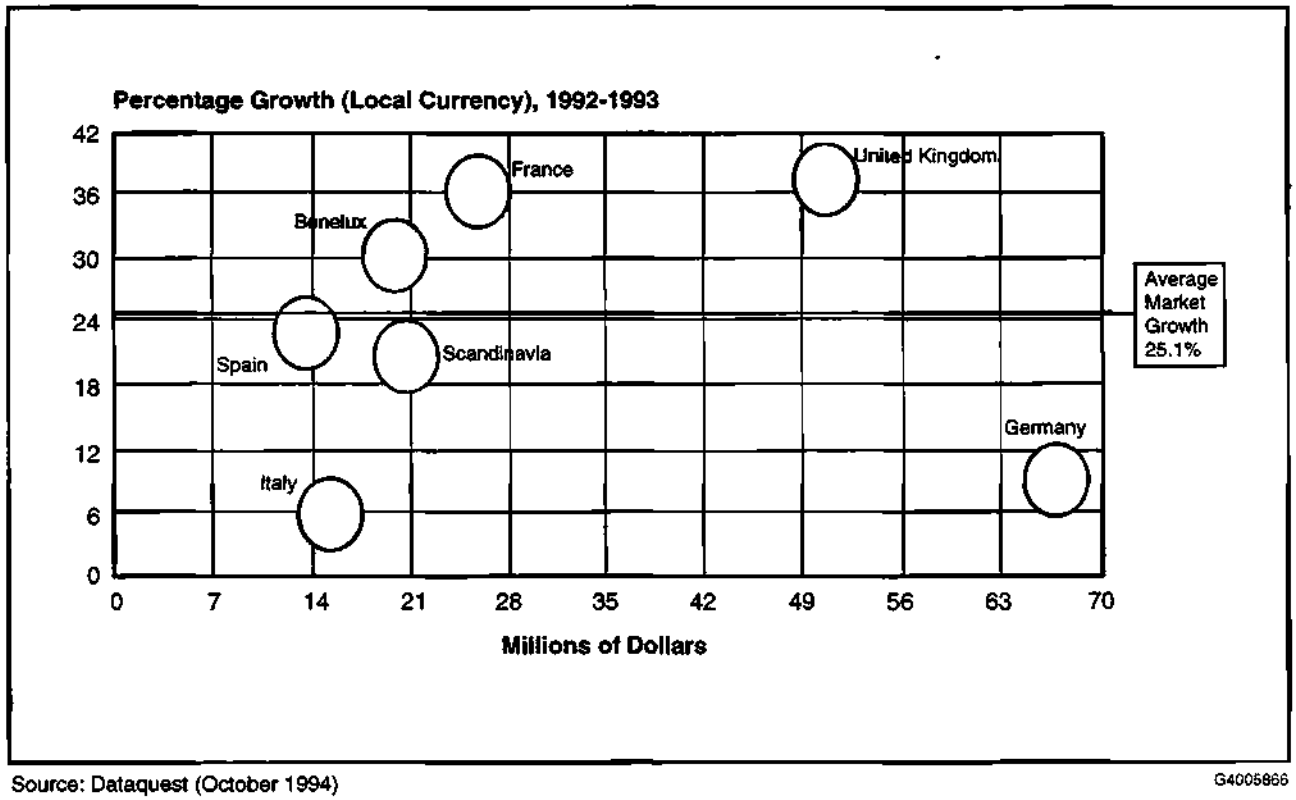
Figure 4-14
1993 European GIS Software Market Portfolio



Source: Dataquest (October 1994)

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Table 4-4
Top 10 GIS Software Vendors' Size and Growth in Europe

Ranking 1993	Company	1993 ($M)	Growth (%)	Ranking 1992
1	Siemens Nixdorf Informationssysteme	48.2	-4.1	1
2	Intergraph	43.0	19.0	2
3	ESRI	36.0	54.1	3
4	Autodesk	14.5	3.9	4
5	Smallworld Systems	13.8	138.6	6
6	Straessle Informationssysteme	6.5	142.2	14
7	Sysdeco Ltd.	5.9	270.6	19
8	Genasys II	4.4	11.2	8
9	Laser-Scan	4.2	22.0	9
10	APIC Systemes	4.0	24.5	13
	Top 10 Companies	180.5	43.1	
	All Companies	246.0	25.1	

Source: Dataquest (October 1994)

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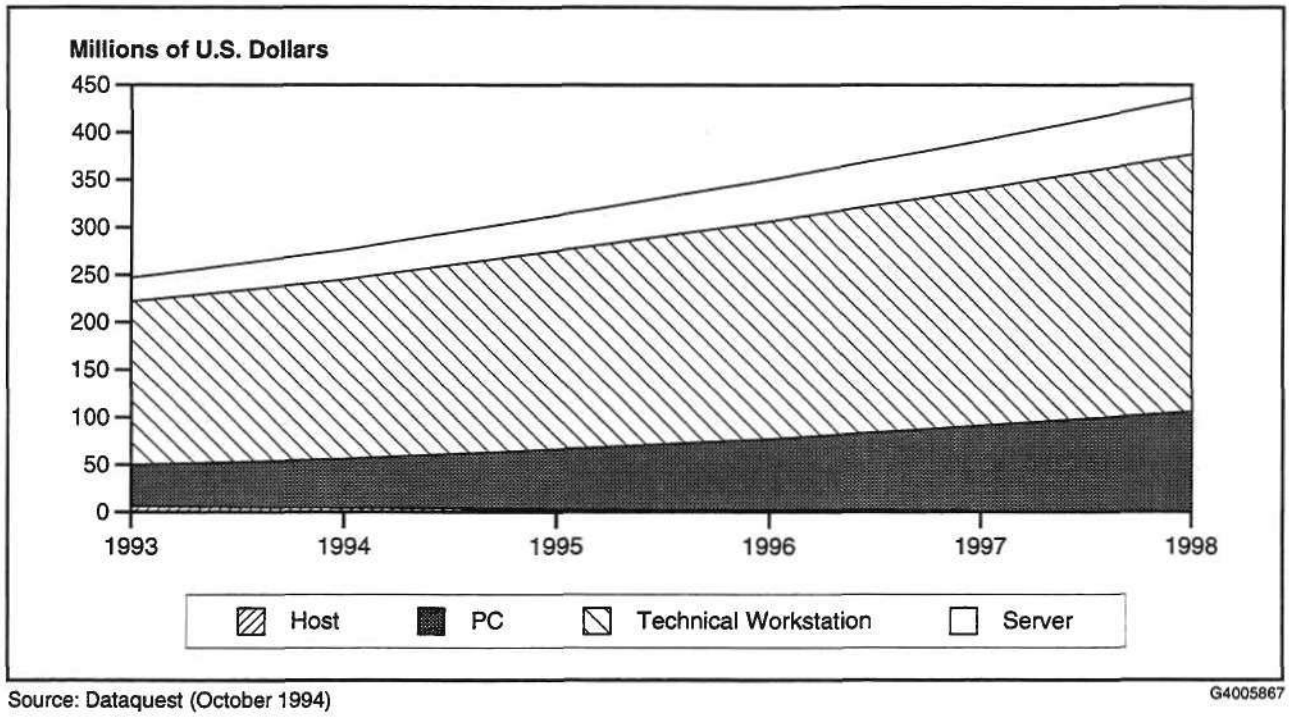
Figure 4-15
GIS Software Revenue Forecast by Platform in Europe



Source: Dataquest (October 1994)

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In 1994, the European GIS software market is expected to increase another 12 percent, and the CAGR until 1998 is also expected to be around 12 percent. See Figure 4-16 for the European GIS software revenue forecast by region. Areas where we expect GIS investment to increase because of EC regulations or EC-funded projects are oil/gas exploration and the water, telecom, freight/transportation, aviation, railway, energy, and mining industries. For example, the EC has proposals for a combined carbon and energy tax to combat the threat of global warming. There may be a long-term place for nuclear power, which does not emit carbon dioxide, with greater use of natural gas. The EC has introduced new standards on drinking and bathing water, requiring a major cleanup operation by the individual member countries. Transport emissions are the fastest-growing type of air pollution, and they need to be closely monitored and reduced. Also, on an ecological scale, it is becoming vital to manage forests, acid rain, and so on.

All of this means that there is plenty of scope for the European GIS market to exhibit strong growth over the next decades; however, some projects in Europe are stuck because of nonavailability of data. Cadastral and utility applications need high-precision data, which in some cases does not exist, and where it does exist, the cost of good topological data is prohibitive.

There are some European initiatives to address these problems. One is the EC's IMPACT initiative, which tries to encourage cross-border development of new geographical information sources aimed at strategic business

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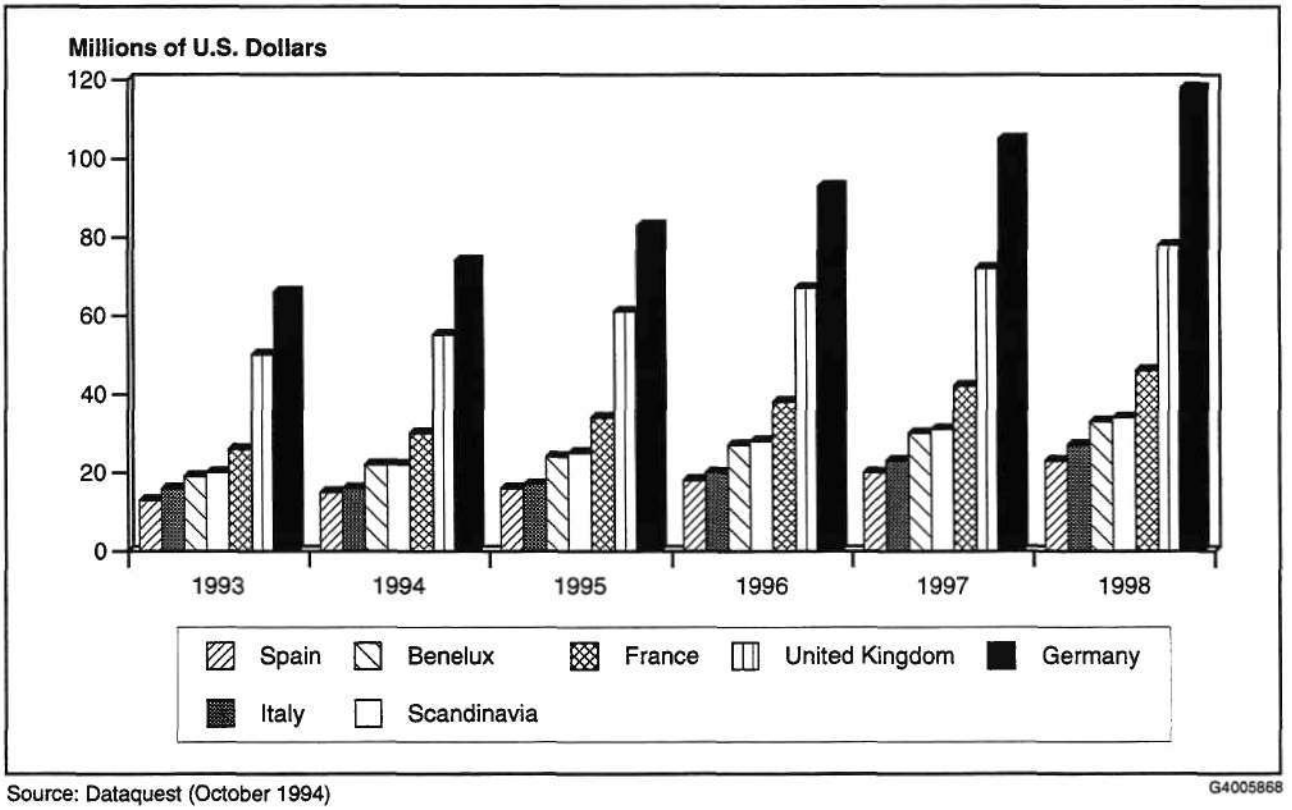
Figure 4-16
European GIS Software Revenue Forecast by Region



Source: Dataquest (October 1994)

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applications. The European Umbrella Organization for Geographical Information (EUROGI) was formed to encourage various groups within the European geographic information community to start working together. It will consider topics such as standards in GIS, cost-benefit studies, teaching, and training.

The European end-user market is fragmented and differs by country depending on the level of privatization of government sectors and how the various sectors are structured. In several of the countries, such as Belgium, the public authority is responsible for roads and wastewater but not for utilities such as gas, electricity, and drinking water. Because there is usually no coordination between the public authority and the utility sector in countries where these sectors are independent of each other, it is impossible to create a single good database. In most cases, these two sectors do not share costs for political reasons.

EDA

The European EDA software market showed relatively healthy growth in 1993. Overall EDA software revenue growth in Europe was 10.3 percent based on ECU. In U.S. dollars, the market reached $267.6 million. Figure 4-17 shows the size of the country markets in millions of dollars: Germany is by far the biggest market, and France and the United Kingdom, the next-largest markets, are about half its size.

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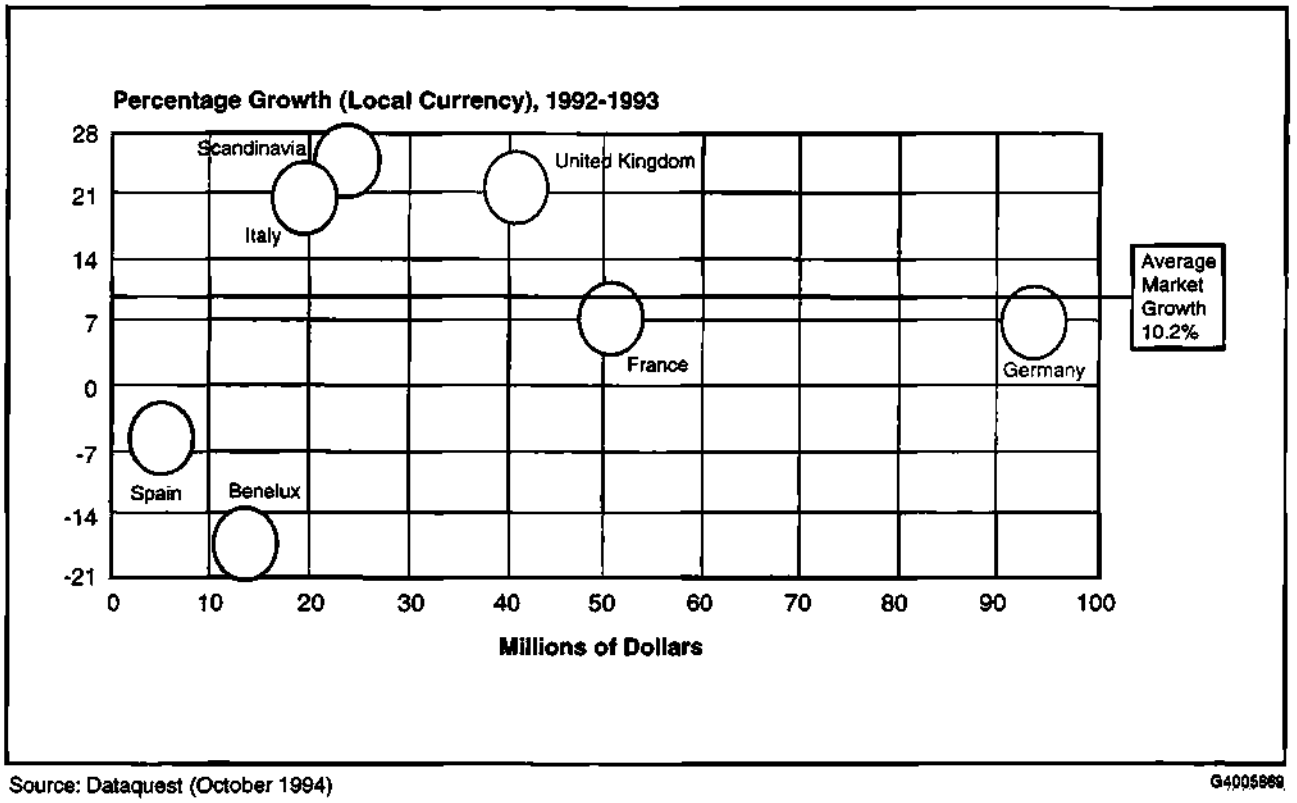
Figure 4-17
1993 European EDA Software Market Portfolio



Source: Dataquest (October 1994)

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Based on an overall improvement in the European economy and the fact that many user companies that deferred investments during the years of recession are going to replace outdated systems, we anticipate that the European EDA software market will increase 5 percent in 1994, reaching a 7 percent CAGR until 1998. See Figure 4-18 for the European EDA software revenue forecast by region.

The top 10 vendors had a 63 percent share of the total EDA software market. The positions of these vendors changed significantly in 1993 compared with 1992 (see Table 4-5). When compared with the other application sectors, these top 10 vendors had only a marginally higher growth rate, 10.7 percent, than the average EDA software growth rate. The EDA market is heavily dominated by U.S.-based vendors, which held an 81 percent share of the overall European EDA software market in 1993. In 1991, this share was 68 percent. U.S.-based vendors have been steadily increasing their hold on the European EDA market, and now that Racal-Redac has become a Japanese company, the European vendors' share will plunge even further in 1994. Other acquisitions of European vendors include Cadis by Synopsys and Anacad by Mentor Graphics.

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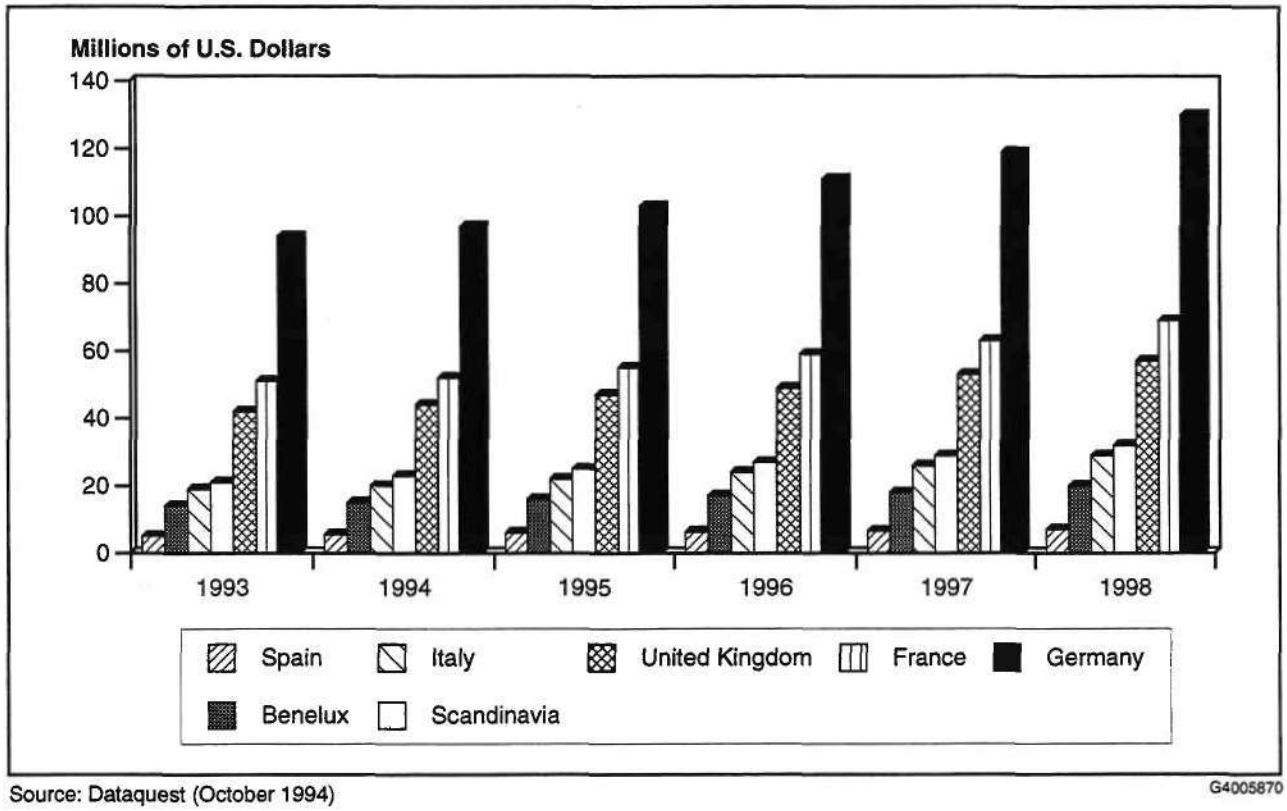
Figure 4-18
European EDA Software Revenue Forecast by Region



Source: Dataquest (October 1994)

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Table 4-5
Top 10 EDA Software Vendors' Size and Growth in Europe

Ranking 1993	Company	1993 ($M)	Growth (%)	Ranking 1992
1	Cadence	46.6	-14.9	1
2	Mentor Graphics	40.2	13.5	2
3	Synopsys	17.5	64.5	5
4	Racal-Redac	12.2	-33.6	3
5	Intergraph	10.2	-6.3	4
6	Viewlogic Systems	9.3	2.9	6
7	Hewlett-Packard	9.1	7.7	8
8	COMPASS Design Automation	8.7	-3.2	7
9	Logic Modeling Corp.	8.1	104.8	15
10	Autodesk	7.9	4.2	9
	Top 10 Companies	169.7	10.7	
	All Companies	267.6	10.2	

Source: Dataquest (October 1994)

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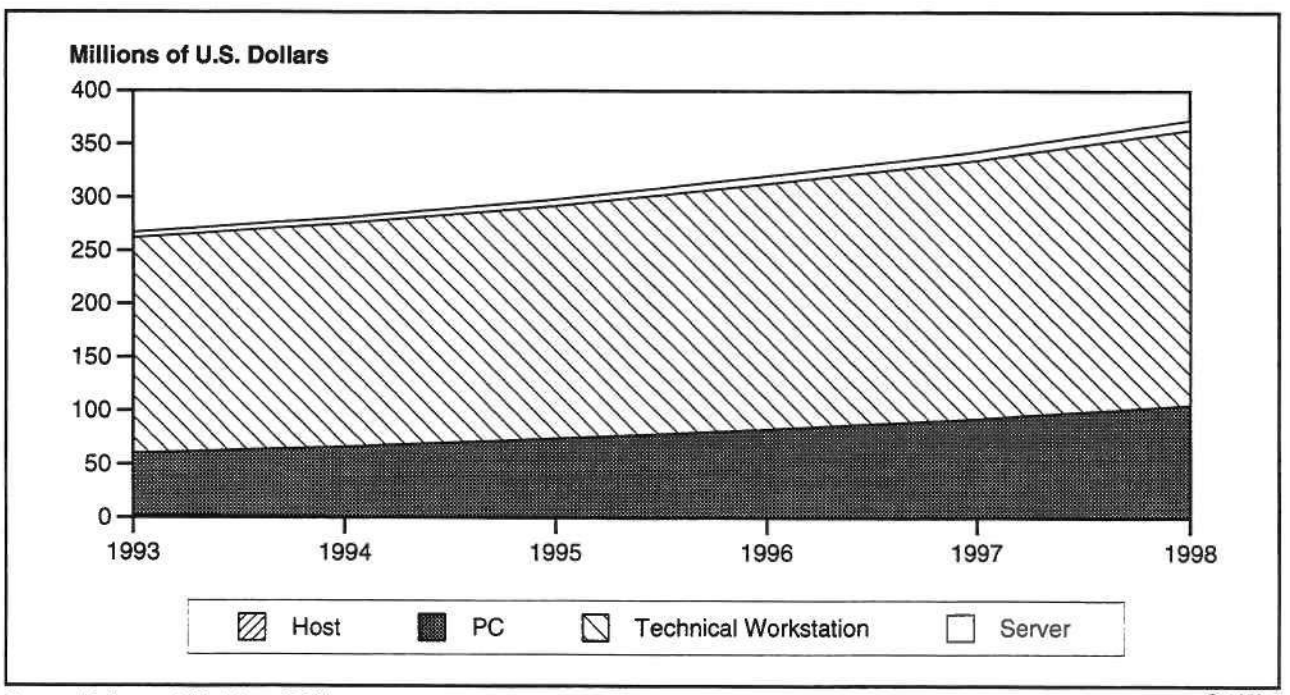
The EDA market, more than any other segment of the European CAD/CAM/CAE/GIS software industry, is dominated by technical workstation-based solutions and will continue to be so for the foreseeable future. See Figure 4-19 for the EDA revenue forecast by platform in Europe.

As in other industries, a lot of equipment is produced in Europe but is not necessarily designed in Europe. Much of it is produced by Japanese or North American companies, which tend to design their products at their home bases. Major differences therefore exist between what is produced and what is designed in Europe. In particular, telecommunications, which is No. 3 in production, is way ahead when it comes to design investment. The main investment in EDA software revenue in Europe during 1993 came from the telecommunications sector, which continues to dominate electronic design in Europe. Forty percent of the EDA software generated in Europe came from the telecommunications sector (see Figure 4-20). Of the top 13 worldwide telecommunications companies, 8 are headquartered in Europe, including the top 2. In addition to this sector, the semiconductor and even the defense industries in Europe increased their investment in EDA software tools.

Figure 4-19
EDA Software Revenue Forecast by Platform in Europe



Source: Dataquest (October 1994)

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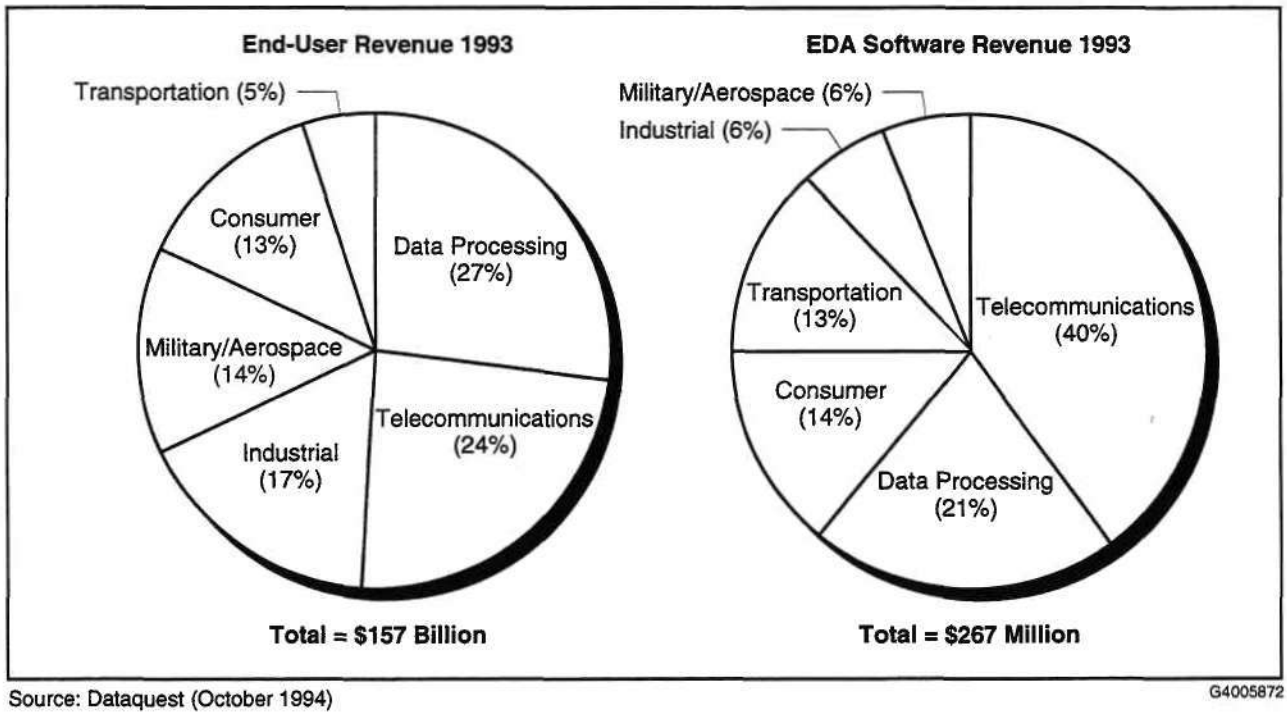
Figure 4-20
European Electronics Production versus Design



Source: Dataquest (October 1994)

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Electrical

Dataquest estimates the size of the electrical engineering software market in Europe to have been $91 million in 1992 and $95 million in 1993. Approximately 50 percent of this revenue comes from Germany. This market is headed by companies such as Intergraph, IGE, Aucotec, TCS, debis, Siemens Nixdorf, and Klöckner-Moeller.

The electrical engineering software market is composed of applications for designing electrical wiring and associated systems (switchgear, relay panels, and so on). The biggest part of the market is for electrical wiring design in buildings and factories (shop-floor wiring applications). Other important sectors are automotive and aircraft wiring design, mainframe computer cabinets, washing machines, dishwashers, and printers.

As in the EDA market, these applications have front-end applications for schematic capture, and back-end applications for physical wire harness/cable design. Some companies focus on just one of these areas (debis, for example, concentrates on schematics), while others support all areas (such as Intergraph and Computervision).

In Germany, Verfahrensneutrale Schnittstelle (VNS), a neutral data interchange standard for electrical applications, is being developed. Phase 1 applied to a graphics interface; Phase 2, which began in autumn 1993, includes data exchange of attributes, part lists, and so on. This standard has opened the German software systems in this segment. This standard will be tied in with the Standard for the Exchange of Product Data (STEP).

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Appendix A
European CAD/CAM/CAE/GIS Market Statistics

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Table A-1
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	909.7	606.6	156.9	39,592	16.7	22.2	9.6	16.4
Hewlett-Packard	477.2	344.1	45.0	18,445	8.7	12.6	2.7	7.6
Digital	455.2	359.2	0	18,490	8.3	13.2	0	7.7
Intergraph	338.4	128.5	114.6	6,181	6.2	4.7	7.0	2.6
Computervision	313.0	70.6	96.4	4,341	5.7	2.6	5.9	1.8
Sun Microsystems	274.2	218.7	0	9,578	5.0	8.0	0	4.0
Siemens Nixdorf Info systeme	211.9	84.1	65.3	6,025	3.9	3.1	4.0	2.5
Autodesk	132.2	0	132.2	0	2.4	0	8.1	0
Silicon Graphics	119.4	104.5	0	3,184	2.2	3.8	0	1.3
Dassault*	92.9	0	80.7	0	1.7	0	4.9	0
Mentor Graphics	91.8	13.0	40.2	439	1.7	0.5	2.5	0.2
Cadence	78.9	0	56.5	0	1.4	0	3.5	0
Matra Datavision	77.5	26.1	43.6	1,427	1.4	1.0	2.7	0.6
Nemetschek	73.4	22.2	44.7	1,793	1.3	0.8	2.7	0.7
EDS Unigraphics	70.0	20.8	33.2	1,062	1.3	0.8	2.0	0.4
IEZ	54.0	18.2	27.8	1,295	1.0	0.7	1.7	0.5
SDRC	51.3	0	35.0	0	0.9	0	2.1	0
Parametric Technology	49.3	0	40.4	0	0.9	0	2.5	0
ESRI	44.6	0	36.0	0	0.8	0	2.2	0
Applicon	38.5	12.7	15.0	424	0.7	0.5	0.9	0.2
Other Companies	227.8	364.7	0	96,637	4.2	13.4	0	40.1
All Companies	5,455.5	2,728.3	1,636.1	241,146	100.0	100.0	100.0	100.0

(Continued)

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Table A-1 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	4,206.2	2,323.2	1,038.8	209,801	77.1	85.2	63.5	87.0
All Asian-Based Companies	29.3	4.2	13.6	153	0.5	0.2	0.8	0.1
All European-Based Companies	1,220.0	400.9	583.7	31,193	22.4	14.7	35.7	12.9
All Hardware Companies	1,883.2	1,644.2	2.5	189,997	34.5	60.3	0.2	78.8
All Turnkey & SW Companies	3,572.3	1,084.1	1,633.5	51,149	65.5	39.7	99.8	21.2

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-2
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	635.9	381.0	136.4	18,756	22.2	25.7	17.4	18.9
Hewlett-Packard	306.6	208.6	35.8	10,409	10.7	14.1	4.6	10.5
Computervision	278.9	62.8	86.3	3,847	9.7	4.2	11.0	3.9
Digital	274.7	217.8	0	9,804	9.6	14.7	0	9.9
Silicon Graphics	105.2	92.1	0	2,789	3.7	6.2	0	2.8
Sun Microsystems	86.7	69.5	0	2,848	3.0	4.7	0	2.9
Dassault*	85.1	0	73.9	0	3.0	0	9.4	0
Matra Datavision	76.7	25.9	43.1	1,414	2.7	1.7	5.5	1.4
EDS Unigraphics	70.0	20.8	33.2	1,062	2.4	1.4	4.2	1.1
Siemens Nixdorf Info systeme	62.9	24.8	16.0	1,754	2.2	1.7	2.0	1.8
Intergraph	62.7	22.3	20.3	942	2.2	1.5	2.6	0.9
Autodesk	52.9	0	52.9	0	1.8	0	6.7	0
SDRC	51.3	0	35.0	0	1.8	0	4.5	0
Parametric Technology	49.3	0	40.4	0	1.7	0	5.2	0
Applicon	38.5	12.7	15.0	424	1.3	0.9	1.9	0.4
Other Companies	30.0	11.2	9.3	267	1.0	0.8	1.2	0.3
ASCAD/ASCAM	28.2	16.7	8.7	436	1.0	1.1	1.1	0.4
CAD Lab	24.7	7.6	11.4	580	0.9	0.5	1.5	0.6
Straessle Informationssysteme	23.6	3.9	14.3	405	0.8	0.3	1.8	0.4
Investronica SA	23.6	14.8	6.2	808	0.8	1.0	0.8	0.8
Other Companies	40.5	163.8	0	32,400	1.4	11.1	0	32.6
All Companies	2,869.3	1,480.7	784.7	99,482	100.0	100.0	100.0	100.0

(Continued)

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Table A-2 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	2,317.5	1,285.0	538.2	85,446	80.8	86.8	68.6	85.9
All Asian-Based Companies	0	0	0	0	0	0	0	0
All European-Based Companies	551.8	195.8	246.6	14,035	19.2	13.2	31.4	14.1
All Hardware Companies	910.1	790.0	0	71,204	31.7	53.4	0	71.6
All Turnkey & SW Companies	1,959.3	690.7	784.7	28,277	68.3	46.6	100.0	28.4

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-3
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: AEC
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	128.4	101.3	13.0	11,362	14.4	22.8	4.1	15.1
Intergraph	126.7	46.4	42.8	3,006	14.2	10.4	13.5	4.0
Nemetschek	73.4	22.2	44.7	1,793	8.2	5.0	14.1	2.4
Autodesk	56.9	0	56.9	0	6.4	0	17.9	0
IEZ	54.0	18.2	27.8	1,295	6.1	4.1	8.8	1.7
Hewlett-Packard	28.5	24.4	0	1,692	3.2	5.5	0	2.2
Computervision	25.7	5.9	7.6	374	2.9	1.3	2.4	0.5
Digital	24.5	21.1	0	3,621	2.8	4.7	0	4.8
Apple Computer	20.4	20.4	0	4,292	2.3	4.6	0	5.7
Siemens Nixdorf Info systeme	20.0	9.0	4.0	559	2.3	2.0	1.3	0.7
Soft-Tech Software Technologies	14.7	1.9	11.4	948	1.6	0.4	3.6	1.3
RIB/Bausoftware	13.0	1.2	10.7	65	1.5	0.3	3.4	0.1
Han Dataport	12.7	3.7	6.5	392	1.4	0.8	2.1	0.5
Microway	12.5	7.5	3.8	138	1.4	1.7	1.2	0.2
Data Technology/DATECH*	11.2	2.1	7.8	5,709	1.3	0.5	2.5	7.6
CAD Centre	8.3	.8	5.3	44	0.9	0.2	1.7	0.1
Kockums Computer Systems	8.0	2.1	1.4	370	0.9	0.5	0.5	0.5
Technische Computer Systeme	7.9	1.5	5.6	148	0.9	0.3	1.8	0.2
Dassault*	7.8	0	6.8	0	0.9	0	2.1	0
Hochtief	7.4	1.3	3.5	91	0.8	0.3	1.1	0.1
Other Companies	89.2	112.2	0	36,689	10.0	25.3	0	48.8
All Companies	890.1	443.8	317.3	75,255	100.0	100.0	100.0	100.0

(Continued)

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Table A-3 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: AEC
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	564.5	346.7	139.7	65,876	63.4	78.1	44.0	87.5
All Asian-Based Companies	0	0	0	0	0	0	0	0
All European-Based Companies	325.6	97.1	177.6	9,379	36.6	21.9	56.0	12.5
All Hardware Companies	281.6	268.1	0	63,241	31.6	60.4	0	84.0
All Turnkey & SW Companies	608.5	175.8	317.3	12,014	68.4	39.6	100.0	16.0

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-4
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Intergraph	137.5	59.7	41.5	2,215	18.1	17.2	17.1	8.2
Siemens Nixdorf Info systeme	126.5	49.2	44.8	3,644	16.7	14.2	18.5	13.5
IBM	56.3	46.6	3.0	2,874	7.4	13.4	1.3	10.6
Digital	50.1	37.2	0	2,176	6.6	10.7	0	8.1
ESRI	44.6	0	36.0	0	5.9	0	14.8	0
Sun Microsystems	39.0	31.8	0	1,010	5.2	9.1	0	3.7
Landmark Graphics	37.1	7.8	14.9	95	4.9	2.2	6.2	0.4
Hewlett-Packard	30.0	25.6	0	1,412	4.0	7.4	0	5.2
ICL	26.0	15.2	9.0	749	3.4	4.4	3.7	2.8
Sysdeco Ltd.	23.7	11.9	5.9	207	3.1	3.4	2.4	0.8
Smallworld Systems	23.2	1.1	13.8	43	3.1	0.3	5.7	0.2
Autodesk	14.5	0	14.5	0	1.9	0	6.0	0
Laser-Scan	9.5	2.8	4.2	58	1.2	0.8	1.7	0.2
Straessle Informationssysteme	9.4	0.7	6.5	75	1.2	0.2	2.7	0.3
Unisys	8.6	1.9	3.5	84	1.1	0.6	1.5	0.3
Sysdeco Innovation	8.5	3.4	2.5	88	1.1	1.0	1.0	0.3
Kohns & Poppenhaeger	6.6	3.0	2.6	76	0.9	0.9	1.1	0.3
Genasys II	6.2	0.6	4.4	26	0.8	0.2	1.8	0.1
Star Informatic	6.0	1.2	3.8	81	0.8	0.3	1.6	0.3
APIC Systemes	5.9	0	4.0	0	0.8	0	1.7	0
Other Companies	37.5	34.5	2.2	11,155	4.9	9.9	0.9	41.3
All Companies	757.7	347.6	242.3	26,996	100.0	100.0	100.0	100.0

(Continued)

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Table A-4 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	487.0	251.6	133.7	21,110	64.3	72.4	55.2	78.2
All Asian-Based Companies	0	0	0	0	0	0	0	0
All European-Based Companies	270.7	96.0	108.6	5,886	35.7	27.6	44.8	21.8
All Hardware Companies	198.4	170.2	0	18,656	26.2	49.0	0	69.1
All Turnkey & SW Companies	559.2	177.4	242.3	8,341	73.8	51.0	100.0	30.9

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-5
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	142.5	112.7	0	5,495	15.2	24.7	0	13.9
Hewlett-Packard	112.1	85.5	9.1	4,931	11.9	18.8	3.1	12.5
Digital	105.9	83.1	0	2,890	11.3	18.2	0	7.3
Mentor Graphics	91.8	13.0	40.2	439	9.8	2.9	13.8	1.1
IBM	89.0	77.8	4.5	6,600	9.5	17.0	1.5	16.7
Cadence	78.9	0	56.5	0	8.4	0	19.4	0
Racal-Redac	26.4	3.3	12.2	135	2.8	0.7	4.2	0.3
Synopsys	25.4	0	17.5	0	2.7	0	6.0	0
Wiechers Datentechnik	17.7	3.2	11.2	344	1.9	0.7	3.8	0.9
Viewlogic Systems	11.5	0	9.3	0	1.2	0	3.2	0
Intergraph	11.5	0.2	10.1	19	1.2	0	3.4	0
Harris EDA	10.4	0.9	6.4	60	1.1	0.2	2.2	0.2
COMPASS Design Automation	9.6	0	7.7	0	1.0	0	2.6	0
Logic Modeling Corp.	9.3	0	8.1	0	1.0	0	2.8	0
Silicon Graphics	9.0	7.9	0	253	1.0	1.7	0	0.6
Aucotec	8.8	2.4	4.4	348	0.9	0.5	1.5	0.9
Autodesk	7.9	0	7.9	0	0.8	0	2.7	0
Sagantec	6.7	0	6.1	0	0.7	0	2.1	0
Computervision	6.3	1.5	1.8	93	0.7	0.3	0.6	0.2
Zycad	5.3	0	3.0	8	0.6	0	1.0	0
Other Companies	60.7	54.2	4.3	16,393	6.5	11.9	1.5	41.6
All Companies	938.3	456.1	291.7	39,414	100.0	100.0	100.0	100.0

(Continued)

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Table A-5 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	837.1	440.0	227.2	37,369	89.2	96.5	77.9	94.8
All Asian-Based Companies	29.3	4.2	13.6	153	3.1	0.9	4.6	0.4
All European-Based Companies	71.9	11.9	51.0	1,892	7.7	2.6	17.5	4.8
All Hardware Companies	493.1	415.9	2.5	36,896	52.5	91.2	0.9	93.6
All Turnkey & SW Companies	445.3	40.2	289.2	2,517	47.5	8.8	99.1	6.4

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-6
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	47.3	37.3	0	1,943	16.9	24.9	0	16.2
IBM	40.2	27.6	6.4	1,892	14.3	18.4	8.4	15.8
Hewlett-Packard	31.6	22.9	2.9	1,223	11.2	15.3	3.8	10.2
Intergraph	27.7	10.5	9.5	526	9.9	7.0	12.5	4.4
Autodesk	10.2	0	10.2	0	3.6	0	13.4	0
Sun Microsystems	10.2	8.1	0	353	3.6	5.4	0	2.9
Computervision	10.1	2.3	3.1	147	3.6	1.5	4.1	1.2
Silicon Graphics	9.6	8.4	0	255	3.4	5.6	0	2.1
Siemens Nixdorf Info systeme	6.4	2.5	2.1	184	2.3	1.7	2.8	1.5
ESRI	5.8	0	4.6	0	2.0	0	6.1	0
EDS Unigraphics	5.3	1.6	2.5	80	1.9	1.0	3.3	0.7
Star Informatic	5.0	1.0	3.2	76	1.8	0.7	4.2	0.6
Parametric Technology	4.9	0	4.0	0	1.8	0	5.3	0
IEZ	4.0	1.4	2.1	96	1.4	0.9	2.7	0.8
Mentor Graphics	3.7	0.5	1.6	18	1.3	0.3	2.1	0.1
Apple Computer	3.5	3.5	0	737	1.2	2.3	0	6.2
Smallworld Systems	2.1	0.1	1.2	4	0.7	0.1	1.6	0
Data Technology/DATECH*	1.9	0.5	1.2	315	0.7	0.3	1.6	2.6
Hochtief	1.8	0.3	0.8	22	0.6	0.2	1.1	0.2
Synopsys	1.7	0	1.1	0	0.6	0	1.5	0
Other Companies	13.2	15.5	0	3,655	4.7	10.3	0	30.5
All Companies	280.7	149.9	76.0	11,975	100.0	100.0	100.0	100.0

(Continued)

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Table A-6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	240.5	139.3	54.8	11,002	85.7	92.9	72.1	91.9
All Asian-Based Companies	1.1	0.1	0.5	5	0.4	0.1	0.6	0
All European-Based Companies	39.2	10.5	20.7	968	14.0	7.0	27.2	8.1
All Hardware Companies	121.7	104.2	0	9,811	43.4	69.5	0	81.9
All Turnkey & SW Companies	159.0	45.7	76.0	2,164	56.6	30.5	100.0	18.1

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-7
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Germany
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	353.3	237.4	59.7	15,785	18.6	24.4	10.8	18.4
Hewlett-Packard	184.6	132.4	17.8	7,087	9.7	13.6	3.2	8.3
Siemens Nixdorf Info systeme	157.1	62.7	46.4	4,453	8.3	6.4	8.4	5.2
Digital	127.3	100.9	0	5,151	6.7	10.4	0	6.0
Computervision	90.8	20.6	27.7	1,255	4.8	2.1	5.0	1.5
Sun Microsystems	88.2	70.2	0	3,182	4.6	7.2	0	3.7
Intergraph	81.0	29.1	28.6	1,517	4.3	3.0	5.2	1.8
Nemetschek	66.8	20.2	40.7	1,632	3.5	2.1	7.4	1.9
Autodesk	37.0	0	37.0	0	2.0	0	6.7	0
Mentor Graphics	31.2	4.4	13.7	149	1.6	0.5	2.5	0.2
IEZ	28.7	9.7	14.8	689	1.5	1.0	2.7	0.8
Dassault*	27.8	0	24.2	0	1.5	0	4.4	0
Silicon Graphics	26.3	23.0	0	700	1.4	2.4	0	0.8
ASCAD/ASCAM	25.9	15.3	8.0	401	1.4	1.6	1.5	0.5
Wiechers Datentechnik	25.8	4.8	16.5	506	1.4	0.5	3.0	0.6
Cadence	25.2	0	18.1	0	1.3	0	3.3	0
EDS Unigraphics	18.9	5.6	9.0	287	1.0	0.6	1.6	0.3
Matra Datavision	18.8	6.3	10.6	346	1.0	0.6	1.9	0.4
Straessle Informationssysteme	18.7	2.7	11.7	282	1.0	0.3	2.1	0.3
Applicon	18.5	6.1	7.2	204	1.0	0.6	1.3	0.2
Other Companies	103.6	135.7	0	35,928	5.5	13.9	0	42.0
All Companies	1,898.4	973.3	551.4	85,613	100.0	100.0	100.0	100.0

(Continued)

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Table A-7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Germany
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	1,310.3	779.4	274.6	72,890	69.0	80.1	49.8	85.1
All Asian-Based Companies	11.1	1.4	5.1	55	0.6	0.1	0.9	0.1
All European-Based Companies	576.9	192.5	271.7	12,667	30.4	19.8	49.3	14.8
All Hardware Companies	620.9	546.2	0	64,662	32.7	56.1	0	75.5
All Turnkey & SW Companies	1,277.4	427.0	551.4	20,951	67.3	43.9	100.0	24.5

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-8
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: France
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	128.2	83.1	23.7	5,072	17.2	22.0	11.0	17.2
Digital	72.4	57.3	0	2,922	9.7	15.2	0	9.9
Sun Microsystems	67.1	53.6	0	2,332	9.0	14.2	0	7.9
Hewlett-Packard	56.6	40.6	5.5	2,167	7.6	10.7	2.6	7.3
Computervision	54.3	12.3	16.8	759	7.3	3.2	7.8	2.6
Intergraph	51.5	20.4	17.1	897	6.9	5.4	7.9	3.0
Matra Datavision	42.6	14.4	23.9	784	5.7	3.8	11.1	2.7
Dassault*	40.3	0	35.0	0	5.4	0	16.2	0
Silicon Graphics	21.5	18.8	0	573	2.9	5.0	0	1.9
Autodesk	19.9	0	19.9	0	2.7	0	9.2	0
Cadence	18.2	0	13.0	0	2.4	0	6.0	0
Mentor Graphics	15.8	2.3	6.9	76	2.1	0.6	3.2	0.3
Cisigraph	13.4	3.6	7.1	200	1.8	1.0	3.3	0.7
Parametric Technology	12.3	0	10.1	0	1.7	0	4.7	0
SDRC	9.1	0	6.2	0	1.2	0	2.9	0
Apple Computer	9.0	9.0	0	1,901	1.2	2.4	0	6.4
EDS Unigraphics	8.4	2.5	4.0	127	1.1	0.7	1.8	0.4
Framasoft + CSI	7.8	0.3	3.5	17	1.0	0.1	1.6	0.1
Serbi	7.0	0.9	6.1	273	0.9	0.2	2.8	0.9
ESRI	5.7	0	4.6	0	0.8	0	2.1	0
Other Companies	0.2	41.9	0	10,319	0	11.1	0	34.9
All Companies	746.0	378.2	216.0	29,559	100.0	100.0	100.0	100.0

(Continued)

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Table A-8 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: France
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	626.1	344.9	150.5	27,330	83.9	91.2	69.7	92.5
All Asian-Based Companies	3.7	0.5	1.7	18	0.5	0.1	0.8	0.1
All European-Based Companies	116.3	32.8	63.8	2,211	15.6	8.7	29.6	7.5
All Hardware Companies	283.9	244.5	0	23,629	38.1	64.7	0	79.9
All Turnkey & SW Companies	462.1	133.7	216.0	5,930	61.9	35.3	100.0	20.1

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-9
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	95.3	62.5	17.1	3,915	20.7	26.4	13.4	21.3
Digital	47.6	37.5	0	1,957	10.4	15.8	0	10.7
Hewlett-Packard	46.9	33.6	4.6	1,804	10.2	14.2	3.6	9.8
Computervision	41.7	9.3	13.1	570	9.1	3.9	10.3	3.1
Sun Microsystems	24.0	19.2	0	806	5.2	8.1	0	4.4
CAD Lab	23.2	7.2	10.7	546	5.1	3.0	8.4	3.0
Intergraph	14.3	5.4	4.7	255	3.1	2.3	3.7	1.4
Siemens Nixdorf Info systeme	14.0	5.4	4.8	401	3.0	2.3	3.8	2.2
ItalCad	12.7	3.6	5.3	280	2.8	1.5	4.2	1.5
Autodesk	12.4	0	12.4	0	2.7	0	9.8	0
Matra Datavision	8.9	3.0	5.0	163	1.9	1.3	3.9	0.9
Silicon Graphics	8.4	7.3	0	223	1.8	3.1	0	1.2
Mentor Graphics	8.3	1.2	3.6	40	1.8	0.5	2.8	0.2
Cimatron	7.0	3.1	3.2	253	1.5	1.3	2.5	1.4
Investronica SA	6.6	4.1	1.7	226	1.4	1.7	1.4	1.2
Cadence	6.3	0	4.5	0	1.4	0	3.6	0
ESRI	5.9	0	4.8	0	1.3	0	3.8	0
Dassault*	5.9	0	5.1	0	1.3	0	4.0	0
SDRC	5.5	0	3.8	0	1.2	0	3.0	0
Parametric Technology	4.4	0	3.6	0	1.0	0	2.9	0
Other Companies	17.3	24.5	0	5,766	3.8	10.4	0	31.4
All Companies	459.9	236.6	127.0	18,376	100.0	100.0	100.0	100.0

(Continued)

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Table A-9 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	366.3	205.6	84.0	16,115	79.6	86.9	66.1	87.7
All Asian-Based Companies	1.1	0.1	0.5	6	0.2	0.1	0.4	0
All European-Based Companies	92.6	30.9	42.6	2,256	20.1	13.1	33.5	12.3
All Hardware Companies	165.8	143.5	0	13,912	36.1	60.6	0	75.7
All Turnkey & SW Companies	294.1	93.2	127.0	4,464	63.9	39.4	100.0	24.3

*Contains reseller or OEM revenue; All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-10
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	72.6	48.3	12.5	3,116	20.6	27.0	12.8	22.7
Intergraph	45.0	17.4	15.0	841	12.8	9.7	15.3	6.1
Digital	43.3	34.2	0	1,781	12.3	19.1	0	13.0
Hewlett-Packard	31.9	23.2	2.9	1,237	9.0	13.0	3.0	9.0
Computervision	22.4	5.1	6.9	318	6.4	2.8	7.0	2.3
Sun Microsystems	14.6	11.6	0	500	4.1	6.5	0	3.6
Mentor Graphics	11.9	1.7	5.2	57	3.4	1.0	5.3	0.4
Autodesk	11.5	0	11.5	0	3.3	0	11.8	0
Data Technology/DATECH*	10.7	2.6	6.9	5,852	3.0	1.4	7.0	42.6
Cadence	6.3	0	4.5	0	1.8	0	4.6	0
ESRI	6.0	0	4.9	0	1.7	0	5.0	0
Silicon Graphics	6.0	5.2	0	159	1.7	2.9	0	1.2
Apple Computer	5.6	5.6	0	1,185	1.6	3.2	0	8.6
EDS Unigraphics	5.6	1.7	2.7	85	1.6	0.9	2.7	0.6
Parametric Technology	4.4	0	3.6	0	1.3	0	3.7	0
SDRC	4.2	0	2.9	0	1.2	0	3.0	0
Sysdeco Innovation	4.0	1.6	1.2	41	1.1	0.9	1.2	0.3
Racal-Redac	3.2	0.4	1.5	16	0.9	0.2	1.5	0.1
Harris EDA	2.4	0.2	1.5	16	0.7	0.1	1.6	0.1
Synopsys	2.2	0	1.5	0	0.6	0	1.5	0
Other Companies	4.3	15.1	0	0	1.2	8.5	0	0
All Companies	352.4	178.8	97.9	13,729	100.0	100.0	100.0	100.0

(Continued)

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Table A-10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	327.4	172.8	85.5	13,356	92.9	96.6	87.4	97.3
All Asian-Based Companies	3.2	0.4	1.5	16	0.9	0.2	1.5	0.1
All European-Based Companies	21.9	5.7	10.9	357	6.2	3.2	11.2	2.6
All Hardware Companies	132.0	114.5	0	11,172	37.5	64.0	0	81.4
All Turnkey & SW Companies	220.4	64.4	97.9	2,557	62.5	36.0	100.0	18.6

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-11
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Spain
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Hewlett-Packard	29.6	21.3	2.8	1,133	17.8	24.4	6.2	14.1
IBM	24.0	16.9	3.6	1,216	14.4	19.3	8.0	15.1
Intergraph	19.3	7.5	6.4	338	11.6	8.6	14.5	4.2
ABB Industria*	13.7	6.0	6.6	510	8.3	6.9	14.8	6.3
Computervision	12.8	2.9	3.9	175	7.7	3.3	8.8	2.2
Siemens Nixdorf Info systeme	7.6	3.0	2.7	219	4.6	3.4	6.0	2.7
Digital	7.1	5.5	0	309	4.3	6.3	0	3.8
Sun Microsystems	6.8	5.5	0	216	4.1	6.2	0	2.7
CIMTEK*	6.6	2.3	3.5	60	4.0	2.6	7.8	0.7
Autodesk	4.7	0	4.7	0	2.8	0	10.6	0
Softronics	4.2	0.9	3.4	322	2.5	1.0	7.5	4.0
Investronica SA	3.8	2.4	1.0	129	2.3	2.7	2.2	1.6
FHECOR*	3.6	0	3.6	0	2.2	0	8.1	0
Silicon Graphics	3.6	3.1	0	95	2.2	3.6	0	1.2
ESRI	3.0	0	2.4	0	1.8	0	5.4	0
Tebis	2.1	0.5	0.3	14	1.3	0.6	0.7	0.2
Logic System Designers*	1.7	0.7	0.7	42	1.0	0.7	1.6	0.5
Aplein*	1.7	1.6	0.1	20	1.0	1.8	0.2	0.3
	1.6	0.6	0.5	14	1.0	0.7	1.1	0.2
Cadence	1.6	0	1.1	0	0.9	0	2.5	0
Other Companies	0	2.4	0	2,744	0	2.7	0	34.1
All Companies	165.8	87.3	44.5	8,036	100.0	100.0	100.0	100.0

(Continued)

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Table A-11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Spain
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	138.5	78.2	32.4	7,161	83.5	89.6	72.8	89.1
All Asian-Based Companies	0	0	0	2	0	0	0	0
All European-Based Companies	27.3	9.1	12.1	872	16.5	10.4	27.2	10.9
All Hardware Companies	60.1	53.1	0	6,192	36.2	60.8	0	77.1
All Turnkey & SW Companies	105.7	34.3	44.5	1,844	63.8	39.2	100.0	22.9

*Contains reseller or OEM revenue; All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-12
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	90.3	64.2	13.2	4,774	11.3	15.9	5.8	14.6
Digital	86.8	68.4	0	3,530	10.8	16.9	0	10.8
Computervision	69.2	15.6	21.3	955	8.6	3.9	9.3	2.9
Intergraph	59.7	22.5	20.4	1,094	7.4	5.6	8.9	3.4
Sun Microsystems	57.5	45.9	0	1,965	7.2	11.4	0	6.0
Hewlett-Packard	53.7	38.9	4.9	2,094	6.7	9.6	2.1	6.4
ICL	30.4	17.8	10.5	873	3.8	4.4	4.6	2.7
Silicon Graphics	23.9	20.9	0	637	3.0	5.2	0	2.0
Sysdeco Ltd.	23.2	11.6	5.8	203	2.9	2.9	2.5	0.6
Autodesk	20.0	0	20.0	0	2.5	0	8.7	0
Data Technology/DATECH*	19.3	4.4	13.0	836	2.4	1.1	5.7	2.6
Mentor Graphics	17.4	2.5	7.6	83	2.2	0.6	3.3	0.3
Radan Computational	16.9	5.8	8.5	339	2.1	1.4	3.7	1.0
Engineering Computer Services*	15.7	6.2	5.5	427	2.0	1.5	2.4	1.3
Cadence	14.2	0	10.2	0	1.8	0	4.4	0
EDS Unigraphics	13.7	4.1	6.5	207	1.7	1.0	2.8	0.6
Parametric Technology	9.9	0	8.1	0	1.2	0	3.5	0
Smallworld Systems	9.3	0.5	5.5	17	1.2	0.1	2.4	0.1
SDRC	8.7	0	6.0	0	1.1	0	2.6	0
PAFEC	8.2	2.6	4.5	107	1.0	0.6	2.0	0.3
Other Companies	13.5	40.6	0	11,555	1.7	10.1	0	35.5
All Companies	802.1	403.5	229.0	32,595	100.0	100.0	100.0	100.0

(Continued)

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Table A-12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	617.1	331.2	150.6	24,178	76.9	82.1	65.8	74.2
All Asian-Based Companies	6.3	0.8	2.9	32	0.8	0.2	1.3	0.1
All European-Based Companies	178.8	71.5	75.5	8,385	22.3	17.7	33.0	25.7
All Hardware Companies	299.3	258.1	0	25,910	37.3	64.0	0	79.5
All Turnkey & SW Companies	502.9	145.5	229.0	6,685	62.7	36.0	100.0	20.5

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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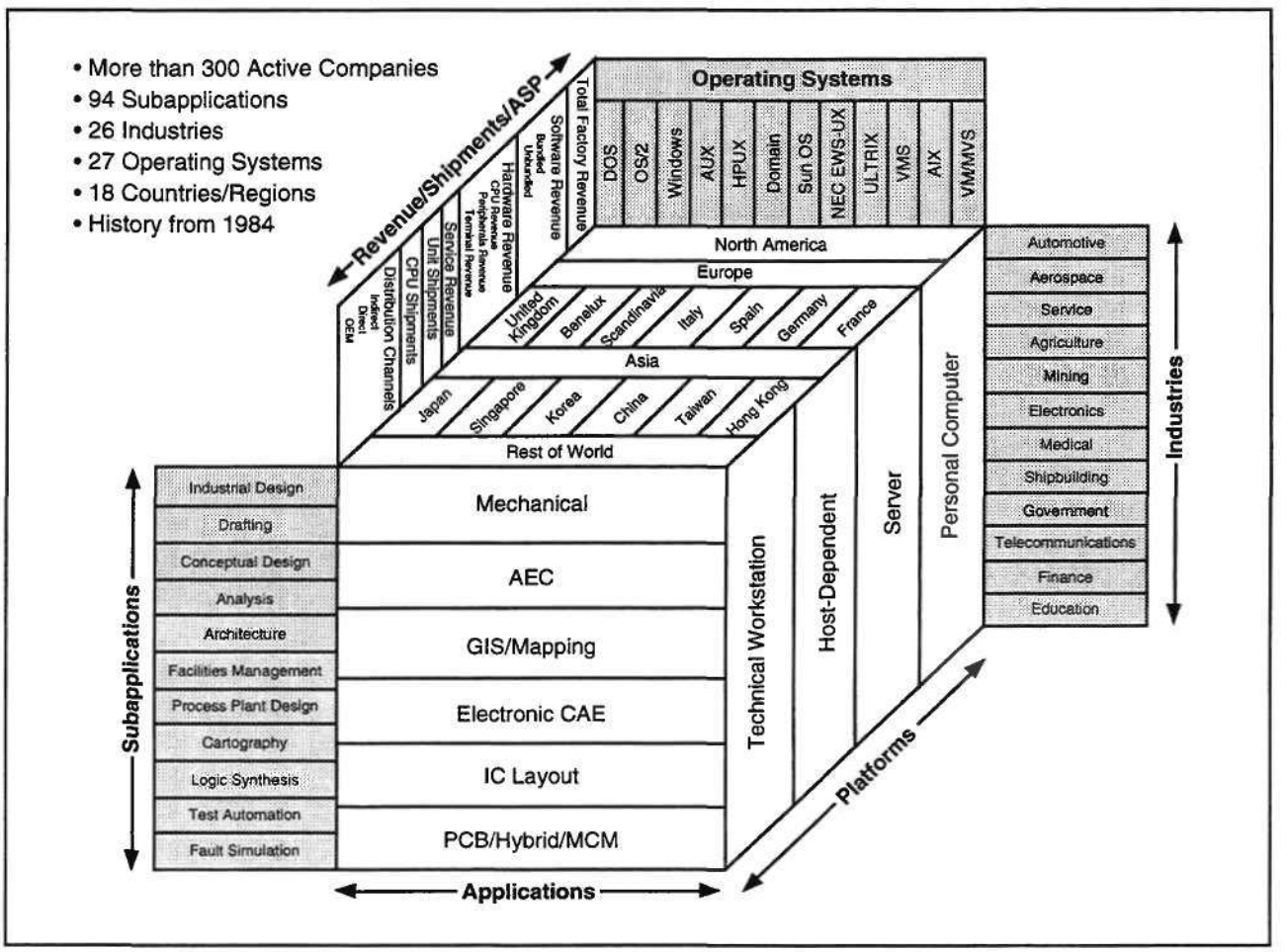
Appendix B
Methodology

To provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure B-1.

Market Share Methodology

Dataquest uses primary and secondary sources to produce our market share data. We survey all participants in each industry in the fourth quarter of each year and the second quarter of the subsequent year. Each vendor is offered the opportunity to report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and geographical regions. Thus, there is a corresponding increase in the number of contacts at large companies.

Figure B-1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (October 1994)

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Examples of the job titles of people contacted for information include the following:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning
- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE/GIS marketing programs
- Market research analyst

The Audit Process

Data supplied by vendors is evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks
- Articles in the general and trade presses
- Annual reports, SEC documents, and credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from vendors' competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice. We also check with different sources at companies to cross-check data.

Dataquest analysts have many years of experience in applying the previously cited tools to get the most accurate information possible on a particular company. We believe that ours are the most accurate and meaningful estimates generally available today. It is the CAD/CAM/CAE/GIS group's policy to update its market information to arrive at the most accurate market representation possible.

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Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—which is particularly useful when comparing regions or applications.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is the underlying philosophy that the best data and analyses come from a well-balanced program. This program includes the following: primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from more than 25 separate high-technology industries that Dataquest covers; balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of market researchers.

Dataquest also analyzes trends in the macro environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at gross domestic product (GDP) growth, interest rate fluctuation, business expectations, and capital spending plans. In the geopolitical arena, we look at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1994.

Figure B-2 shows the CAD/CAM/CAE/GIS forecasting model. The overall forecasting process uses a combination of forecasting techniques such as time series and technological modeling.

Market estimates and forecasts are derived using the following research techniques:

- Bottom-up aggregation: This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting: For each application segment tracked by the CAD/CAM/CAE/GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis: Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market model and a satisfied available market figure to accurately assess levels of penetration. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Acceptance and use of new technology are also factored into Dataquest's demand-based models and analyses.

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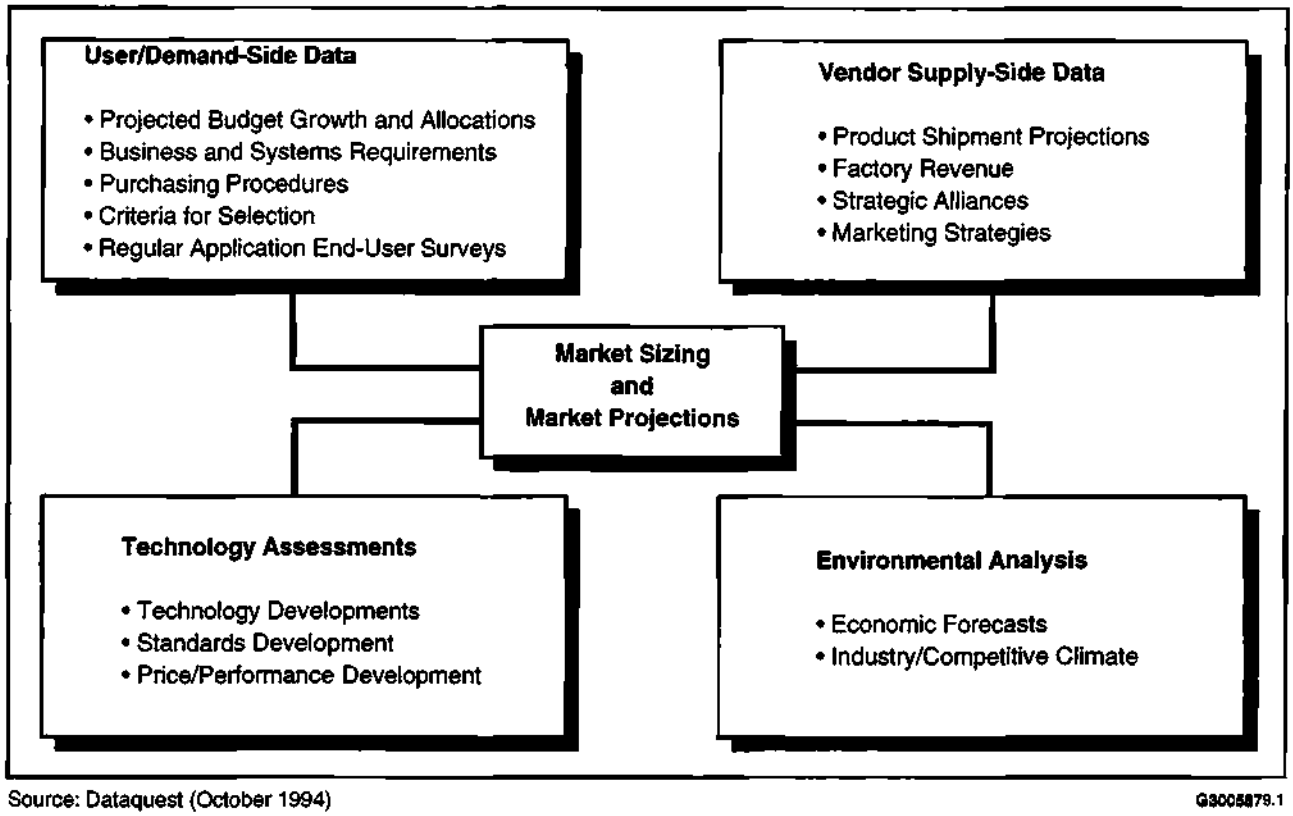
Figure B-2
CAD/CAM/CAE/GIS Forecasting Model



Source: Dataquest (October 1994) G3005879.1

- Capacity-based analysis: This method involves identifying future shipment volume constraints. These constraints, or ceilings, can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below demand level.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and electromechanical design (mechanical design with electrical or electronic components and

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mechanisms). Common manufacturing applications include tools and fixture design, numerical control part programming, offline robotics programming, and interface to quality control systems. Management tools for database control and distribution as well as user-defined application programming are included in this segment.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems/Mapping (GIS/Mapping)

GIS is a computer-based technology composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product including printed circuit boards (PCBs), integrated circuits (ICs), and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic computer-aided engineering (ECAE): These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of ECAE applications are schematic capture and simulation.
- IC layout: This is a software application tool that is used to create and validate the physical implementation of an integrated circuit. The IC layout category consists of polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/hybrid/MCM: This segment covers products that are used to create the placement and routing of the traces and components on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The regions covered in the service database are defined as follows:

- North America: Canada, Mexico, and the United States
- Europe: Benelux (Belgium, the Netherlands, Luxembourg), France, Germany, Italy, Scandinavia (Denmark, Finland, Norway, Sweden), Spain, the United Kingdom, and the Rest of Europe (Austria, Switzerland, and central and eastern Europe [including Russia and all other European countries/principalities])
- Asia: Japan, Hong Kong, Korea, Singapore, Taiwan, and China
- Rest of World: Africa, Australia, Caribbean Islands, Central America, India, Middle East, New Zealand, and South America

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Computing Platforms

The computing platforms used for CAD/CAM/CAE/GIS include everything from notebooks to supercomputers. The Dataquest CAD/CAM/CAE/GIS database uses four platform designations—technical workstations, host-dependent systems, servers, and personal computers—to track the market.

Technical Workstation

A technical workstation is a single-user computer that is distinguished from a personal computer by its features and by the user's potential migration path within the platform. Dataquest classifies workstations based on hardware, software, and product features (as opposed to usage). In general, a workstation must come standard with an integrated floating-point coprocessor, integrated networking, a 32-bit multitasking operating system (UNIX, VMS, DOMAIN), and high-resolution graphics capability.

Host-Dependent System

A host-dependent system is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a workstation, without the high-resolution graphics capability, that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems, the clients. Functions include file storage, database access, and print and compute capabilities. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE/GIS applications:

- Compute servers: These provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (such as vector and parallel processing) and large memories.
- Print servers: These provide access to printers, specialized printing applications software, and print spooling resources to a network.
- File servers: These provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database servers: These manage databases as a shared resource to a network. Database servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is defined as a general-purpose computer that is distinguished from other computers by its adherence to hardware and software compatibility. This compatibility drives high unit volumes of commodity-like products that do not require on-site technical support.

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High-performance features (such as networking, graphics, a floating-point coprocessor, and a virtual, multiuser/multitasking operating system) are normally optional rather than integral features. IBM/IBM-compatible and Macintosh personal computers are two of the platforms in this product segment. A single-user PC's resident operating system typically is DOS, OS/2, or Mac OS. PCs have a performance ceiling that is typically lower than that of workstations: lower in computer performance, I/O channel speed, disk speed, and sophistication or available application software. Optional high-end graphics are limited compared with graphics options on workstations.

Line Items

Line item definitions are as follows:

- Average selling price (ASP) is the average price of a product, inclusive of any discounts.
- Unit shipment is the number of products delivered (that is, seats).
- Seats are the number of possible simultaneous users.
- Installed seats are the total number of seats in active, day-to-day use.
- Terminal revenue is defined as revenue derived from the sale of terminals used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform; terminal revenue is contained within CPU revenue for technical workstations and PCs.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated by subtracting hardware and software revenue from total revenue.
- Total factory revenue, measured in U.S. dollars, is the amount of money received by a manufacturer for its goods and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue from products sold to another company for resale (OEM revenue).

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Dataquest Perspective

Software

CAD/CAM/CAE/GIS Europe

In This Issue

The European CAD/CAM/CAE and GIS Software Market in 1993

The European CAD/CAM/CAE and GIS software market, which represented the world's largest regional market for this software until the beginning of 1993, suffered a setback in 1993 and lost its leading position in this market. Adverse economic conditions, which hit the manufacturing and construction industries particularly hard, were the main cause of the slowdown in revenue growth.

This *Dataquest Perspective* gives an analysis of the top-level European market share data by application and provides country focus for the four major countries in the European CAD/CAM/CAE/GIS industry: Germany, United Kingdom, France, and Italy.

By Petra Gartzen

The European CAD/CAM/CAE and GIS Software Market in 1993

Overall, the European CAD/CAM/CAE and GIS market dropped 5.6 percent, falling to $5.4 billion in total factory revenue in 1993. Software revenue dropped 5 percent to $1.6 billion. Of the total software revenue, U.S. vendors shipped 64.3 percent, and European vendors shipped 35.7 percent. The Asian vendors' share is negligible. Currency fluctuations are complicating the picture. The dollar appreciated strongly against European currencies in 1993, which had a big negative impact on growth in the European countries (see Table 1). Calculating the European revenue in European Currency Units (ECU), the market actually showed positive growth: 5.2 percent for total revenue and 5.8 percent for software revenue. The main reasons behind this slower growth rate were the continuing recessionary climate in most European countries, a decline in the manufacturing industry followed by the continuing rapid decline of hardware prices, and the repositioning of major CAD vendors like Computervision from turnkey to software vendors.

Figure 1 provides a snapshot of the activities in the European CAD/CAM/CAE/GIS software industry, indicating market size and market growth rate for each segment and each European region. In this figure, as well as in Figures 3 through 6, the heavy horizontal line indicates the industry average for software revenue growth; the positions of the bubbles indicate their segment or regional growth rates (x-axis) and segment or regional sizes (y-axis) for 1993. Growth is shown in local currency terms for CAD/CAM/CAE and GIS in Europe by region and by application. To enable a comparison between regions, the actual market sizes in Figure 1 are given in U.S. dollars. Figures 3 through 6 show the individual market sizes in local currency.

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Table 1
Exchange Rates between U.S. Dollars and European Currencies

Country	Currency	1990 per U.S.$	1991 per U.S.$	Change (%)	1992 per U.S.$	Change (%)	1993 per U.S.$	Change (%)
Austria	Schilling	0.08821	0.08802	-0.2	0.0916	4.1	0.08594	-6.2
Belgium	Franc	0.03002	0.0294	-2.1	0.03131	6.5	0.02889	-7.7
Denmark	Krone	0.1622	0.157	-3.2	0.1667	6.2	0.1544	-7.4
Finland	Markka	0.26233	0.24832	-5.3	0.22599	-9.0	0.17461	-22.7
France	Franc	0.18424	0.17799	-3.4	0.19022	6.9	0.17655	-7.2
Germany	D-Mark	0.6207	0.6052	-2.5	0.6446	6.5	0.6045	-6.2
Italy	Lira	0.0008368	0.0008097	-3.2	0.0008191	1.2	0.0006349	-22.5
Netherlands	Guilder	0.551	0.5372	-2.5	0.5725	6.6	0.5385	-5.9
Norway	Krone	0.1603	0.1547	-3.5	0.1622	4.8	0.1409	-13.1
Spain	Peseta	0.009833	0.009664	-1.7	0.009652	-0.1	0.007668	-20.6
Sweden	Krona	0.1691	0.1658	-2.0	0.1731	4.4	0.1282	-25.9
Switzerland	Franc	0.7239	0.6999	-3.3	0.7182	2.6	0.6759	-5.9
United Kingdom	Pound	1.7859	1.7674	-1.0	1.7694	0.1	1.5004	-15.2
European Average	ECU		1.23776		1.30102	5.1	1.16744	-10.3

Source: Dataquest (September 1994)

Applications

The proportional split of software revenue by application changed in distribution from 1992 to 1993, with actual percentages varying slightly from last year's picture (see Figure 2). In terms of actual software revenue growth based on ECU for the various applications in 1993, the GIS/mapping sector showed a 25.1 percent gain over 1992, followed by EDA applications with 10.3 percent growth. AEC grew 5.4 percent, whereas mechanical applications showed a 0.2 percent decrease.

Mechanical

The market for mechanical CAD/CAM/CAE software was badly affected during 1993 by the overall economic situation in the manufacturing industry in Europe. Because of the fall in 1992 and 1993 in industrial production throughout Europe, the level of spare capacity generated through this decline resulted in a sharp decline in machinery and equipment investment in the manufacturing industry during this period.

Mechanical applications, which totaled $782 million, had a 48.6 percent share of the total European CAD/CAM/CAE and GIS software market, compared with 51.5 percent in 1992 and 53.9 percent in 1991, and dropped 0.2 percent in software revenue based on ECU. Compared with this, the top 10 vendors actually grew 2.2 percent and now control 64 percent of this market (see Table 2). New entrants among the top 10 were Parametric Technology and MacNeal-Schwendler, which made the top 10 list at the

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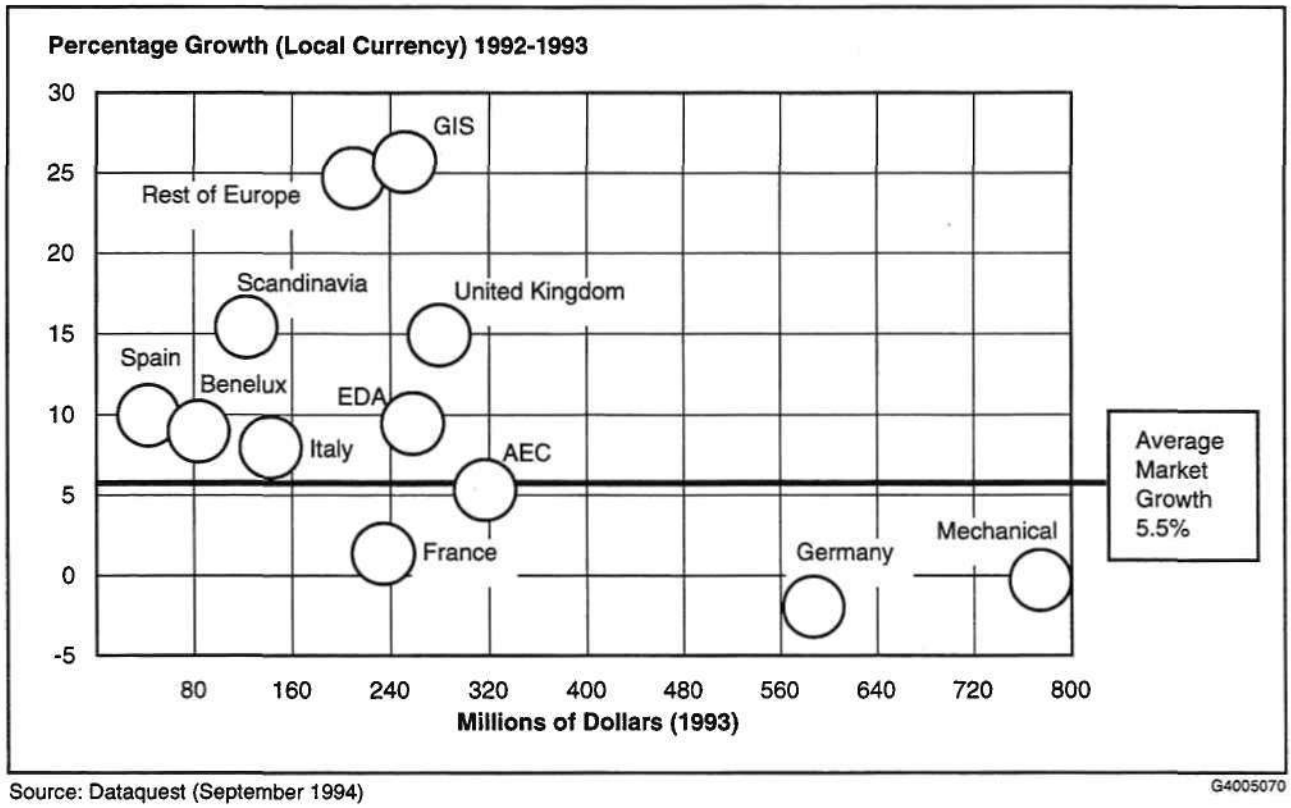
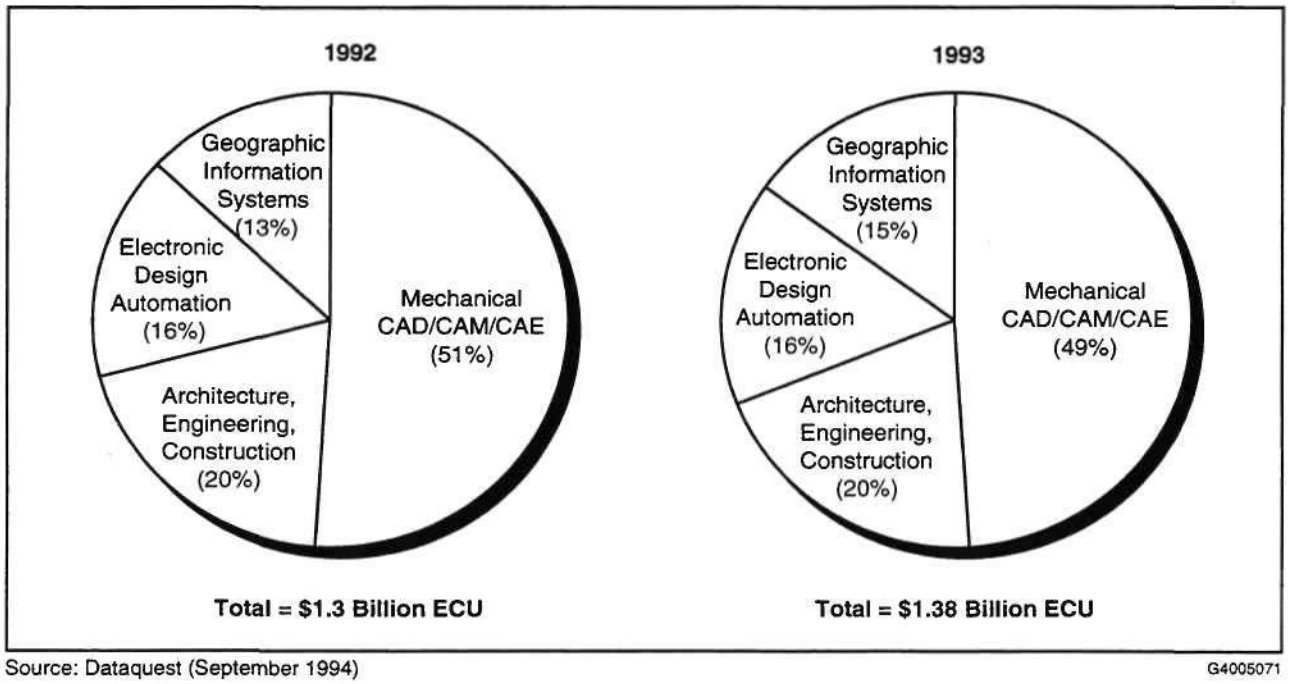
Figure 1
1993 European CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (September 1994) G4005070

Figure 2
1992 and 1993 Software Revenue Distribution by Application



Source: Dataquest (September 1994) G4005071

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Table 2
Top 10 Mechanical CAD/CAM/CAE Software Vendors' Size and Growth in Europe

Company	1993 Revenue ($M)	Growth (%)	1992 Ranking
IBM	136.4	4.1	1
Computervision	86.3	-32.0	2
Autodesk	52.9	3.8	3
Matra Datavision	43.1	0.7	5
Parametric Technology	40.4	122.9	11
Hewlett-Packard	35.8	-15.2	6
SDRC	35.0	-24.9	4
EDS Unigraphics	33.2	12.6	7
MacNeal-Schwendler	20.8	23.5	12
Intergraph	19.9	-26.9	9
Top 10 Companies*	503.8	2.2	
All Companies*	782.0	-0.2	

*Growth rates based on ECU
Source: Dataquest (September 1994)

expense of Siemens-Nixdorf and Applicon. U.S.-based vendors had 79 percent share of the mechanical CAD/CAM/CAE software market, with European vendors holding the rest. Over the last few years we have seen the share of European vendors decline in favor of U.S.-based vendors. This trend is, on the one hand, because of U.S. vendors' acquisitions of several European companies (Norsk Data, Isykon product line) and, on the other hand, because of local mergers and acquisition (Straessle acquired Nestler and Fides). Or, companies have simply pulled out of this market.

AEC

The European construction industry, like the economy of the region, was in retreat during 1993. Economic recession, high interest rates, and mounting unemployment hit exports and undermined consumer confidence. Private investment in homes and by manufacturers and service industries declined as demand for these products fell. Companies are unlikely to invest in improving premises or new buildings while their own sales remain weak, and public sector spending on construction is unlikely to see much improvement when looking at the budget deficits that most countries have accumulated. The situation has not been helped by overdevelopment of offices in the late 1980s, which has left many buildings empty.

The European AEC software market reached $313.4 million in software revenue in 1993. Based on ECU, AEC software revenue in Europe actually increased by 5.4 percent. This growth was driven by the top 10 vendors, which grew 9.1 percent in aggregate. These top 10 vendors now control 71 percent of this market segment with 6 European companies among the top 10 (see Table 3). In the AEC segment, European vendors keep gaining market share and now control 56.2 percent of the market, with U.S.-based vendors controlling the rest in terms of software revenue. This compares with a 52.7 share for European vendors in 1991.

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Table 3
Top 10 AEC Software Vendors' Size and Growth in Europe

Company	1993 Revenue ($M)	Growth (%)	1992 Ranking
Autodesk	56.9	3.9	1
Nemetschek	44.7	37.6	3
Intergraph	40.1	-8.0	2
IEZ	27.8	5.9	4
IBM	13.0	-13.1	6
Soft-Tech Software Technologies	11.4	9.8	8
Computervision	7.6	-58.1	5
Han Dataport	6.5	0.5	11
RIB/Bausoftware	6.1	13.8	12
CADCentre	7.6	-30.4	9
Top 10 Companies*	221.7	9.1	
All Companies*	313.4	5.4	

*Growth rates based on ECU
Source: Dataquest (September 1994)

GIS

There is a tendency around Europe to make the public sector smaller. In countries where, for example, the utility sector was privatized, we have seen a surge in GIS spending as almost a direct result. Also, the telecommunications sector is becoming increasingly deregulated, and in order for telecommunications companies to have a competitive edge, they have had to become more efficient in managing territories. This trend has resulted in large orders for GIS by, for instance, German Telekom and France Telecom.

Growth in Europe for GIS software accelerated in 1993 to 25.1 percent based on the ECU, reaching $246 million in revenue. The top 10 vendors, which control 73 percent of this market segment, increased their software revenue by 43 percent in aggregate (see Table 4). Compared with 1991, when European vendors held a 52 percent share of the European GIS software market, the roles have now switched, with U.S.-based vendors holding 55 percent of the market in 1993 despite the fact that there are 6 European vendors among the top 10.

EDA

The main investment in EDA software in Europe during 1993 came from the telecommunications sector, which continues to dominate electronic design in Europe. Forty percent of the EDA software revenue generated in Europe came from the telecommunications sector. In addition to this sector, the semiconductor and even the defense industries in Europe increased their investment in EDA software tools. Several North American and Japanese semiconductor companies established operations in Europe during the past year. These new operations boosted the sale of CAE and IC layout tools in particular.

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Table 4
Top 10 GIS Software Vendors' Size and Growth in Europe

Company	1993 Revenue ($M)	Growth (%)	1992 Ranking
Siemens Nixdorf Informationssysteme	48.2	-4.1	1
Intergraph	43.0	19.0	2
ESRI	36.0	54.1	3
Autodesk	14.5	3.9	4
Smallworld Systems	13.8	138.6	6
Straessle Informationssysteme	6.5	142.2	14
Sysdeco Ltd.	5.9	270.6	19
Genasys II	4.4	11.2	8
Laser-Scan	4.2	22.0	9
APIC Systemes	4.0	24.5	13
Top 10 Companies*	180.5	43.1	
All Companies*	246.0	25.1	

* Growth rates based on ECU
Source: Dataquest (September 1994)

Based on these trends, the European EDA software market showed relatively healthy growth. Overall EDA software revenue growth in Europe was 10.3 percent based on ECU. In U.S. dollars, the market reached a size of $267.6 million. The top 10 vendors had a 63 percent share of the total EDA software market. The positions of these vendors changed significantly in 1993 compared with 1992 (see Table 5). When compared with the other application sectors, these top 10 vendors had only a marginally higher growth rate, 10.7 percent, than the average EDA software growth rate. The EDA market is heavily dominated by U.S.-based vendors, which held an 81 percent share of the overall European EDA software market in 1993. In 1991, this share was 68 percent. U.S.-based vendors have been steadily increasing their hold on the European EDA market. And now that Racal-Redac has become a Japanese company, the European vendors' share will plunge even further in 1994.

European CAD/CAM/CAE/GIS Market by Region

Europe is and will continue to be a number of separate countries. The economies of the different countries react very differently to recessionary pressures, despite their being flexibly linked via the so-called exchange rate mechanism of the European Community, and aim toward greater unity in the wake of the Maastricht Treaty. This difference is also reflected in the varying size and growth rates for CAD/CAM/CAE/GIS revenue.

German CAD/CAM/CAE and GIS Overview

The German CAD/CAM/CAE/GIS software market led Europe with 35.7 percent share of the European market in 1993. However, the general economic situation in Germany was bad. Large potential CAD/CAM/CAE/GIS customers had taken board-level decisions to halt investments. Customers in the medium-size independent German manufacturing

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Table 5
Top 10 EDA Software Vendors' Size and Growth in Europe

Company	1993 Revenue ($M)	Growth (%)	1992 Ranking
Cadence	46.6	-14.9	1
Mentor Graphics	40.2	13.5	2
Synopsys	17.5	64.5	5
Racal-Redac	12.2	-33.6	3
Intergraph	10.2	-6.3	4
Viewlogic Systems	9.3	2.9	6
Hewlett-Packard	9.1	7.7	8
COMPASS Design Automation	8.7	-3.2	7
Logic Modeling Corp.	8.1	104.8	15
Autodesk	7.9	4.2	9
Top 10 Companies*	169.8	10.7	
All Companies*	267.6	10.2	

*Growth rates based on ECU
Source: Dataquest (September 1994)

companies saw their orders fall by as much as 50 percent and slashed spending. Only strategic projects went ahead; replacement investments were delayed.

This was the main reason why this market dropped 2.7 percent over 1992 to DM700 million. The top 10 vendors in Germany had a particularly bad time, with their revenues declining 5.9 percent in aggregate. The decline was mainly caused by the big drop of 9.3 percent in revenue for mechanical CAD/CAM/CAE software (see Figure 3 and Table 6). These 10 vendors hold a 52 percent share of the German market. The two growth leaders among the top 10 were AEC company Nemetschek and electrical engineering vendor Wiechers Datentechnik. European and, in particular, German-based CAD/CAM/CAE and GIS software vendors are relatively strong in this country, controlling 46 percent of the market with U.S.-based vendors holding the remaining 54 percent.

Looking at the software application splits in Germany, mechanical was the largest segment with 46.5 percent, followed by AEC with 25.8 percent, EDA with 16.2 percent, and GIS with 11.5 percent.

U.K. CAD/CAM/CAE and GIS Overview

The £162.6 million U.K. market was equivalent to a 15.2 percent share of the overall European CAD/CAM/CAE/GIS software market in 1993. Software revenue in terms of U.K. pounds increased 16.2 percent, which was considerably above the European average, a strong indication that the long recession in this country is finally over. During 1993, the manufacturing industry and the electronics industry began to invest again, which also had a significant impact on the CAD/CAM/CAE/GIS software industry in the United Kingdom.

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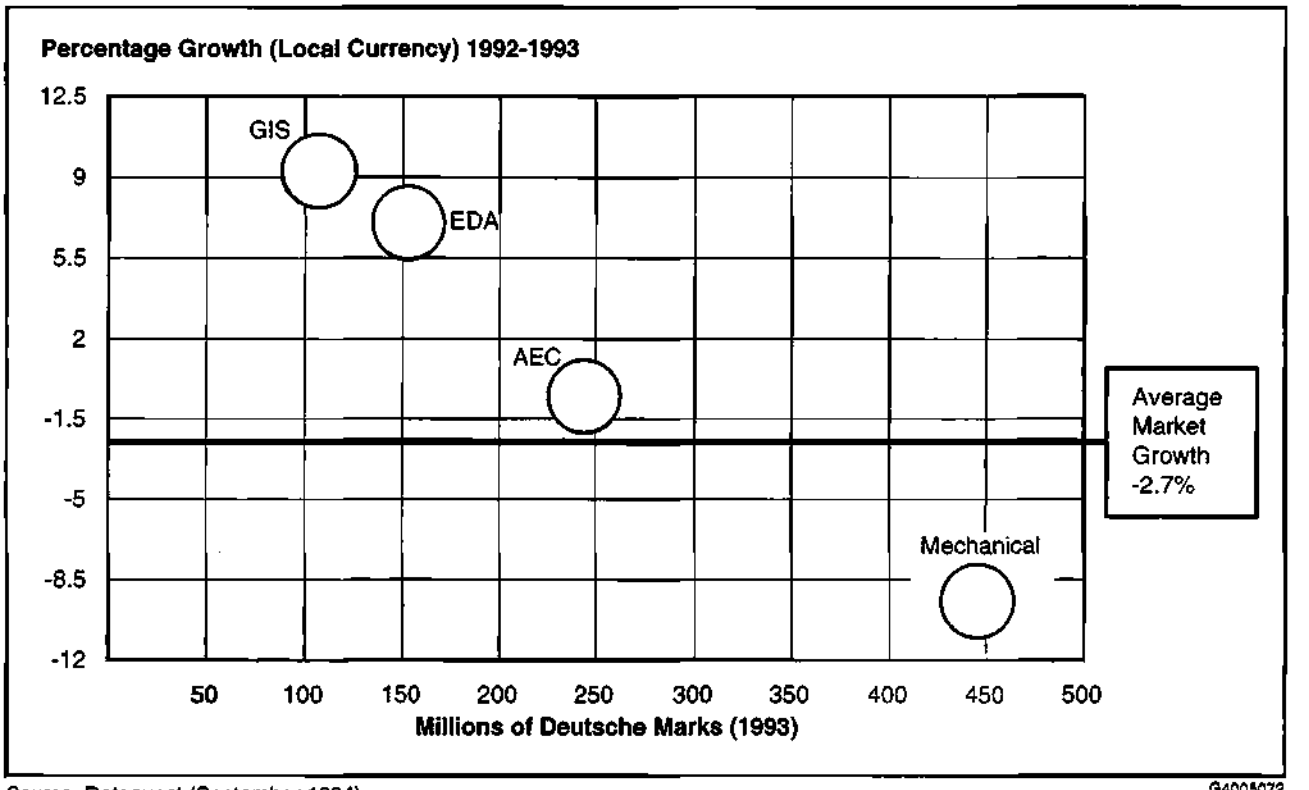
Figure 3
1993 German CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (September 1994)

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Table 6
Top 10 German CAD/CAM/CAE/GIS Software Vendors' Size and Growth

Company	1993 Revenue (DM M)	Growth (%)	1992 Ranking
IBM	98.7	7.7	2
Siemens-Nixdorf Informationssysteme	72.1	-33.0	1
Nemetschek	67.3	41.3	6
Autodesk	61.2	-13.8	3
Intergraph	46.1	-4.2	5
Computervision	45.8	-16.3	4
Hewlett-Packard	29.4	-7.2	7
Wiechers Datentechnik	25.3	35.8	11
Cadence	24.6	3.8	9
IEZ	24.5	-20.7	8
Top 10 Companies	495.0	-5.9	
All Companies	949.9	-2.7	

Source: Dataquest (September 1994)

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The leading 10 vendors in software revenue in the United Kingdom in 1993 controlled only 49 percent of the market, and these vendors' average growth rate of 11.2 percent was significantly below the country's average software growth rate (see Table 7). Growth leader among the top 10 was Parametric Technology, which, for the first time, claimed a position among the U.K. leaders. Exiting the top vendor list were GDS and Pafec.

In 1993, mechanical CAD/CAM/CAE software revenue made up 46.7 percent of the U.K. market, with GIS at 20.5 percent, EDA at 17.1 percent, and AEC at 15.7 percent. GIS was the fastest-growing application sector, with growth over 1992 at 38.4 percent (see Figure 4).

French CAD/CAM/CAE and GIS Overview

The overall French economy contracted during 1993, affecting the construction and manufacturing industries in particular. Industrial production declined sharply, resulting in a drop in investment in the manufacturing industry. This in turn affected the overall performance of the French mechanical and AEC software markets. The GIS sector, on the other hand, showed tremendous growth because of large investment by the utility and telecommunications sectors (see Figure 5).

France's share of the overall European CAD/CAM/CAE/GIS market was 14.4 percent in 1993. The French CAD/CAM/CAE/GIS software market in 1993 increased just 2.6 percent over 1992 to FF1,313 million. The top 10 vendors actually dropped 1.7 percent in aggregate and held a 61 percent share of the French market. Matra Datavision, the local matador, finally made it to the leading position. As in all European CAD/CAM/CAE and GIS markets, the French market is dominated by U.S.-based vendors, which had 71.7 percent of the software revenue with European vendors holding the remaining 28.3 percent. However, the leading two software packages sold in France in 1993 are French developments, although IBM's CATIA product is counted as a U.S. product (see Table 8).

Table 7
Top 10 U.K. CAD/CAM/CAE/GIS Software Vendors' Size and Growth

Company	1993 Revenue (£M)	Growth (%)	1992 Ranking
Computervision	14.2	-26.6	1
Intergraph	13.4	15.1	2
Autodesk	13.3	24.3	3
IBM	8.8	44.6	4
Radan Computational	5.6	19.9	5
Cadence	5.6	27.2	6
Parametric Technology	5.4	162.5	17
Mentor Graphics	5.1	20.8	7
EDS Unigraphics	4.3	60.6	13
SDRC	4.0	-5.9	8
Top 10 Companies	79.7	11.2	
All Companies	162.6	16.2	

Source: Dataquest (September 1994)

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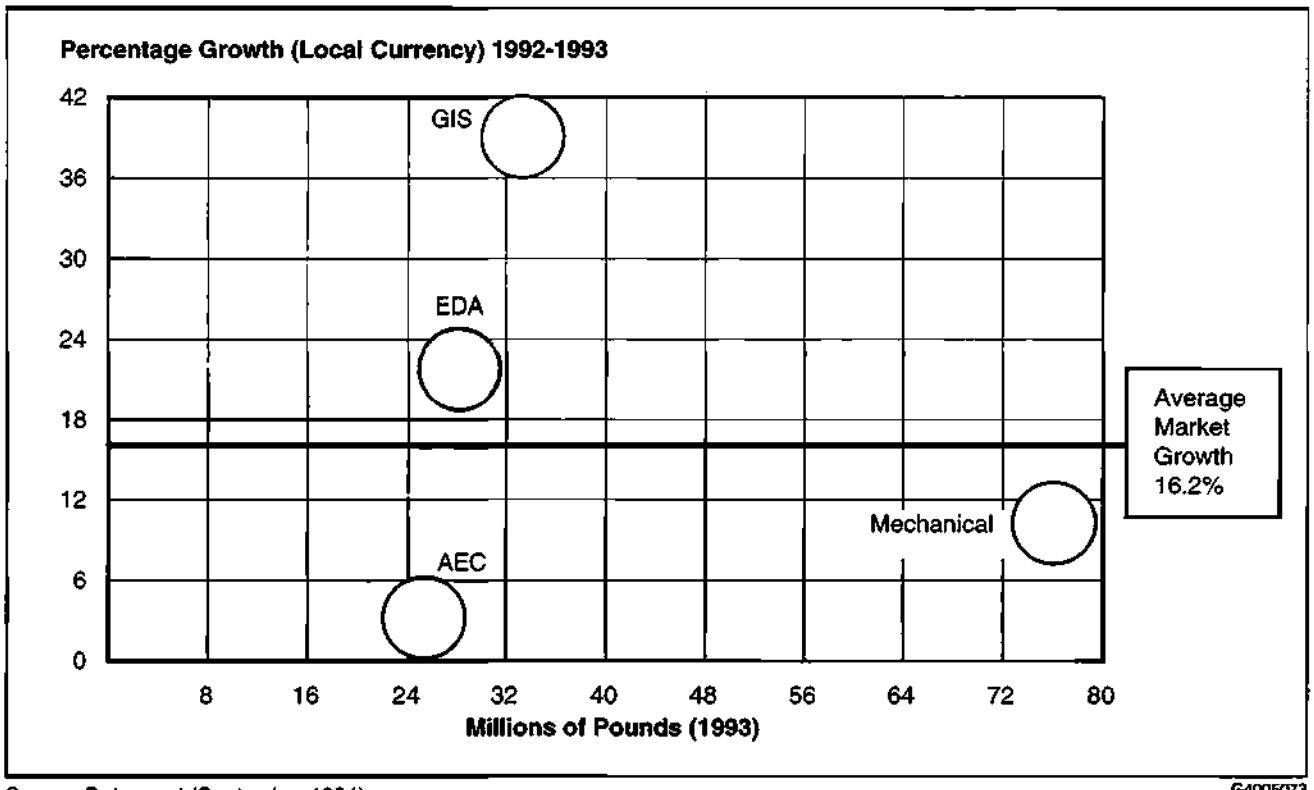
Figure 4
1993 U.K. CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (September 1994)

G4005073

About 55 percent of the CAD/CAM/CAE and GIS software revenue in France came from mechanical applications, with 22 percent spent on EDA tools and only about 11.4 percent on AEC and 11.3 percent on GIS applications.

Italian CAD/CAM/CAE and GIS Overview

For years Italy had been holding a constant 10 percent share of the market, with strong, above-average growth until 1991. In 1992, owing to the overall economic and political situation, the market started to slow down. The situation became even worse in 1993, when software revenue grew only 5.8 percent, reaching L211.4 billion. Now, the Italian market only has an 8.3 percent share of the total European CAD/CAM/CAE/GIS software market. The public sector, which accounts for the majority of Italy's business, is not going to invest in anything until the corruption issues have abated. Until then, most public sector projects/investment is frozen. Looking at the market by application, mechanical had the biggest share of the total Italian CAD/CAM/CAE and GIS revenue with 62.6 percent, followed by EDA with 14.2 percent, GIS with 12 percent, and AEC with 11.2 percent (see Figure 6).

The top 10 vendors controlled 59 percent of the total Italian CAD/CAM/CAE/GIS software revenue; however, this group declined sharply at

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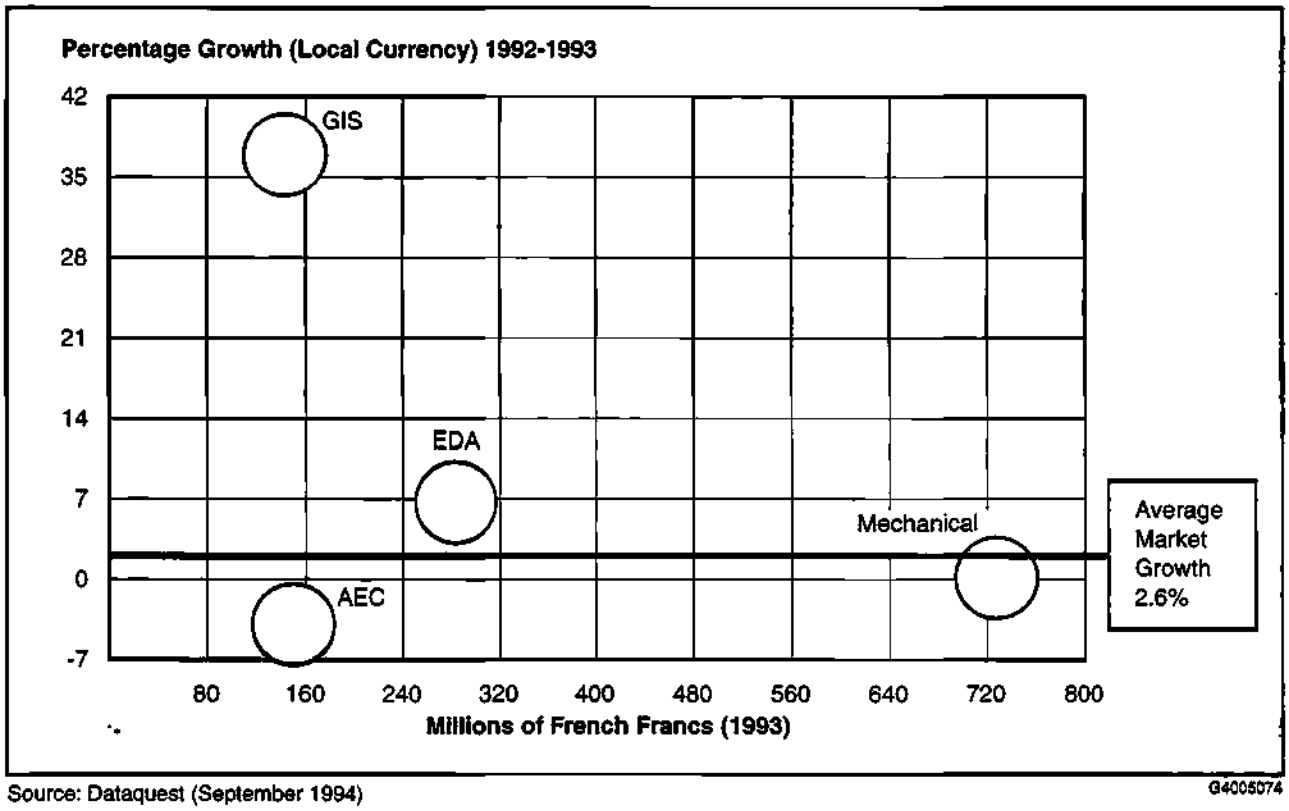
Figure 5
1993 French CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (September 1994)

G4005074

Table 8
Top 10 French CAD/CAM/CAE/GIS Software Vendors' Size and Growth

Company	1993 Revenue (FF M)	Growth (%)	1992 Ranking
Matra Datavision	135.6	18.1	3
IBM	134.4	-17.0	1
Autodesk	112.4	23.0	4
Intergraph	97.1	34.4	5
Computervision	95.0	-41.0	2
Cadence	60.6	-15.7	6
Parametric Technology	57.3	140.5	12
Cisigraph	40.1	5.2	8
Mentor Graphics	39.2	40.4	11
SDRC	35.2	-20.3	7
Top 10 Companies	806.9	-1.7	-
All Companies	1,312.5	2.6	-

Source: Dataquest (September 1994)

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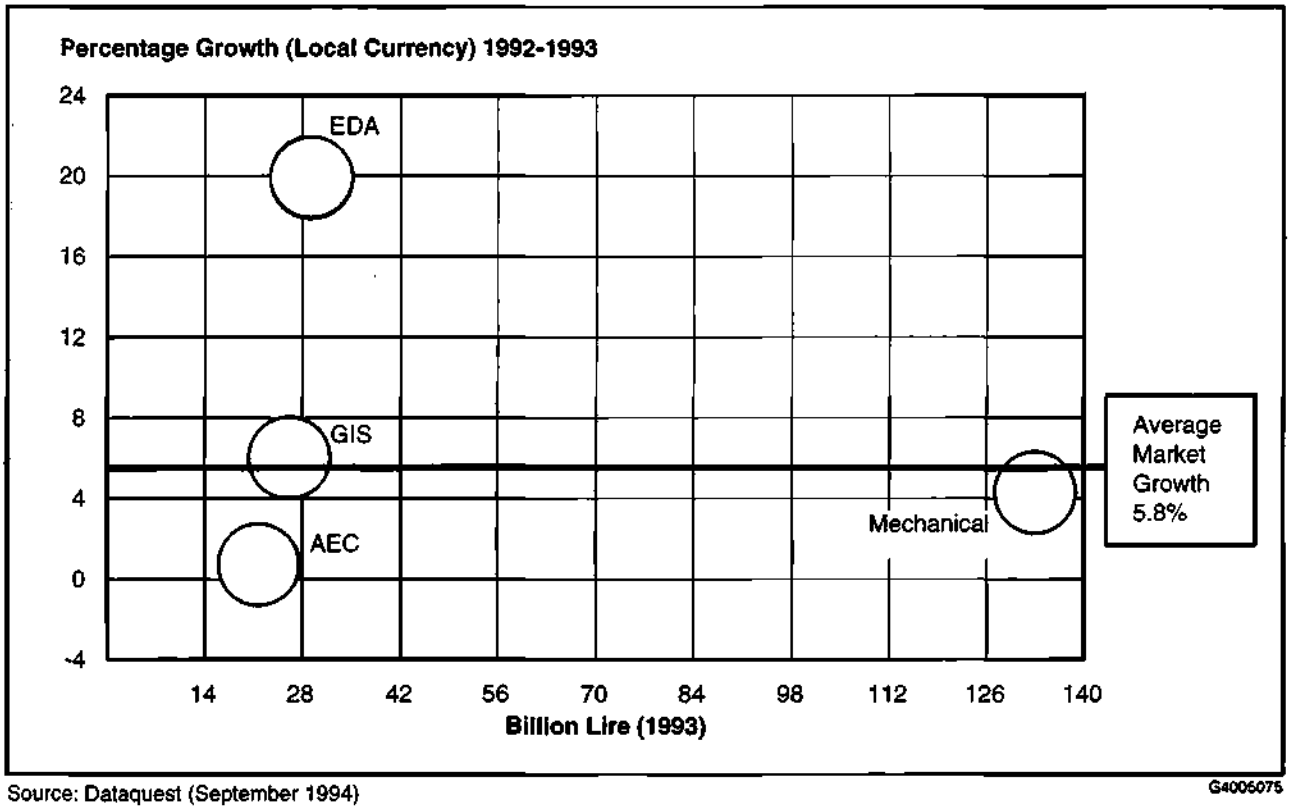
Figure 6
1993 Italian CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (September 1994) G4006075

5.1 percent (see Table 9). The losers among this group were the two leading Italian vendors, CAD.LAB and ItalCad, and Computervision. ItalCad has since been acquired by Computervision. Computervision, in particular, suffered badly from the slowdown among Italy's leading manufacturers as the company depends on their orders to a large extent. Fiat, Computervision's largest customer in Italy, drastically cut its investment in CAD/CAM/CAE software. As was the case in most European regions, U.S.-based vendors had the largest share of the market with 68.3 percent (see Table 9).

In the past, all the PC-based software vendors had problems selling to their full potential in Italy, as the country lacked proper software copyright protection laws. This changed in January 1993 when Italy introduced a new copyright protection law. It had a positive effect on companies like Autodesk.

Dataquest Perspective

Looking at the overall performance of the European CAD/CAM/CAE and GIS software industry, the dominance of U.S.-based vendors becomes obvious. Except for the AEC sector, U.S.-based vendors have continued to increase their hold on the European market. Most European vendors operate only in their country of origin and one or two other countries, and

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Table 9
Top 10 Italian CAD/CAM/CAE/GIS Software Vendors' Size and Growth

Company	1993 Revenue (Billions of Lira)	Growth (%)	1992 Ranking
IBM	21.2	1.4	2
Computervision	20.7	-36.9	1
Autodesk	19.6	60.5	5
CAD Lab	16.9	-3.9	3
ItalCad	8.4	-44.8	4
SDRC	8.2	31.2	9
Siemens-Nixdorf Informationssysteme	8.0	2.5	6
Matra Datavision	7.8	25.0	10
ESRI	7.5	145.7	15
Intergraph	7.4	12.9	8
Top 10 Companies	125.7	-5.1	-
All Companies	211.4	5.8	-

Source: Dataquest (September 1994)

these vendors suffered. Operating in a comparatively small region does not generate enough revenue to keep up the investment in R&D necessary to continue to produce competitive products. Most European vendors that have expanded their international presence have actually grown above industry average.

By Petra Gartzen

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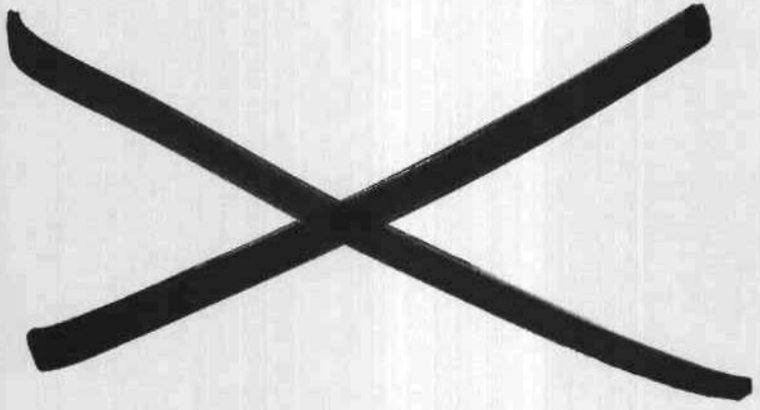

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Dataquest Company Profile

Software

CAD/CAM/CAE/GIS Europe

Hewlett-Packard—Mechanical Design Division

Corporate Statistics

Corporate Headquarters	Hanover Street 3000 Palo Alto, CA 94304-1181 USA Telephone: (+1) 415-857-1501 Fax: (+1) 415-857-4586
MDD Headquarters	Herrenberger Straße 130 71034 Böblingen Germany Telephone: +49-7031-14-0 Fax: +40-7031-14-2999
General Manager MDD	Peter Bohn
Number of MDD Employees	135 (excluding sales, administration, and support)
Corporate Revenue	$20.3 billion in 1993, $25.0 billion in 1994
MDD Software Revenue 1993	$70.8 million (Dataquest estimate)
R&D Investment	15 percent of MDD turnover
Fiscal Year-End	October 31
Company Founded	1939
HP Entering MCAD Market	1985

Hewlett-Packard Company's Mechanical Design Division (MDD) provides 2-D and 3-D design, drafting, and documentation systems plus product data management (PDM) solutions for the mechanical CAD/CAM market.

Corporate Overview

Hewlett-Packard's MDD was founded in Böblingen, Germany, in 1985. In 1986, the company introduced ME30, a 3-D modeling, design, and drafting CAD system. To manage the data generated by companies using ME10 and ME30, HP developed the engineering data management system HP-DMS.

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In 1989, MDD was established as an independent division within HP, and that same year MDD started development of its next-generation product, PE/SolidDesigner, which was released in spring 1993.

In 1991, MDD acquired ABB Cade, the Swiss-German electrical engineering CAD company. The product DDS-C is now part of MDD's overall product offering.

In 1994, HP announced an OEM partnership with Cisigraph of France to develop PE/SurfaceStyler, a surface modeling application. In October, MDD announced version 3.0 of its PE/SolidDesigner product.

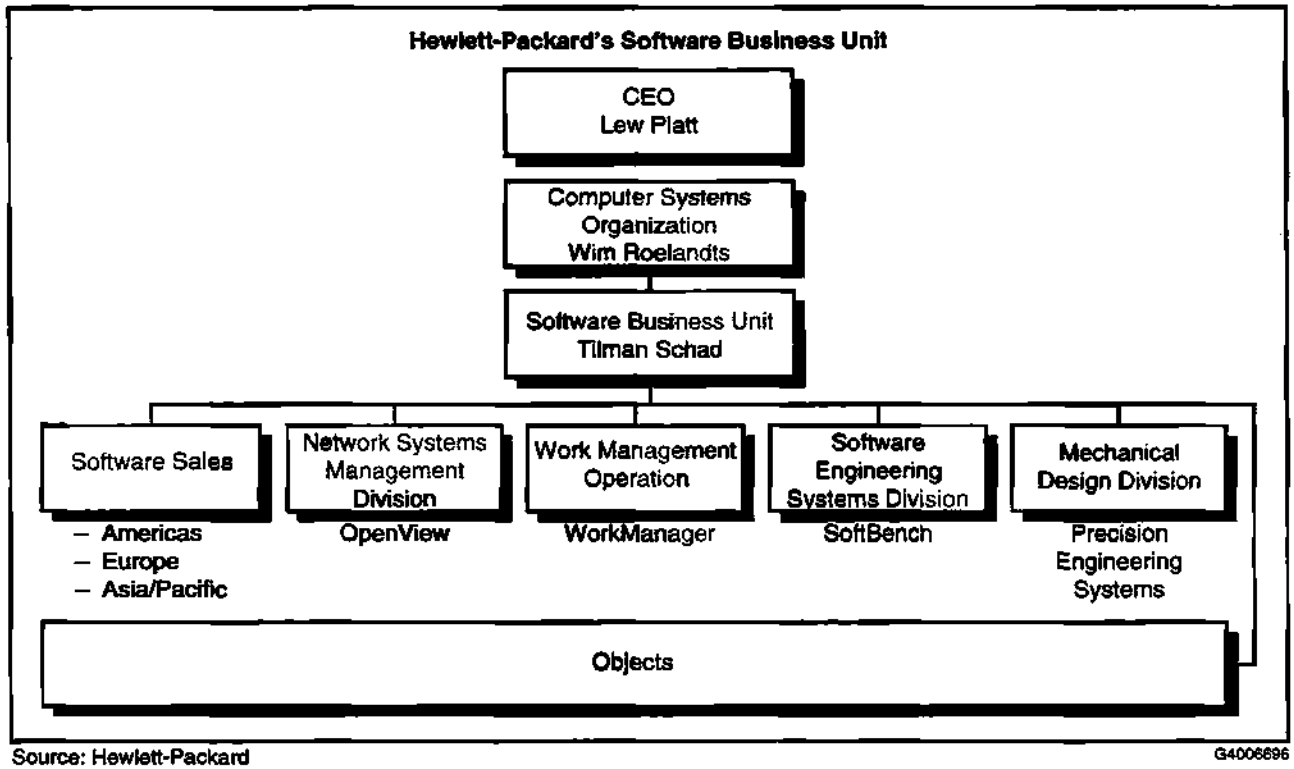
Organization

HP's MDD is a separate entity within the Software Business Unit (SBU), and like most HP divisions, it has its own profit and loss responsibility.

HP's SBU is headed by General Manager Tilman Schad, who previously held the position of General Manager, MDD. SBU consists of separate software development entities ranging from CASE and network and systems management to MCAD and PDM. See Figure 1 for SBU's organization chart.

WorkManager, which was developed out of the need for CAD data and workflow management, led to the establishment of a new division called

Figure 1
Hewlett-Packard's Software Business Unit



Source: Hewlett-Packard G4006696

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WorkManagement Operation (WMO) in November 1993. WMO also resides in the SBU. This means that MDD's solutions are closely linked to products offered by HP's WMO. Common charters for MDD and WMO support the development of software across multiple platforms.

All aspects of the SBU are also of strategic importance to HP as a whole, because the company uses the SBU's products for its internal product development in many divisions. See Figure 2 for the distribution of mechanical CAD software seats used internally at HP.

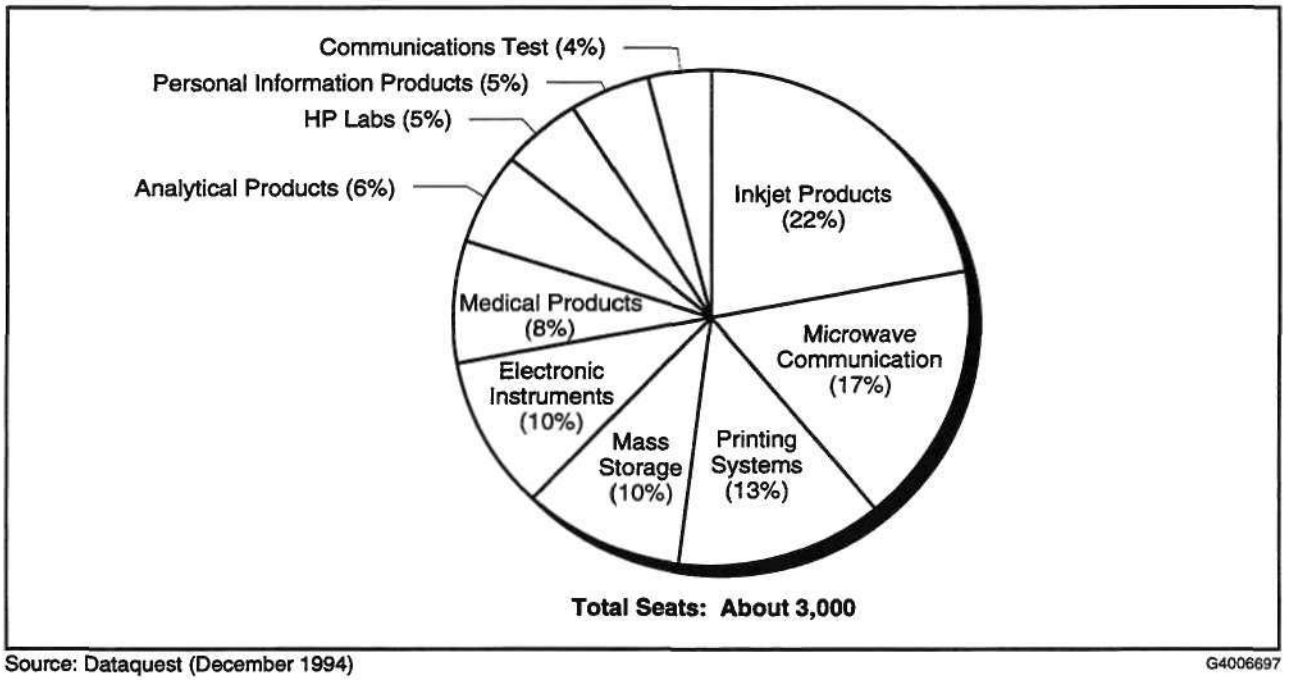
In December 1993, Peter Bohn was appointed general manager of MDD; Bohn had previously held several leading positions in software-related divisions within HP.

MDD's sales are divided into the three major world regions: Europe, United States, and Asia/Pacific. The product development and marketing areas are divided into two entities: one is in charge of the 2-D business, and the other focuses on the product modeling business.

Mission Statement

Because of the organizational structure, both the SBU's statement and MDD's individual statement apply.

Figure 2
MDD Mechanical Software Seats Shipped into Hewlett-Packard Business Group in 1993



Source: Dataquest (December 1994) G4006697

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The SBU's mission statement is as follows:

> Provide software foundations and solutions that our customers need to re-engineer their business processes for improved competitiveness.

Areas of Focus:

- Managing the new computing environment
- Workflow and information management
- Software application development environments
- Mechanical product design
- Object-oriented technologies

MDD's mission statement is as follows:

> Improve customer competitiveness by providing to them the highest quality and leading capability software products, services, and consulting in order to increase the effectiveness and efficiency of their product development process.

Market Position

Worldwide, mechanical CAD/CAM/CAE software revenue reached a total of $2.3 billion in 1993. MDD had a 3.1 percent share of that total, which placed the company in the No. 8 position among the top 10 MCAD software vendors (see Table 1). Market growth for mechanical CAD software slowed down in 1993, reaching a growth rate of just under 6 percent over 1992. In Germany, MDD's most important regional market, the market for MCAD applications actually declined by a huge 9.3 percent based on local currency.

MDD claims to have installed more than 50,000 mechanical CAD seats worldwide. Approximately 13 percent of these seats are 3-D products (mainly ME30, but a growing proportion of SolidDesigner), and the rest are ME10 seats (2-D). This is also reflected in the company's turnover in 1993, where the majority of the revenue came from PDM and ME10/ME30 sales. SolidDesigner started shipping in the spring of 1993.

In terms of regional distribution of the aforementioned installed seats, 55 percent are in Europe, 30 percent in Japan, and 15 percent in the United States. The largest proportion, more than half of MDD's turnover and installations in Europe, is generated in Germany. The rest of the installed seats and turnover in Europe is divided among France, the United Kingdom, and Italy. (See Figures 3 and 4.)

Looking at the company's position by industry sector, the company believes that it has a leading position in the machinery and fabricated metal industries in Germany. In Japan it also holds a leading position in those two industries and is also a major player in electronic packaging.

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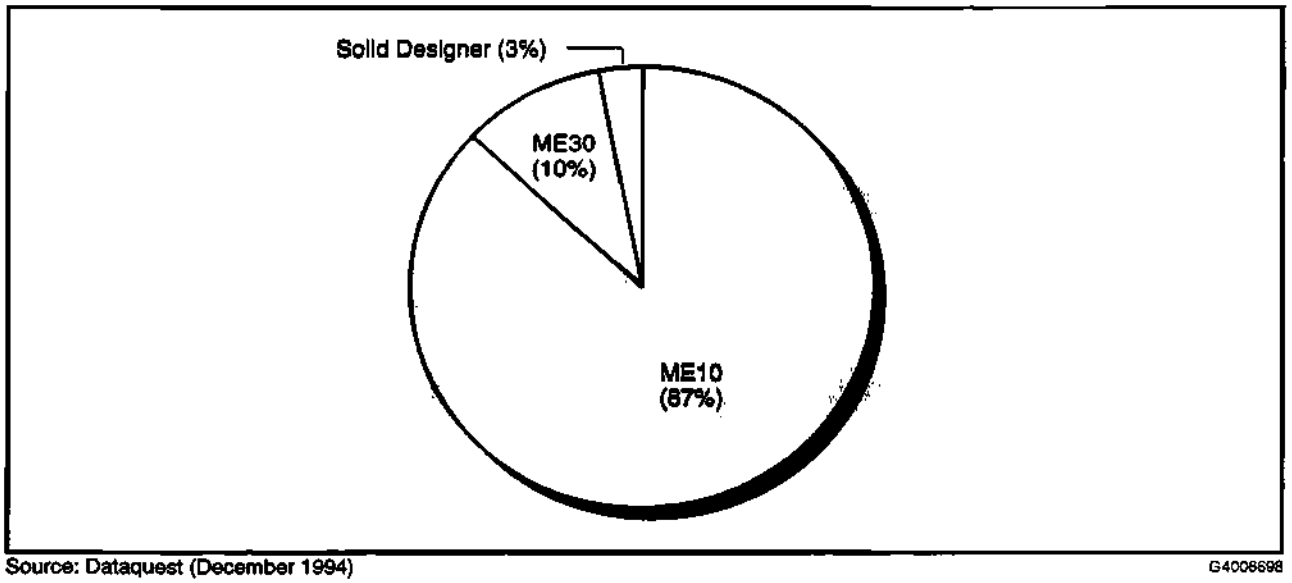
Table 1
Top 10 MCAD Software Vendors

	1992 Software Revenue ($M)	1992 Share of Market (%)	1993 Software Revenue ($M)	1993 Share of Market (%)	Software Revenue (%)
IBM	308.7	14.2	325.5	14.2	5.4
Autodesk	136.5	6.3	160.2	7.0	17.4
Parametric Technology	81.2	3.7	151.0	6.6	85.9
Computervision	193.6	8.9	147.5	6.4	-23.8
EDS Unigraphics	106.9	4.9	129.2	5.6	20.9
SDRC	94.4	4.3	120.7	5.3	27.9
MacNeal-Schwendler	59.5	2.7	74.1	3.2	24.6
Hewlett-Packard	72.8	3.4	70.8	3.1	-2.8
Intergraph	72.6	3.3	70.5	3.1	-2.8
Fujitsu	46.9	2.2	67.4	2.9	43.8
Top 10 Companies	1,173.0	54.0	1,316.9	57.4	12.3
All Companies	2,170.4	100.0	2,294.7	100.0	5.7

Source: Dataquest (December 1994)

Figure 3
Installed Seats by Product



Source: Dataquest (December 1994) G4008698

Electronic packaging is a bigger industry in Japan than the machinery sector, whereas in Germany, the machinery sector is dominant. These sectors use ME10 to a large extent rather than solid modeling technology. Figure 5 shows MDD's 1993 worldwide software revenue distribution by industry sector. In each of the four major industry segments displayed in Figure 5, MDD is among the top 10 in software market share ranking (see Table 2).

In terms of mechanical subapplications, the largest portion of MDD's software revenue comes from documentation/drafting applications. This

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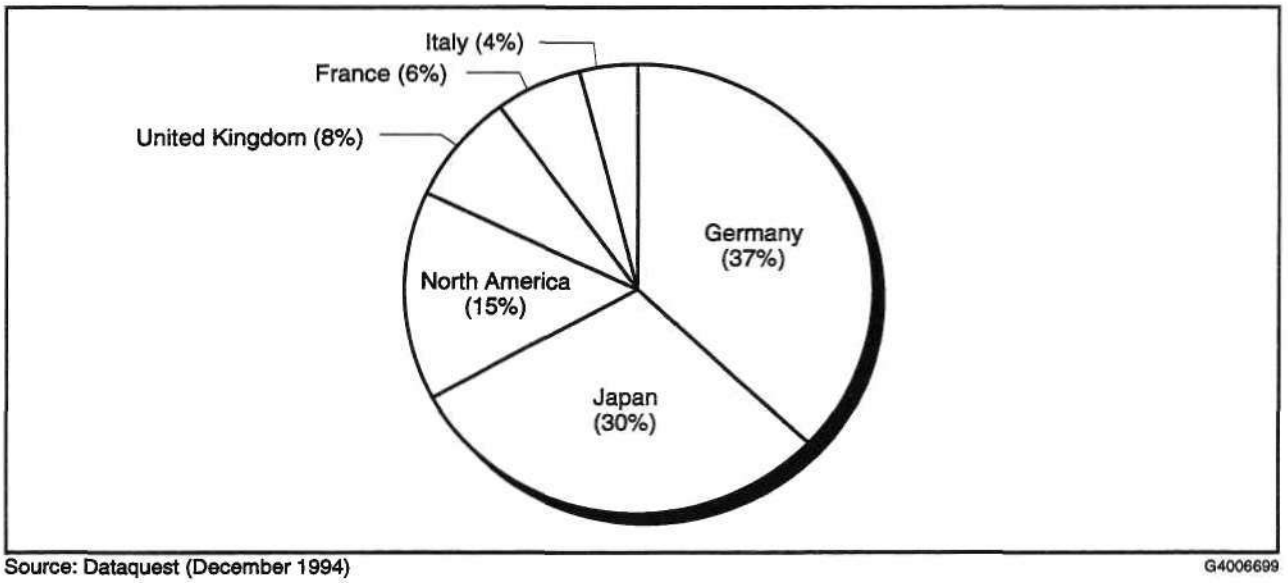
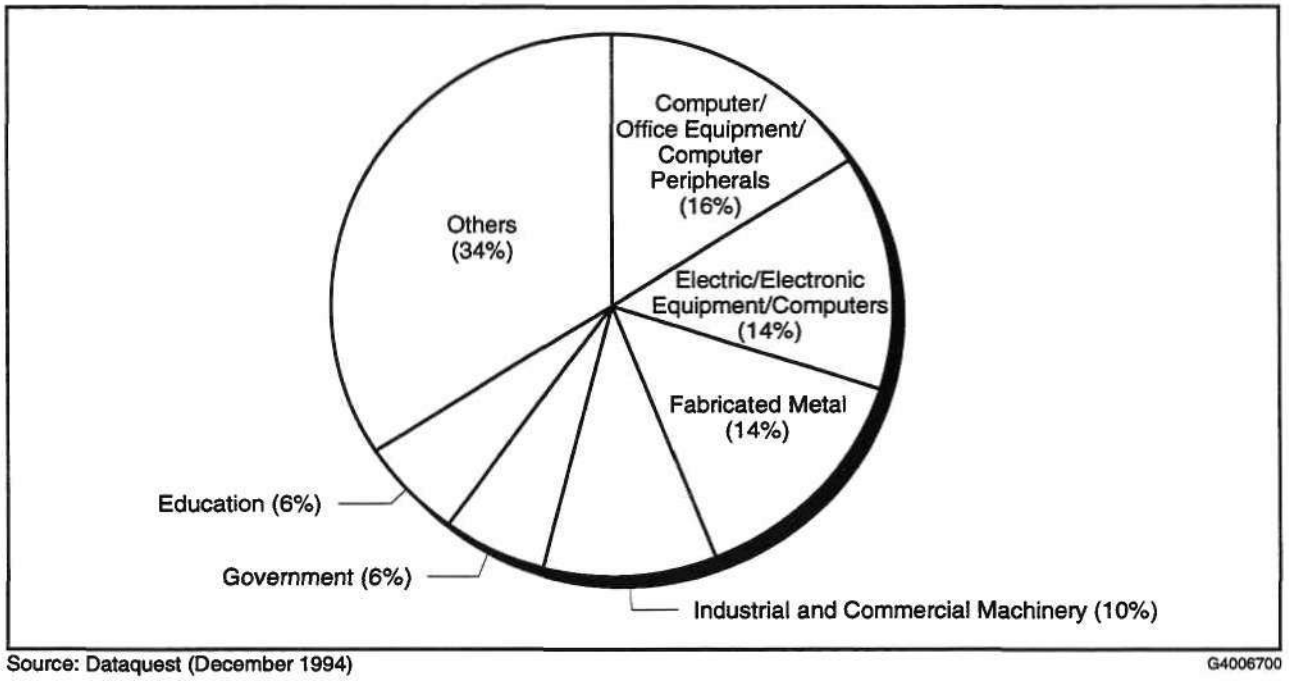
Figure 4
Installed Seats by Region



Source: Dataquest (December 1994) G4006699

Figure 5
Software Revenue by Industry



Source: Dataquest (December 1994) G4006700

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Table 2
MDD's Market Ranking by Industry Sector

Industry Sector	Ranking
Computers/Office Equipment/Computer Peripherals	4
Electrical/Electronic Equipment/Semiconductors	5
Fabricated Metal Products (except Machinery and Transportation)	4
Industrial and Commercial Machinery	10

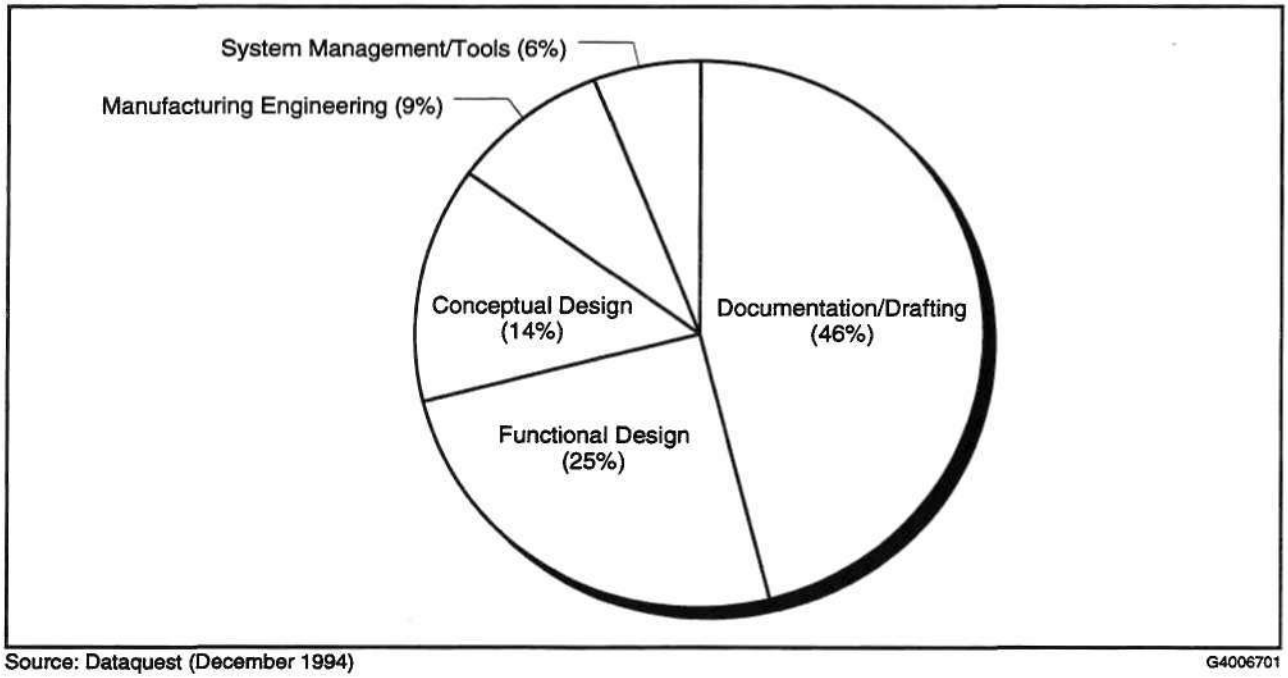
Source: Dataquest (December 1994)

application is also the largest subapplication sector for mechanical software as a whole. MDD holds the number 5 position in this sector, which underlines the strength of its ME10 product. See Figure 6 for MDD's software revenue distribution by mechanical subapplication.

Product and Marketing Strategy

The family for all MDD's products is Precision Engineering Systems. MDD's product offering includes HP PE/SolidDesigner for product modeling design; HP PE/ME10 for 2-D design, drafting, and documentation; HP PE/ME30 for 3-D modeling, design, and drafting; HP PE/SheetAdvisor for sheet metal design; HP PE/DDS-C for electromechanical design; and HP/PE WorkManager for product data and workflow management. This product portfolio will increase soon with the introduction of PE/SurfaceStyler, the surface modeler based on Cisigraph's Strim 100 product. In addition to its own developments, MDD has also teamed up with a variety of software partners in areas such as CAM. See Figure 7 for MDD's product portfolio.

Figure 6
Software Revenue by Subapplication



Source: Dataquest (December 1994) G4006701

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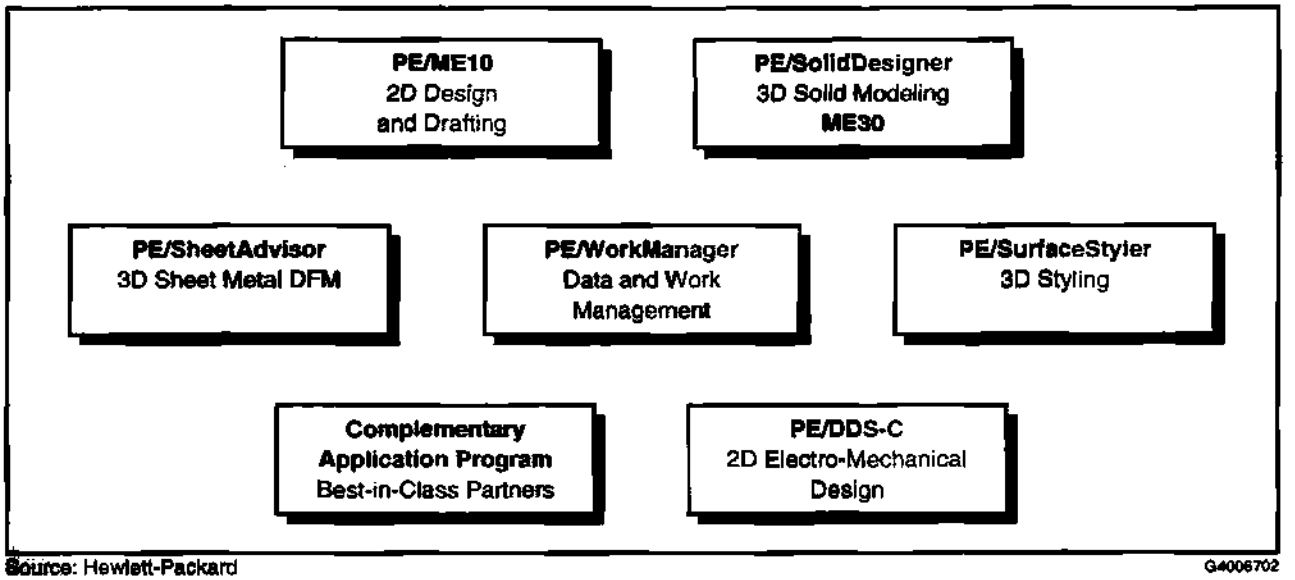
Figure 7
MDD Products



Source: Hewlett-Packard G4006702

The strength of MDD's product line rests largely with ME10, because 2-D software is preferred in the industry sectors in which MDD operates in Germany and Japan.

In 1989, development of the next-generation product PE/SolidDesigner began. MDD still sells ME30, but PE/SolidDesigner is now the mainstream product.

PE/ME10

HP PE/ME10, a 2-D design, drafting, and documentation system targeted at mechanical and electromechanical design, is MDD's most successful product so far, with nearly 45,000 installations worldwide. The product is very popular with the user community, as a recent Dataquest Mechanical CAD/CAM/CAE systems user survey revealed. Users in Europe and the United States gave HP's Precision Engineering products the highest ratings in terms of ease of use and overall software quality. The user responses focused primarily on the 2-D ME10 package. HP tied with Matra Datavision for highest software quality and had the No. 1 rating for ease of use (see Table 3).

Table 3
User Satisfaction Ratings for Mechanical CAD/CAM/CAE Software

Satisfaction with Ease of Use	Rating	Satisfaction with Software Quality	Rating
HP MDD (Mostly ME10)	4.33	HP MDD (Mostly ME10)	4.0
Adra Systems	3.82	Matra Datavision	4.0
CADAM	3.69	Autodesk	3.88
EDS UG	3.59	Adra Systems	3.82
PTC	3.55	Applicon, CADAM, PTC	3.5

Source: Dataquest (December 1994)

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The PE/ME10 product is sold standalone, but is also integrated with PE/SolidDesigner to provide 3-D-to-2-D associativity to automatically update 3-D changes on related 2-D documentation.

In August, MDD announced HP PE/ME10 for MS Windows and Windows NT. The new software release supports Windows-specific data-exchange capabilities, such as cut and paste, and dynamic data exchange (DDE). The Windows-based product is competitively priced and is sold through the dealer channel.

PE/ME30

PE/ME30 is an integrated solid modeling, design, and drafting system. Its user interface is identically structured to PE/ME10 to enable a smooth migration from 2-D to 3-D. The product is targeted at users who want to migrate from ME10 to take the first step into solid modeling.

PE/SolidDesigner

SolidDesigner is an ACIS-based solid modeler and is the most interesting modeling technology to emerge to date. It has some very strong underlying concepts, such as dynamic labeling and modification without history trees or constraints, flexible workplane construction techniques, and dynamic feature recognition and manipulation.

Version 1.0 of SolidDesigner was announced in March 1992, but because of functionality and reliability problems, it was never aggressively marketed. PE/SolidDesigner Version 2.0, a much-improved and reliable system, was finally released at the end of 1993. However, as a competitive CAD product, even version 2.0 did not have the breadth of applications that some of the competition have, such as free-form surfacing and complex filleting and blending. The latest announcements are addressing exactly these issues.

Version 3.0 has improved IGES import capabilities that enable both surface and wire-frame data to be transferred into PE/SolidDesigner. Surface and solid data can also be imported via STEP. Once transferred, this data can coexist with PE/SolidDesigner data and can be manipulated accordingly. SolidDesigner also enables solid parts and assemblies to be exported to the object-oriented, geometric modeler ACIS-based systems using Version 1.5 of the ACIS SAT file format. This feature also provides a direct link to other ACIS-based systems. The other major enhancements in version 3.0 are variable radius blending and mass property capabilities. It also incorporates interference-checking capabilities, which allow the detection of interference, face touching, and noninterference of assemblies and part combinations.

MDD is now on schedule with its strategy of releasing two major releases of PE/SolidDesigner each year, which seems to indicate that the division is beginning to get the underlying technology under control. The next major release is planned for the second quarter of 1995.

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With SolidDesigner, HP hopes to penetrate the market segments that are migrating from 2-D to solid modeling applications. The product has been criticized for being a single-platform modeler that is available only for the HP workstation. The latest announcement of porting the product to Sun and Silicon Graphics Inc. (SGI) workstations will address this criticism.

PE/SurfaceStyler

HP PE/SurfaceStyler is an engineering styling application based on the 3-D surface modeling software STRIM 100 from the French company Cisigraph.

A bidirectional data link to SolidDesigner allows the user to use the surfaces in SolidDesigner to create and modify solid models and to further detail and complete the mechanical design. However, the recent acquisition of Cisigraph by Matra Datavision puts a question mark on this OEM agreement with MDD. It remains to be seen how Matra will approach this issue.

PE/SheetAdvisor

HP PE/SheetAdvisor features design for manufacturability practices to aid engineers designing sheet metal parts and assemblies. By identifying possible manufacturing design flaws and providing cost and tooling information early in the design process, the product can help to reduce design iterations and to minimize human error. The product's main features are:

- Design for manufacturability
- Online cost estimation
- Predefined library of tools and online guidance to preferred materials
- 2-D flat generation for flats from the 3-D model

PE/DDS-C

In 1991, MDD acquired ABB CADE. ABB CADE was mainly active in the German-speaking markets with its products DDS-C, an electrical wiring system and a knowledge-based engineering shell. The electrical engineering product has since been integrated into the overall MDD product offering. The main users for this kind of technology are electrical engineering companies like ABB and Siemens, along with manufacturers of construction and machine tools, specialty machinery, electrical power utilities, mining, and automotive industries. These are also the industry sectors currently using the ME10/ME30 products.

PE/WorkManager

HP PE/WorkManager, which integrates with HP's CAD solutions, is an enterprisewide PDM solution with workflow capabilities. It is used as a framework for the product development process and to ensure the security, accuracy, and accessibility of the product development information.

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Platform Strategy

For mission-critical applications in design and manufacturing, users expect to have the required software available on the optimal combination of hardware configurations. This forces the leading ISVs to be on all the leading hardware platforms. The PE/SolidDesigner product supports only HP's workstations, but the announcement that the software will be available on Sun and SGI next year will help overcome that weakness.

The porting activity for HP is even more important because of the mix of applications offered. The product modeling and documentation applications have been the focal point in the past. Now, the additional offering of an integrated product data and workflow management application increases the value of multiple platform porting. See Table 4 for the hardware platforms supported by the various MDD products.

Table 4
Platform Strategy

Product	Computer Platforms Supported
PE/ME10	HP, Sun, MS Windows, NEC, Toshiba, SGI (Q1/95)
	MS Windows, MS Windows NT
PE/SolidDesigner	HP, Sun (Q1/95), SGI (Q1/95)
PE/SheetAdvisor	HP, Sun (Q2/95), SGI (Q2/95)
PE/DDS-C	HP, IBM, DEC, Sun (UNIX platforms)
	MS Windows
PE/SurfaceStyler	HP
PE/WorkManager	HP, Sun, MS Windows

Source: Dataquest (December 1994)

Partnerships/Sales and Distribution

The final component of the HP PE/Systems solution is the PE/Complementary Application Program (CAP), a joint R&D and marketing program that enables HP to deliver additional functionality to its customers. HP continues to specialize in 2-D and 3-D mechanical design and workflow solutions, while partnering with other vendors to offer capabilities in applications such as numerical control (NC) machining, analysis (FEA), and electronic design automation (EDA). HP has relationships with about 70 companies worldwide, covering approximately 200 applications. Some of these are listed in Table 5.

A set of test suites is used to qualify products for joining the CAP. Integration of these products is based on standards such as ACIS, PDES/STEP, and IGES.

In addition to partnering with other vendors, HP MDD has a worldwide network of value-added resellers (VARs) and independent software vendors (ISVs) that, together with HP's own sales force, offer MDD's products to end users.

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Table 5
MDD Complementary Application Partners (CAP)*

Application Area	Partner	Product
CAM	CAMAX Manufacturing Technologies	Camax, SmartCAM
	Cisigraph	NC Strimstation
	CADCentre	Solid Mill
	Cimalog	Cimalog
	Sapex	PAM-X
Analysis	Rasna	MECHANICA
	Framasoft+CSI	Mosaic
	Ansys Inc.	ANSYS
	Cisigraph	FE Strimstation
EDA	Mentor Graphics Corp.	Boardstation

*Selection only: There are approximately 200 applications available.
Source: Hewlett-Packard, Dataquest (December 1994)

Standards

MDD is committed to supporting international standards such as STEP and is implementing STEP-based data exchange. HP has also participated in ProSTEP for the automotive industry and in CAD Data Exchange (CADEX) and Product Data Exchange (PRODEX) established by the European Community's ESPRIT projects. HP PE/SolidDesigner supports the following standards-based technologies:

- OSF/Motif in the user interface
- Spatial Technology's ACIS Geometric Kernel as the open modeling kernel technology
- STEP protocol for 3-D solid data exchange
- Other open data exchange standards (IGES, ACIS SAT)

Major Customers

MDD has over 50,000 seats at customers in Europe, Japan, and North America. Customers include Panasonic, Duracell, Fujitsu, Motorola, and NEC (see Table 6 for profiles of some of MDD's customers). In addition, MDD's systems are installed at 56 internal HP divisions, totaling more than 3,000 users (see Figure 2).

Dataquest Perspective

Being part of HP is a strong advantage for MDD. It will be hard to find a competitor with such a broad spectrum of products, customer support centers, and training, among other offerings. However, it nonetheless seems that HP has been unable to establish worldwide awareness of its MCAD products.

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Table 6
Major Customer Profiles

Company	Country	Industry Sector	Implementation
Jordan Grand-Prix	United Kingdom	Formula One racing cars	PE/SolidDesigner, PE/ME10
Toshiba	Japan	Power-plant turbines	PE/ME10
Leica	Germany	Optical instruments	PE/SolidDesigner, PE/ME10 HP DMS, Stereolithography
Hendry	United States	Sheet metal parts for telecommunications industry	PE/SheetAdvisor, PE/ME10 NC link
Leviton	United States	Electrical/electronic devices	PE/ME30, PE/SolidDesigner FEA, Stereolithography
Playmobil	Germany	Plastic toys	PE/SolidDesigner, PE/ME10 Stereolithography
RKS	United States	Industrial design for consumer electronics, computer equipment, medical/scientific equipment	PE/SolidDesigner, PE/ME30 PE/ME10, Rapid Prototyping
Sennheiser	Germany	Audio equipment	PE/SolidDesigner, PE/ME30 PE/ME10, Stereolithography
S.G. Hauser	United States	Industrial design for medical, consumer electronics, computer industry	PE/SolidDesigner, PE/ME10 CNC link, Rapid Prototyping
IDEO	United States	Industrial design, consumer design	PE/ME10, PE/ME30 PE/SolidDesigner
TRIM-C-O	United States	Sheet metal parts	PE/ME10, PE/ME30 PE/SolidDesigner PE/SheetAdvisor
Motorola	United States	Computers, components	PE/ME10, PE/ME30, PE/SheetAdvisor
Oki	Japan	Consumer electronics	PE/ME10
Panasonic	Japan	Consumer electronics	PE/ME10
Schindler	Germany	Elevator manufacturing	PE/ME10
Trumpf	Germany	Machine tools	PE/ME10, PE/ME30
Gildemeister	Germany	Machine tools	PE/ME10, PE/ME30
Festo	Germany	Machine tools, machinery	PE/ME10, PE/SolidDesigner

Source: Hewlett-Packard, Dataquest (December 1994)

One of the strong success stories of HP has been the ME10 product, which is one of the best 2-D mechanical CAD products around. Users confirmed this in a Dataquest survey of mechanical CAD/CAM/CAE end users. ME10 had the No. 1 position in terms of software quality and ease of use. This product has never had the praise that it deserves.

We also believe that HP's lack of financial commitment to marketing is responsible for the lower penetration rates outside of Germany and Japan. The marketing behind the company's MCAD products is not sufficient in the face of products like AutoCAD and Parametric Technology.

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SolidDesigner, MDD's flagship product, could be one of the best, if not the best, modelers available if the development group can maintain a rapid, ongoing development of the code, offer a styling/surfacing solution soon, and maintain the functionality and modeling approach. It took a long time for SolidDesigner to become salable, and this certainly had a negative impact on the product's reputation. The latest release should help to overcome this and enable MDD to increase SolidDesigner's share of MDD's installed base in the coming year.

In summary, we believe that the company's major advantages are the ME10 product's high user rating, a large installed base of the ME10 product in Germany and Japan, and PE/SolidDesigner's unconstrained modeling approach and data exchange capabilities. However, MDD faces some major challenges: to grow the share of its business outside of Germany and Japan, to integrate surfacing technology, and to increase the user base of its PE/SolidDesigner product.

By Petra Gartzen

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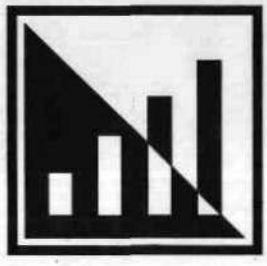
Software

European CAD/CAM/CAE/GIS



Market Trends

1994

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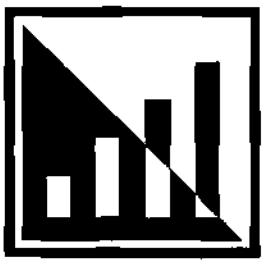
Software

European CAD/CAM/CAE/GIS



Market Trends

1994

Program: CAD/CAM/CAE/GIS Europe
Product Code: CCAM-EU-MT-9401
Publication Date: October 24, 1994

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Chapter 1
Report Overview

The European CAD/CAM/CAE/GIS 1994 Market Trends book presents the results of Dataquest's research and analysis in the 1993 European CAD/CAM/CAE/GIS market. The remainder of this report is divided into the following chapters:

- Chapter 2, Executive Summary: An overview of the major findings of the report
- Chapter 3, Trends Analysis: Definitions, discussions, and analyses of the major trends and issues driving the market
- Chapter 4, Market Analysis: An analysis of Dataquest's 1993 European market survey results, by region and application
- Appendix A, European CAD/CAM/CAE/GIS Market Statistics: Tables from *Source: Dataquest* market share used in reference in the text of the document
- Appendix B, Methodology: Market definitions

Methodology

The market and trends analysis is based upon many years of industry experience in the CAD/CAM/CAE/GIS group. We use the results of primary research to define, measure, and estimate the significant parameters of the market. Vendor- and user-based surveys are conducted to gain further insight into significant market dynamics. First-hand discussions with end users, investors, and vendors are used to verify assumptions and to check analysis results.

Project Analyst: Petra Gartzen

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Chapter 2
Executive Summary

The European CAD/CAM/CAE/GIS market, which represented the world's largest regional market for this segment in terms of total revenue and software revenue until the beginning of 1993, suffered a setback in 1993 and lost its leading position. The region accounted for 33 percent of total CAD/CAM/CAE/GIS product sales in 1993 and 32 percent of software revenue. More details can be found in chapters 3 and 4.

Major Trends and Issues

Major trends and issues include the following:

- The economy: Adverse economic conditions, which hit the manufacturing and construction industries particularly hard, and a stronger dollar throughout 1993, were the main causes of the slowdown in revenue growth.
- End-user industries: The major European end-user industries are undergoing significant changes that will affect CAD/CAM/CAE/GIS sales into the various industries in one way or another.
- Central and eastern Europe: Dataquest believes that central and eastern Europe is a major growth area for CAD/CAM/CAE/GIS tools. Privatization and the formation of new companies are key drivers in this region.
- Dollar exchange rates: The dollar appreciated strongly against European currencies in 1993, which had a major negative impact on dollar revenue growth in the European countries.

The Market

The following bullet points characterize the European CAD/CAM/CAE/GIS market in 1993:

- Overall, the European CAD/CAM/CAE/GIS market dropped 5.6 percent, falling to $5.4 billion in total factory revenue in 1993. Calculated in European Currency Units (ECU), the market grew 5.2 percent.
- CAD/CAM/CAE/GIS software revenue dropped 5 percent to $1.6 billion. Based on ECU, software revenue grew 5.8 percent.
- U.S.-based vendors shipped 64.3 percent of the CAD/CAM/CAE/GIS software revenue, compared with 35.7 percent generated by European vendors; however, several leading products sold by U.S. vendors are being developed in Europe.
- The top 10 European CAD/CAM/CAE/GIS software market share rankings remained fairly stable through 1993. The group accounted for 51 percent of the total in 1992, dropping to 49 percent in 1993, which translates to $782 million in revenue.

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- A view of the European CAD/CAM/CAE/GIS market by platform shows the importance of the technical workstation. More than 66 percent of the software revenue came from technical workstations, slightly down from 68 percent in 1992.
- The largest regional market in 1993 was Germany, with $574 million in software revenue, representing nearly 36 percent of the total European CAD/CAM/CAE/GIS software market.
- The largest application sector in Europe is the mechanical segment, having some 49 percent of the total European CAD/CAM/CAE/GIS software market.
- The fastest-growing segment in 1993 was GIS, with 12 percent software revenue growth.

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Chapter 3
Trends Analysis

Introduction

The postwar years in Europe have witnessed tremendous change in political and economic divisions, moving toward a single, stronger market. The European single market is strengthening the 12 European Union (EU) members at a cost to the political autonomy of the members. The European Economic Community (EEC) was established in January 1958 in Rome to create a common market. In July 1968, a customs union was achieved among the six member countries, which shared a common external tariff with the other countries. The United Kingdom originally refused to play a part in the EEC but was a founding member of the European Free Trade Association (EFTA), set up in 1960. In 1961, however, the United Kingdom applied for membership to the EEC. Other countries followed suit, and by 1986 the EEC had 12 members.

The Single European Act (SEA) planned the introduction of a single unified internal market by the beginning of 1993, thereby giving a longer-term direction to the building of Europe. The SEA was to offer freedom of movement for people, goods, services, and capital. The realization of this huge economic unit required the removal of numerous obstacles and barriers that expend time and money, hinder development of international competitiveness, and curb economic growth and social progress. The activities are financed by a central fund for the community, with many loans granted by the European Investment Bank. See Figure 3-1 for the major stages of the SEA.

European Economy

Year-end 1992 and all of 1993 were characterized by declining consumer and business confidence, weaker than expected economic activity, and considerable tensions in the foreign exchange markets. Somewhat better economic data is expected for 1994. According to the International Monetary Fund's (IMF) latest World Economic Outlook, the broadening and strengthening of recovery in the industrialized countries marks the end of the long and unusually severe downturn in recent years. Continental Europe shows stronger signs of a turnaround, which was partly delayed by German interest rate and exchange rate policy. Much of the improvement comes in a sharp upward revision in growth projections for the EU, with the United Kingdom, France, and Germany at the forefront of the recovery.

After a low point toward the end of 1993, industrial output is now turning positive for the first time since early 1992. Revival of activities is feeding into property values, which appear to be leveling out after the steep decline since 1991. However, Germany's recovery, much of which has relied on exports, is expected to be slow. Germany faces problems associated with the financing of the former East Germany and has continued to lose competitiveness within Europe. Attempts to redress this have

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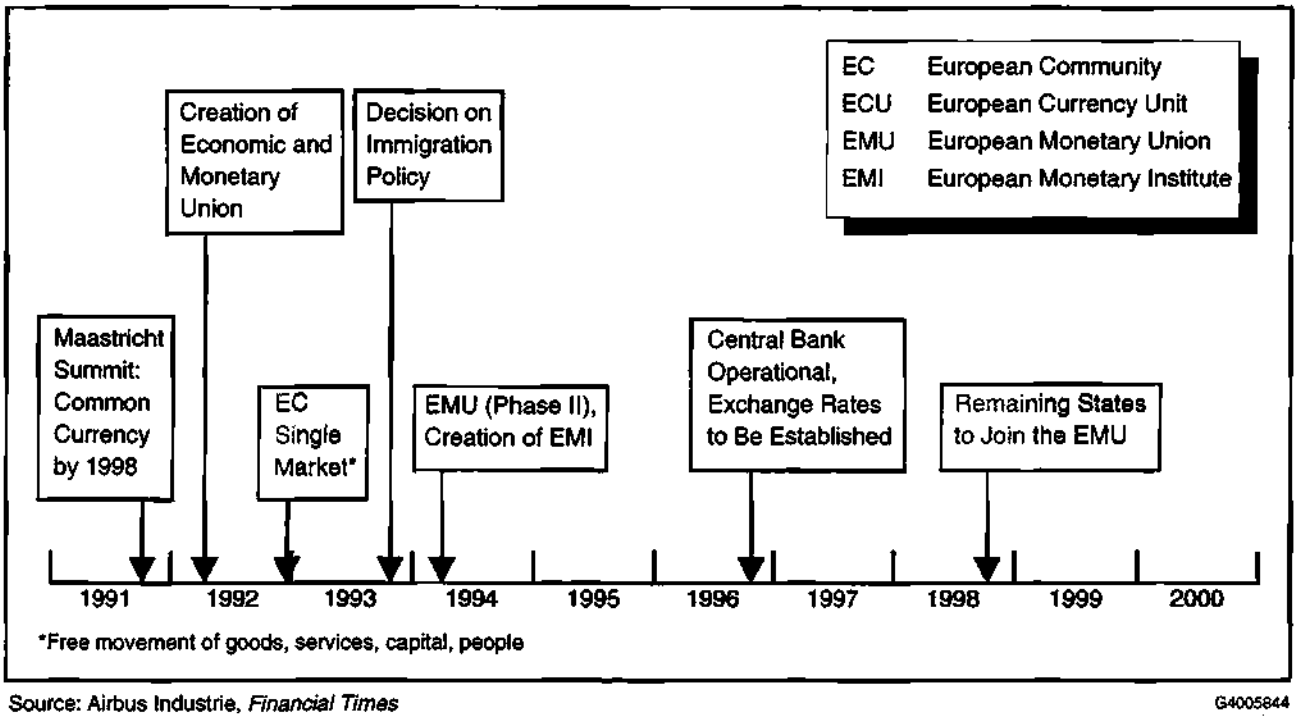
Figure 3-1
The European Community Timetable



Source: Airbus Industrie, *Financial Times* G4005844

only just begun. Europe's dependence on the German recovery will make it difficult for the rest of Europe to return to high growth. Also, despite the upbeat message from the IMF, manufacturing investment intentions across most of Europe show a further fall after last year's sharp decline. A strong upswing will require a substantial recovery in overall corporate profitability. There is still much work to be done in restraining budget deficits and reforming labor markets. The continuing high deficits in the public sectors of the industrialized nations have contributed to declining investment in many countries. Unemployment, which is Europe's big problem, will need fundamental labor market reforms. More liberalization of markets is needed. Exports will play an important role in a general economic recovery in Europe, and the signs for this are good as the Pacific Rim countries and China step up investment.

Looking at the emerging markets of central and eastern Europe, it becomes evident that those former communist countries such as the Baltic states, the Czech Republic, Hungary, Poland, the Slovak Republic, and Slovenia, that implemented market reforms are now growing or appear to be on the threshold of recovery, and prospects for continued growth are good. Enormous difficulties must still be faced over structural reform in, for example, Russia and the Ukraine, where output remains in severe decline, and it may well be a further two years before the decline there bottoms out.

Following are a set of figures showing the major economic indicators for the various European countries (see Figures 3-2, 3-3, 3-4, 3-5, and 3-6).

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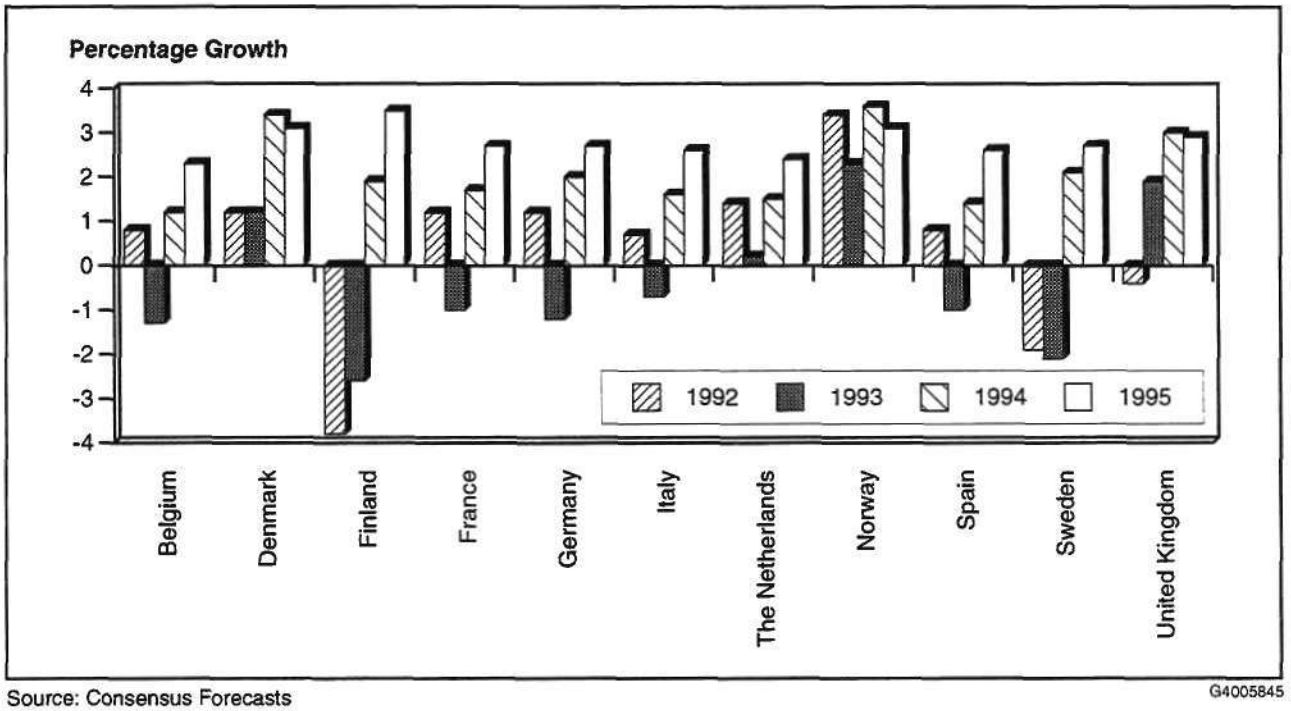
Figure 3-2
GDP Growth by European Country



Source: Consensus Forecasts

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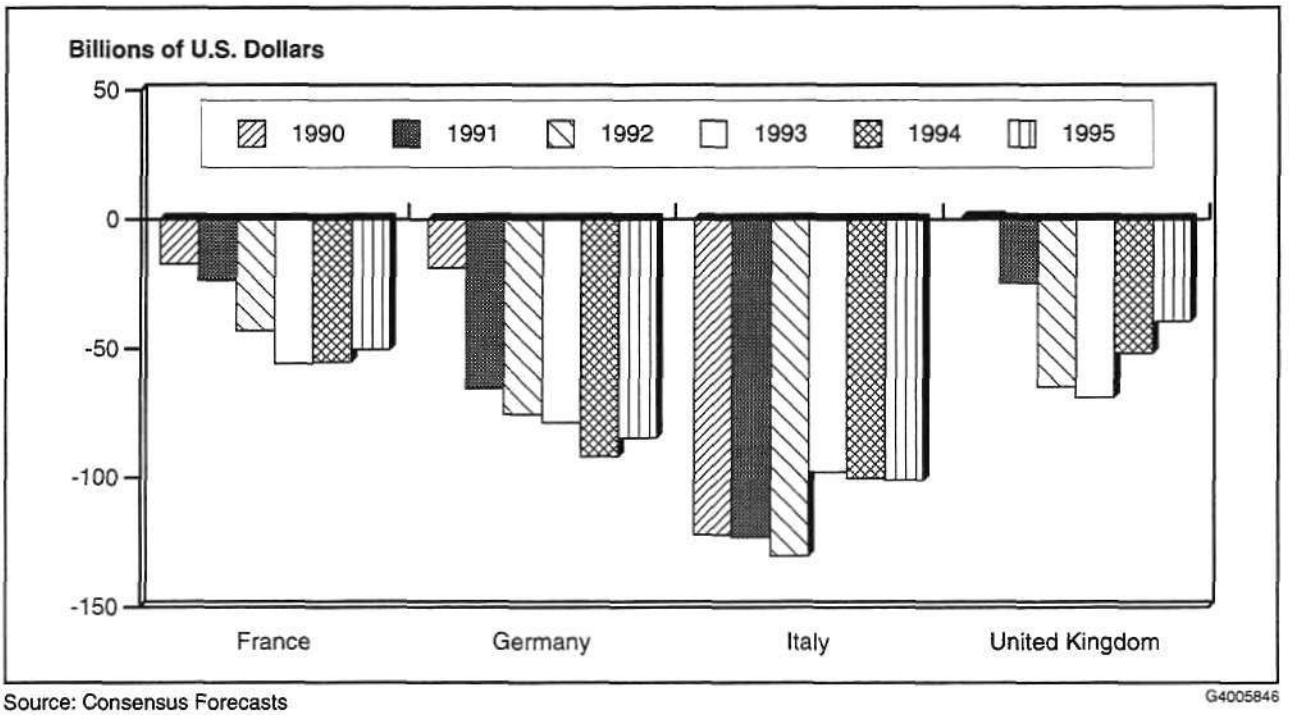
Figure 3-3
Government Budget Balance



Source: Consensus Forecasts

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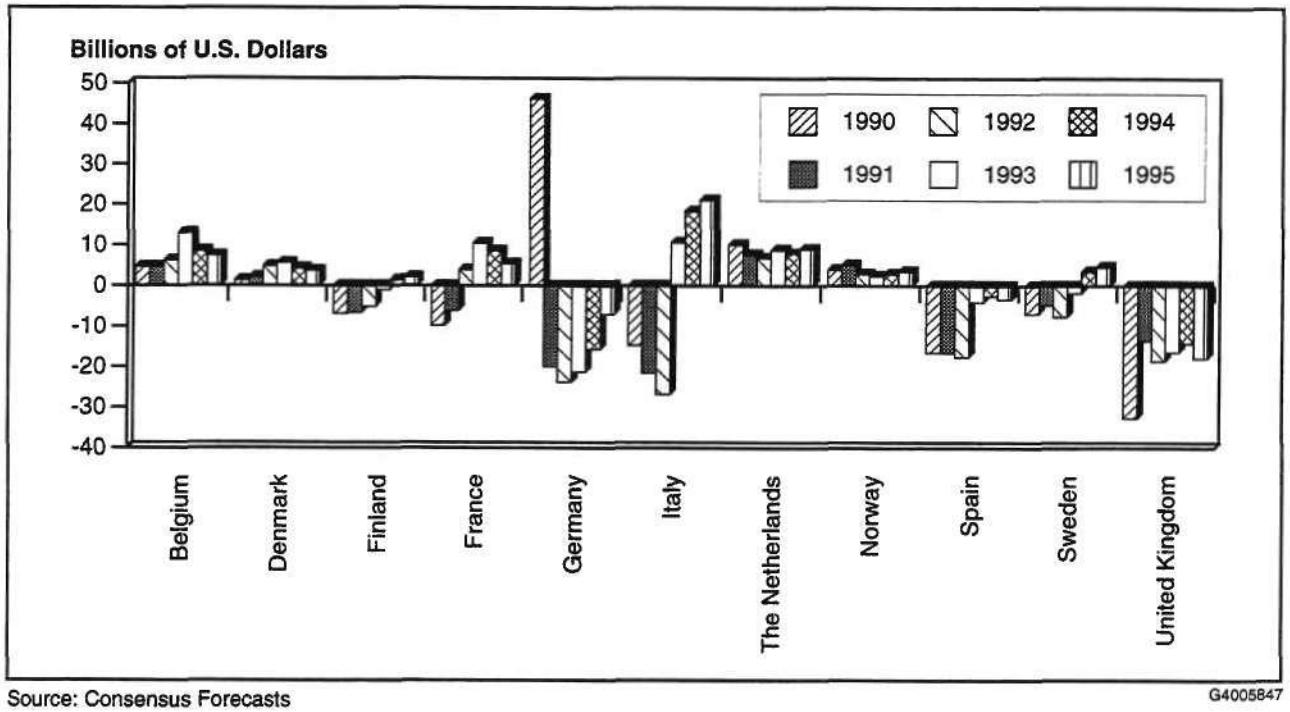
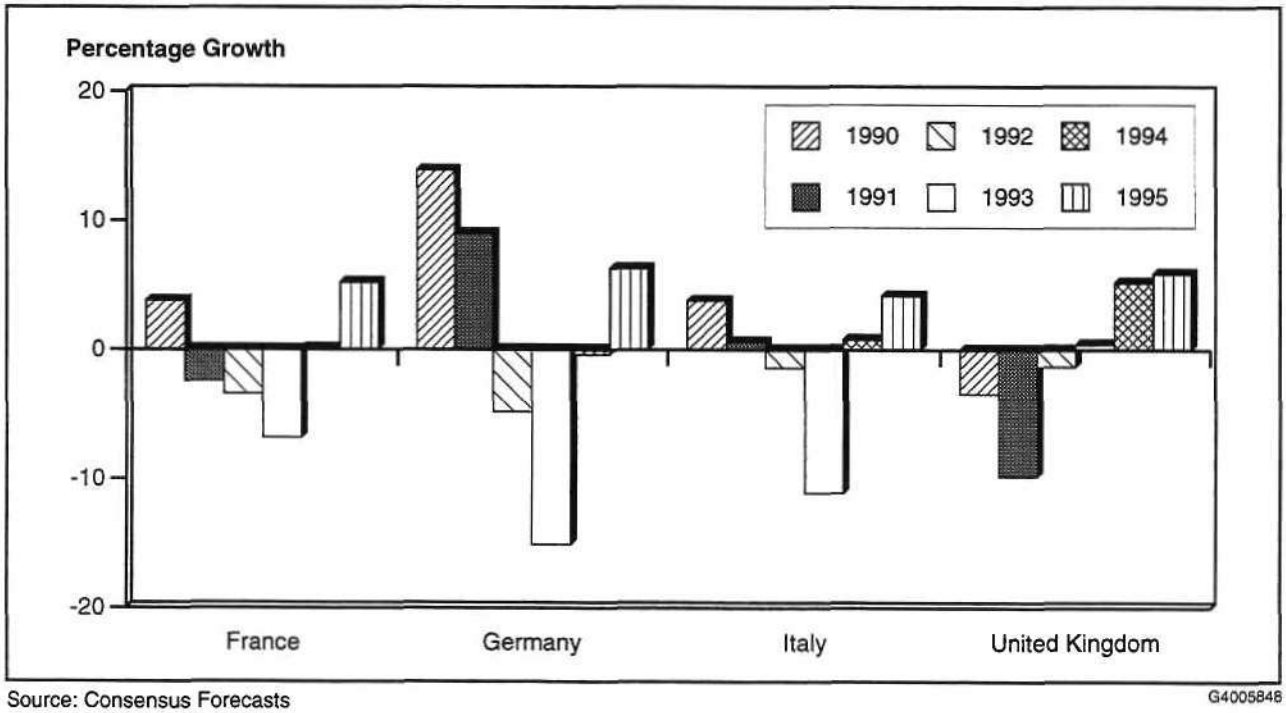
Figure 3-4
Current Account by European Country



Source: Consensus Forecasts G4005847

Figure 3-5
Business Investment by European Country



Source: Consensus Forecasts G4005848

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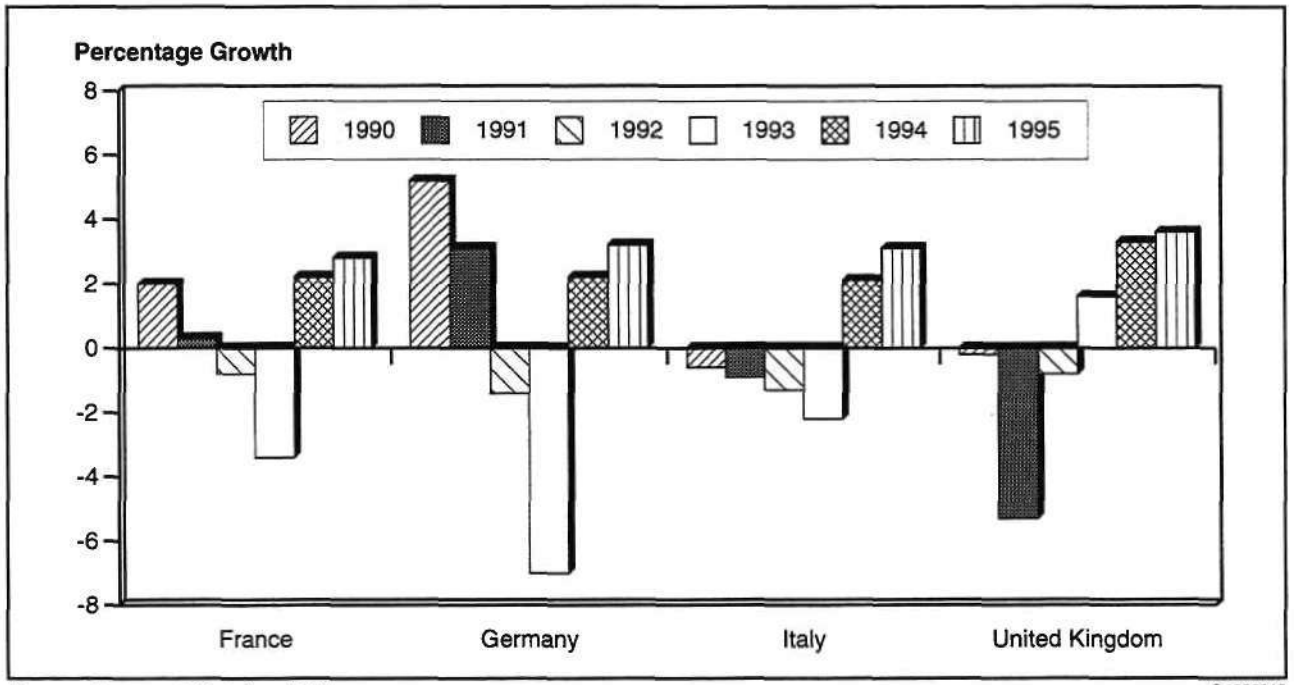
Figure 3-6
Industrial Production by European Country



Source: Dataquest (October 1994)

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European End-User Industries

Since 1992, all the major European end-user industries have been undergoing profound changes that have had a significant effect on the growth rates for the various applications of the CAD/CAM/CAE/GIS industry. The following bullet points and accompanying figures provide a snapshot of what has happened in these end-user industries:

- Like the industry worldwide, the aerospace sector was hit by the coincidence of a sharp recession in civil aviation and drastic cuts in defense spending, as governments sought to reap the dividends of the end of the Cold War. Europe could lose its access to a vast area of vital high technology if it allows the aerospace sector to be marginalized. European governments must be prepared to back the industry with indirect support—through defense spending and subsidies for research and development—as the U.S. government does for its aerospace manufacturers.
- The electronics industry, from computers to semiconductors to consumer electronics, is troubled.
- The state of the German economy has brought its machine tools industry to a complete halt. However, we do expect to see somewhat better results in 1994 and a recovery in this sector in 1995.

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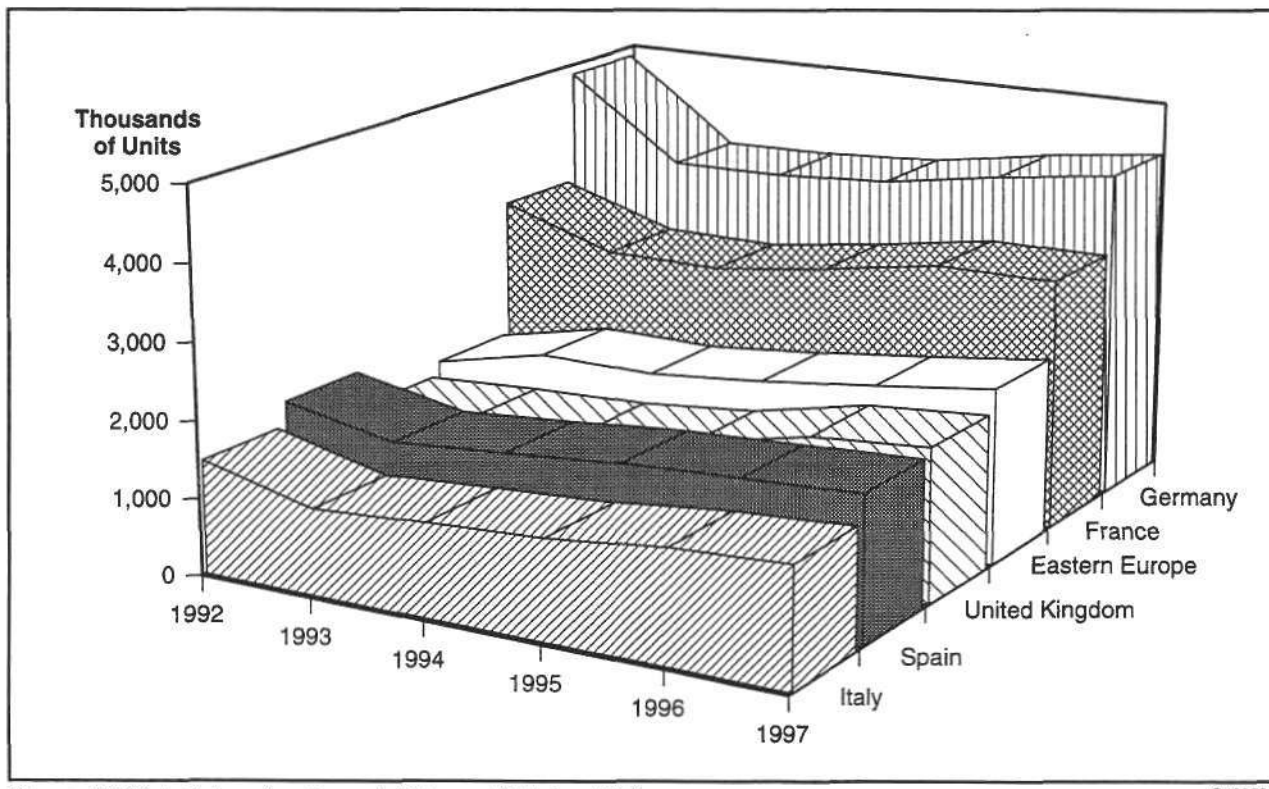
- Power-generating equipment producers are currently prospering from growing demand in the western world for new, cleaner generating methods. In eastern Europe, there is likely to be plenty of work for western companies retrofitting Soviet-designed nuclear power stations. The heavy capital investment required to rebuild eastern Europe's industries and businesses, along with the continuing investment need in western Europe, should get the machinery sector moving.
- The transportation industry in Europe offers good growth potential for CAD/CAM/CAE/GIS tools. The overstretched road network in most European regions needs sorting out, and the railway industry in particular is undergoing a renaissance.
- The automotive industry suffered from recession in the U.S. and European markets as well as from mounting Japanese competition. Markets in countries such as Germany, France, Italy, and Spain were hit by plunging sales during 1993, while the United Kingdom showed a small upturn. Figures for 1994 are expected to be somewhat better, with a sharper increase to follow in 1995 (see Figures 3-7 and 3-8).
- The building/construction industry in Europe is in deep recession, with the exception of Germany, where this industry is benefiting from the effects of reunification (see Figure 3-9).

Figure 3-7
European Car and Production Forecast



Source: DRI World Automotive Forecast, Dataquest (October 1994)

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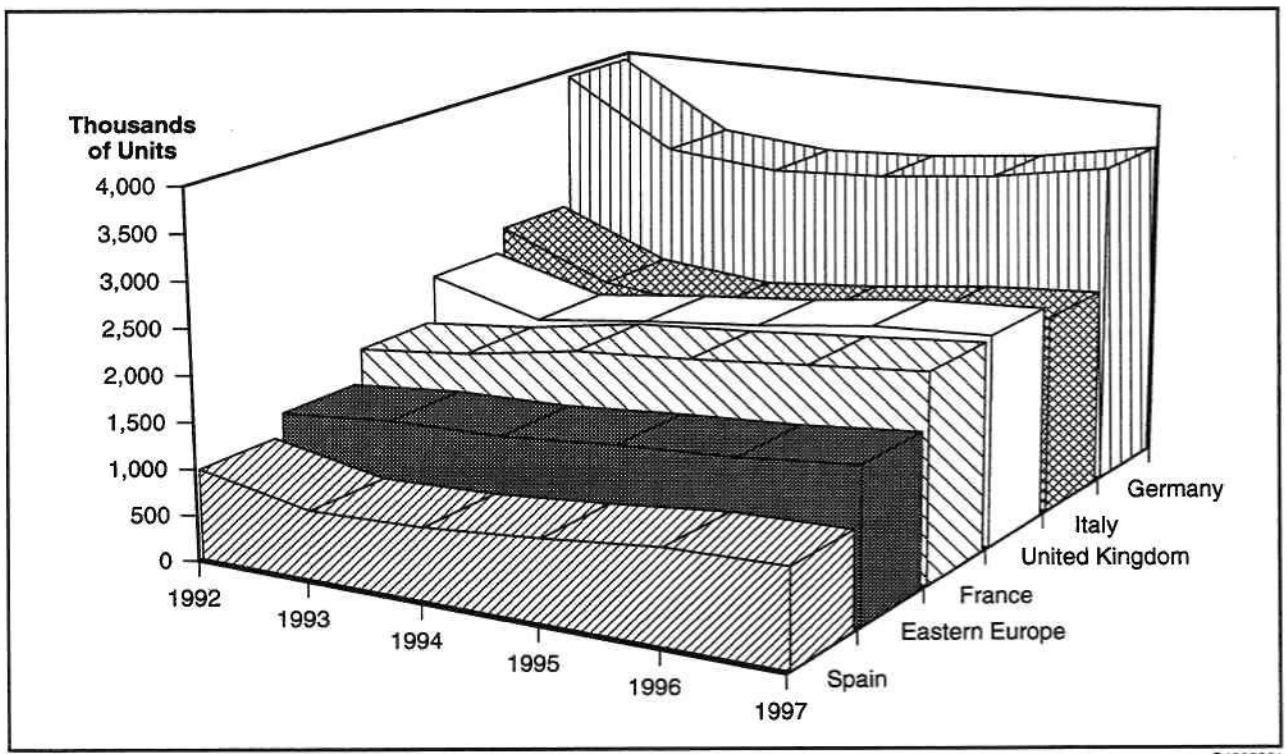
Figure 3-8
European New Car Sales Forecast



Source: DRI World Automotive Forecast, Dataquest (October 1994)

Eastern Europe

Eastern Europe's conversion to capitalism has been immense, with the removal of communist regimes and the introduction of privatization, but political strife is smoldering everywhere. The eastern countries are heavily in debt, and this will take some time to correct and will cause instability. The entire region is vulnerable to all of the international banking whims. Also, the strength of the single market has caused nonmembers to conform to many of the de facto standards set up by the members, and this enables nonmembers to trade with members. However, conforming is difficult for the central and eastern European countries at such an early stage in their metamorphosis from centralized planning to a market-driven economy, and the varying economies of each European country also makes unity difficult.

The situation in this part of Europe is turbulent and changing almost daily as these countries gradually open up to international markets and competition. Infrastructure developments are given a very high priority, with telecommunications equipment receiving a greater emphasis than most other developments.

High-technology trade restrictions are no longer preventing the sale of satellite equipment, computers, chips, plant equipment, and so on. The dissolving of the Co-ordinating Committee for Multilateral Export

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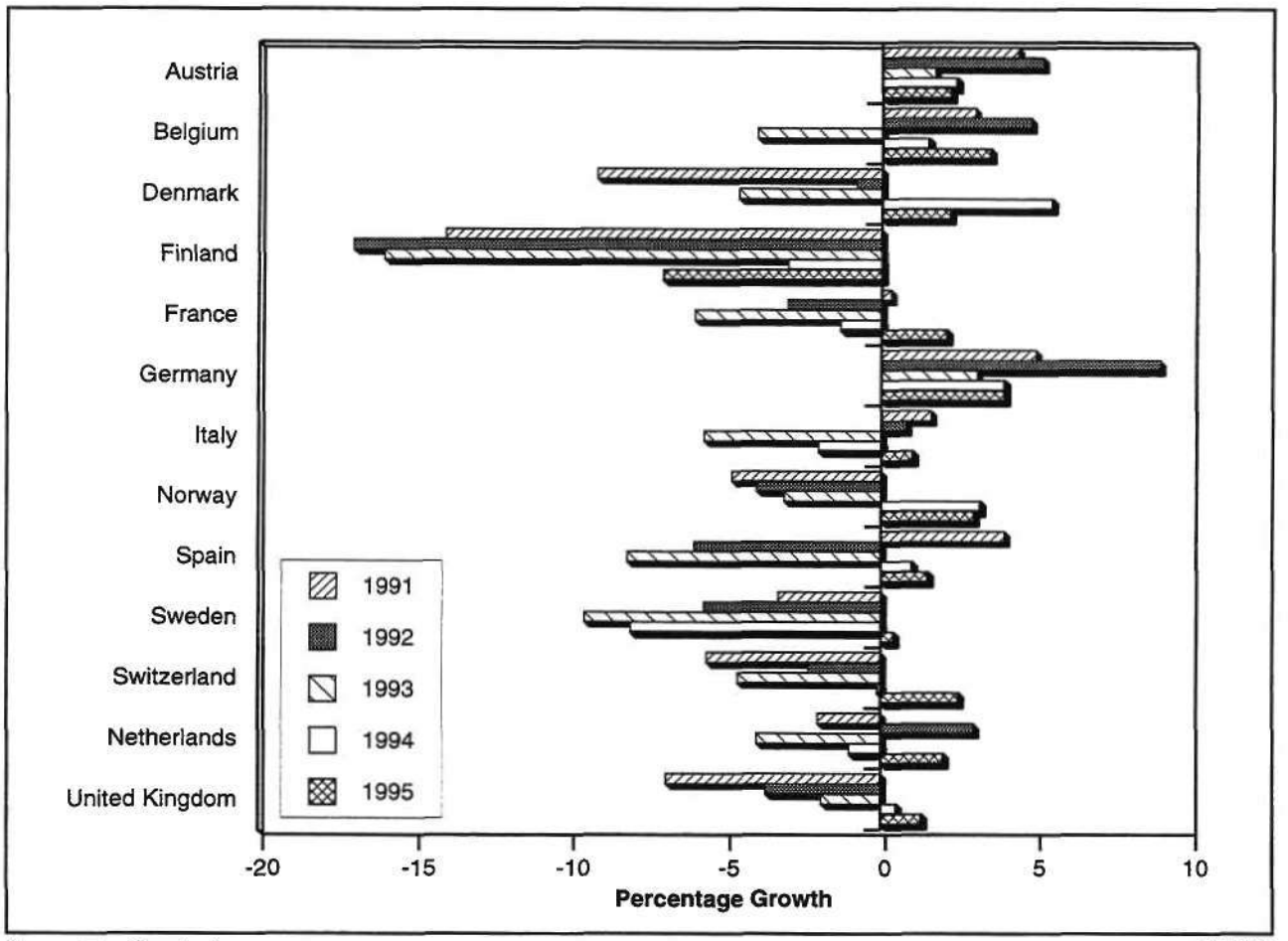
Figure 3-9
Building/Construction Industry Forecast



Source: EuroConstruct

G4005852

Control (CoCom) earlier this year was the final step in an already accelerating process that stripped away virtually all remaining controlled exports. Trade restrictions were one of the major barriers for investment. Perhaps most important, these developments would have been impossible were it not for the speed at which organizations are maturing as businesses. Local companies are now taking on a greater degree of managerial and financial responsibility, which makes the organization of true joint ventures more realistic. This is partly because of the growing number of people who have experience in the west and who have some training in western management styles.

There may be considerable economic problems in central and eastern Europe, but there is certainly no shortage of optimism there. This is definitely one of the major future growth areas for CAD/CAM tools. Privatization and the formation of new companies are key drivers in this region. Financing can be found, especially for public and large-scale infrastructure projects. Telecom is a critical need in this part of the world, and the development of industry will follow. High-quality international and

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intercity telecommunications links already exist via high-speed digital optical fiber links. Now only the cities themselves need to be modernized.

The region is very much a Windows-based market, but piracy has been a big problem. Many suppliers have preferred to supply customized software rather than packages to overcome piracy problems. Overall, some eight illegal copies of software exist for every legal copy, but this is changing now that a legal framework exists. There are now channels consisting of sophisticated distributors and value-added resellers (VARs). Computer 2000 and Autodesk have pioneered market entry into some of these countries.

The size of these countries, measured both in square kilometers and in population, varies enormously, as does the time scale over which the country will become developed as a market for high-tech goods such as CAD/CAM/CAE/GIS products.

Central European countries emerged first from the eastern bloc. These are the countries that offer the greatest short-term opportunities.

Sources used for this report include the following:

- Financial Times
- Consensus Forecasts
- EuroConstruct
- DRI World Automotive Forecast
- World Bank
- OECD
- IMF
- DTI
- Barclays Bank
- EBRD

Dollar Exchange Rate

Dataquest does not forecast exchange rates, but we do use the best information available. We assume that the June 1994 exchange rate will continue in the future. The annual exchange rate is the arithmetic mean of the 12-month exchange rate, assuming the June exchange rate for the remainder of the year. Since March 1994, the U.S. dollar has weakened against most foreign currencies, so the same growth abroad in March translates into inflated growth in the U.S. dollar in June. Table 3-1 provides the currency exchange rates used for our 1993 market share and for our forecasts.

Compared with the weakening of the dollar in 1994, the dollar appreciated against all European currencies throughout 1993. This has shown a corresponding decrease in the growth of the European CAD/CAM/CAE/GIS markets. Table 3-1 highlights the effect that the fluctuations in the dollar exchange rate had on the results of European CAD/CAM/CAE/GIS vendors. Most U.S.-based vendors report to us in dollars using their own internal conversion rate, which is fixed for several years.

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Table 3-1
Exchange Rates

		Actual				Year-to-Year Change (%)		
Country	Currency	1990	1991	1992	1993	1990-1991	1991-1992	1992-1993
Austria	Schilling	0.088	0.088	0.092	0.086	-0.2	4.1	-6.2
Belgium	Franc	0.03	0.029	0.031	0.029	-2.1	6.5	-7.7
Denmark	Krone	0.162	0.157	0.167	0.154	-3.2	6.2	-7.4
Finland	Markka	0.262	0.248	0.226	0.175	-5.3	-9.0	-22.7
France	Franc	0.184	0.178	0.19	0.177	-3.4	6.9	-7.2
Germany	D-Mark	0.621	0.605	0.645	0.605	-2.5	6.5	-6.2
Italy	Lira	8E-04	8E-04	8E-04	6E-04	-3.2	1.2	-22.5
Netherlands	Guilder	0.551	0.537	0.573	0.539	-2.5	6.6	-5.9
Norway	Krone	0.16	0.155	0.162	0.141	-3.5	4.8	-13.1
Spain	Peseta	0.01	0.01	0.01	0.008	-1.7	-0.1	-20.6
Sweden	Krona	0.169	0.166	0.173	0.128	-2.0	4.4	-25.9
Switzerland	Franc	0.724	0.7	0.718	0.676	-3.3	2.6	-5.9
United Kingdom	Pound	1.786	1.767	1.769	1.5	-1.0	0.1	-15.2
Europe Average	ECU	NM	1.238	1.301	1.167	NM	5.1	-10.3

NM = Not meaningful
Source: Dataquest (October 1994)

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Chapter 4
Market Analysis

The European CAD/CAM/CAE/GIS Market

Europe comprises many countries, each with unique market characteristics. Europe accounts for 33 percent of the world's total CAD/CAM/CAE/GIS product sales and 32 percent of software sales for 1993. Overall, the European CAD/CAM/CAE/GIS market dropped 5.6 percent in 1993, falling to $5.4 billion in total factory revenue. Software revenue dropped 5 percent to $1.6 billion. Currency fluctuations are complicating the picture. The dollar appreciated strongly against European currencies in 1993, which had a big negative impact on growth in the European countries (see Table 3-1). Calculating the European revenue in European Currency Units (ECU), the market actually showed positive growth: 5.2 percent for total revenue and 5.8 percent for software revenue.

Each European country represents a different market, requirements, languages, and so on. This makes it more difficult, slower, and more expensive for vendors to sell products in Europe—and that means that these markets mature more slowly in Europe. Figures 4-1 and 4-2 provide a look at the activities in the European CAD/CAM/CAE/GIS software industry, indicating market size and market growth rate for each segment and each European region. In Figure 4-1, as well as the remaining software market portfolios throughout this document, the heavy horizontal line indicates the industry average for software revenue growth; the positions of the bubbles indicate their segment or regional growth rates (x-axis) and segment or regional sizes (y-axis) for 1993. Growth is shown in local currency terms for CAD/CAM/CAE/GIS in Europe by region and application. To enable comparison between the regions, the actual market sizes in Figure 4-1 are given in U.S. dollars. The remaining software market portfolios show the individual market sizes in local currency.

Of the total European CAD/CAM/CAE/GIS software revenue, U.S.-based vendors had 64 percent and European vendors 36 percent in 1993. This indicates a gain of market share for U.S.-based vendor over 1992, when the distribution was 63.1 percent for U.S.-based vendors versus 36.8 percent for European vendors; the Asian vendors' share was negligible. However, when looking at this distribution we have to remember that several of the products sold by U.S.-based vendors are actually developed in Europe. The leading example of this is the CATIA system, developed by Dassault Systemes, for which IBM has the sole distribution rights. Other examples include Computervision's Medusa product, HP's Precision Engineering products, GDS, and the solid modelers Acis and Parasolids.

The share of European vendors is declining for many reasons. First, it is much more difficult to find venture capital or other start-up funding in many countries of Europe than it is in North America. Much of the U.S. CAD/CAM/CAE/GIS industry is driven by people leaving one company

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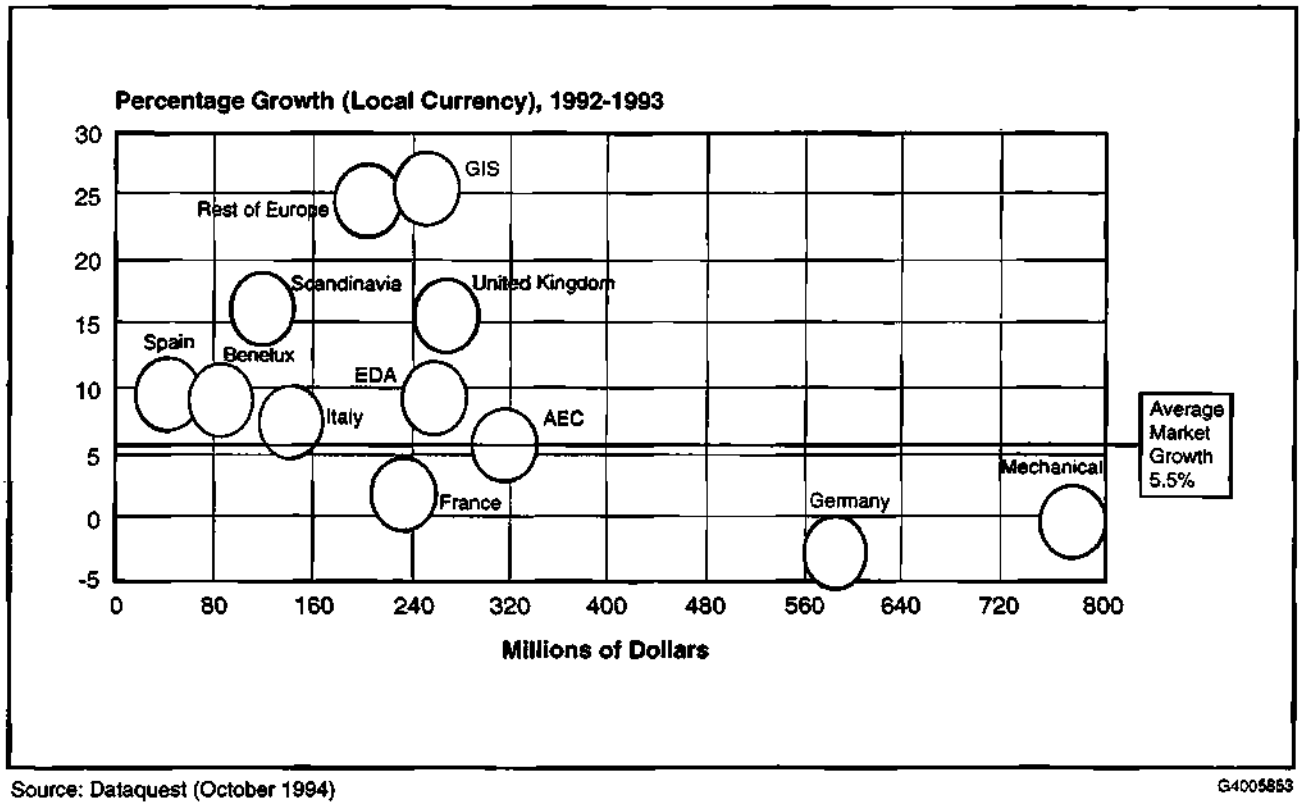
Figure 4-1
1993 European CAD/CAM/CAE/GIS Software Market Portfolio



Source: Dataquest (October 1994) G4005853

and starting a new company with new ideas. These start-ups often include veterans of the vendor and user companies. This happens to a greater extent in the United States because of the critical mass and partnership situation that exists there. Marketing is another issue, and many European companies are extremely reluctant to invest in the right kinds of marketing organizations. Marketing, market research, and press relations all cost money, and companies must be prepared to pay for these things. A third factor is that many European vendors operate only in their country of origin and one or two other countries, and these vendors have suffered. Operating in a comparatively small region does not generate enough revenue to keep up the R&D investment necessary to continue to produce competitive products.

The main reasons for the reduced growth rates experienced in Europe throughout 1993 were the continuing recessionary climate in most European countries, a decline in the manufacturing industry followed by a rapid decline in hardware prices, and the repositioning of major CAD vendors like Computervision from turnkey to software vendors.

Dataquest expects the European CAD/CAM/CAE/GIS market to show relatively low growth again in 1994: 4 percent in total revenue and 7.6 percent in software revenue. We expect the market to return to somewhat higher growth in 1995. Until 1998, we anticipate a compound annual growth rate (CAGR) of 5 percent for total CAD/CAM/CAE/GIS revenue and a 7 percent CAGR for software revenue (see Figure 4-3).

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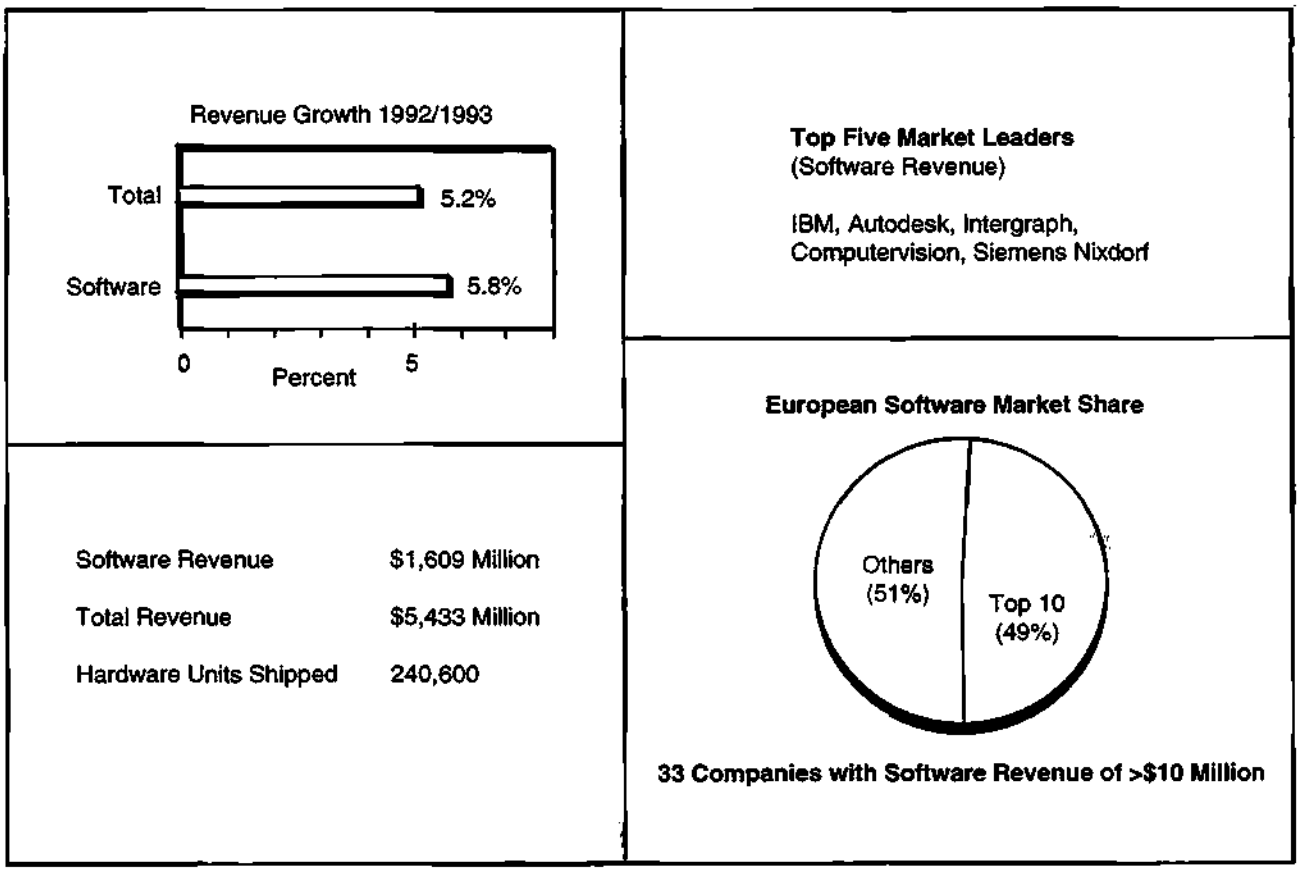
Figure 4-2
European CAD/CAM/CAE/GIS Market Snapshot



Source: Dataquest (October 1994)

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In terms of market share, the position of the top 10 CAD/CAM/CAE/GIS software vendors changed somewhat from 1992. As a group, these top vendors lost market share and accounted for only 49 percent of the total European software revenue, compared with 51 percent in 1992. New entrants among the top 10—and growing high above the market average—were Nemetschek and Parametric Technology, which replaced SDRC and Mentor Graphics (see Table 4-1). Many of the large vendors suffered lower growth, especially because these companies tended to focus on key accounts. As these large accounts deferred purchases, it became vital for the vendors to look to smaller companies for business. However, some vendors have little or no experience in selling to small and medium-size companies, and this lack of experience posed a big problem.

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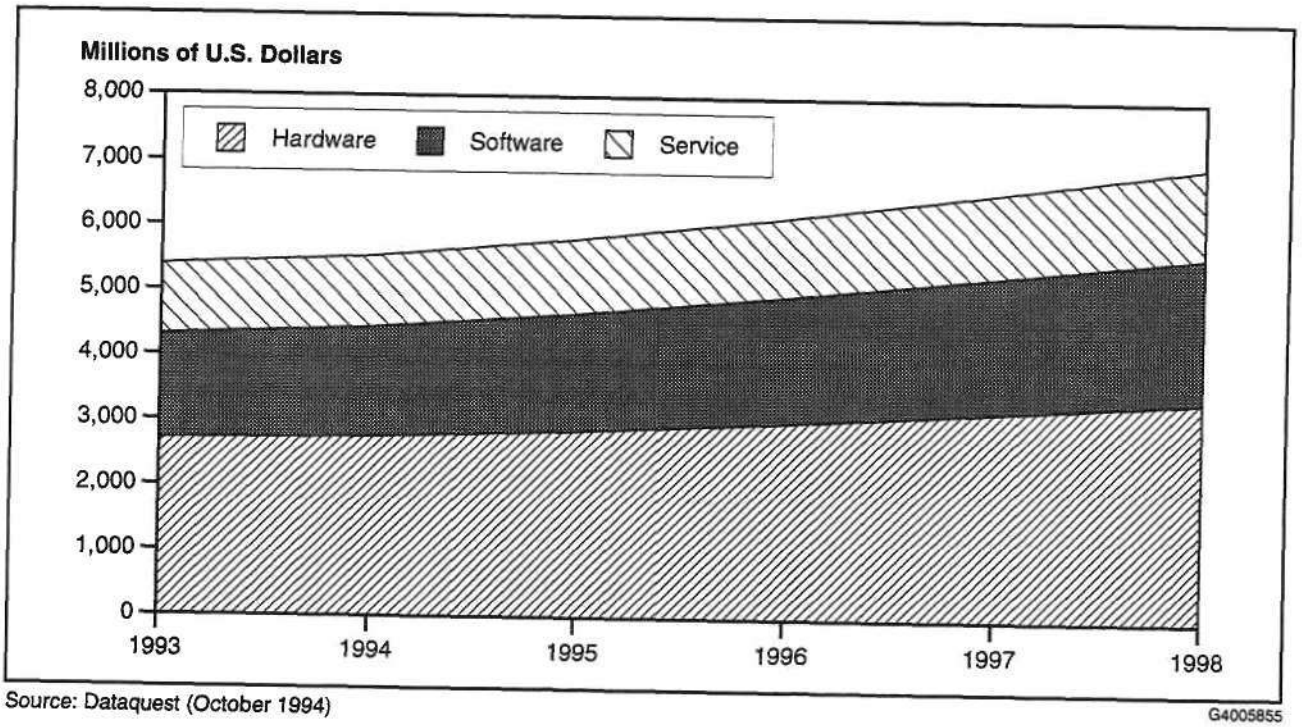
Figure 4-3
European CAD/CAM/CAE/GIS Forecast by Component



Source: Dataquest (October 1994)

G4005855

Table 4-1
Top 10 CAD/CAM/CAE/GIS Software Vendors' Size and Growth in Europe

Ranking 1993	Company	1993 ($M)	Growth (%)	Ranking 1992
1	IBM	156.9	2.06	1
2	Autodesk	132.2	3.87	3
3	Intergraph	113.2	-4.0	4
4	Computervision	96.4	-35.9	2
5	Siemens Nixdorf Informationssysteme	63.4	-30.1	5
6	Cadence	46.6	-14.9	6
7	Hewlett-Packard	45.0	-11.4	7
8	Nemetschek	44.7	37.6	11
9	Matra Datavision	43.6	0.1	9
10	Parametric Technology	40.4	122.9	17
	Top 10 Companies	782.1	0.1	
	All Companies	1,608.9	5.9	

Source: Dataquest (October 1994)

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CAD/CAM/CAE/GIS Forecast Assumptions

The following is a list of assumptions we used to arrive at the overall growth figures for the CAD/CAM/CAE/GIS market until 1998.

Technology

Computing performance is continuing to improve at an exponential rate. The resulting technological improvements drive further demand for improved software solutions.

Indispensability

As complexity increases in both the design and the design process, the benefits of automation improve dramatically. This, coupled with market pressures to produce higher quality products and to reduce cycle time, is making CAD/CAM/CAE/GIS a necessity.

Late Buyers

A significant pool of untapped users still exists in mechanical, AEC, and GIS applications, driving additional growth. These conservative buyers will favor market leaders and installed systems for compatibility. For vendors, therefore, the value of high market share and customer satisfaction will increase.

Desktop Dominance

The turf war for desktop dominance is building steam with the introduction of the Pentium chip and Windows NT, which will fight to take market share from the higher-priced, multiple UNIX operating systems with RISC technology. The decline of host-dependent systems is also continuing, with replacements going to networked, desktop systems. Vendors whose business models depend on high-priced workstations are threatened by these powerful new PCs. At the same time, the replacement of host systems provides them with opportunity for growth.

Unbundling of Software

Software vendors are porting to multiple platforms. The market is quickly moving from proprietary to open systems, resulting in a shift from bundled to unbundled software.

Replacement Market

The replacement market is gaining importance, as illustrated by the fact that over 50 percent of all seats sold in 1993 were replacement seats. Over the next five years, owing to the aging installed base of these technical markets, replacements will dominate sales at over 60 percent. Except for the GIS/mapping market, early adoptions are complete.

Mergers and Acquisitions

The continuing lust for market share, the increased demand for better software solutions, and the pressure to develop new channels of distribution are driving a parade of acquisitions and mergers.

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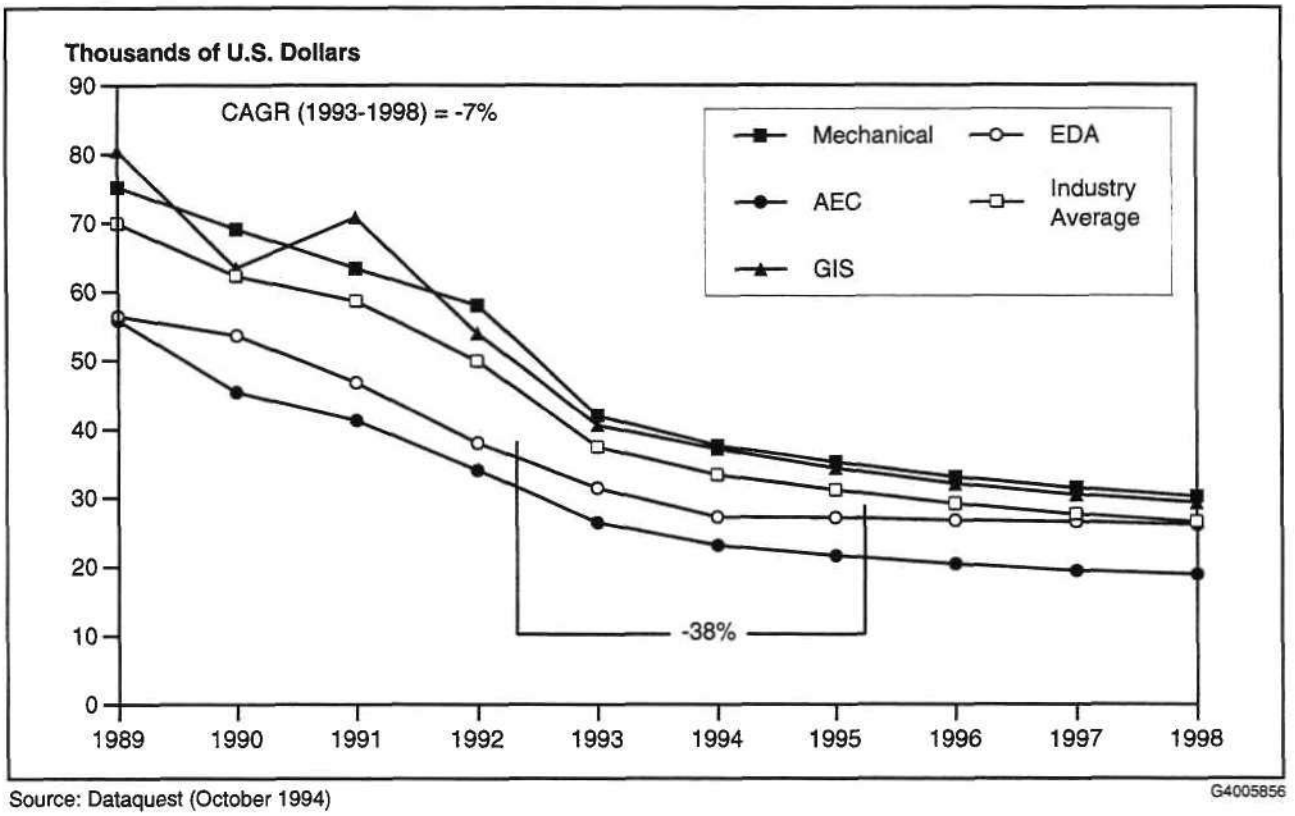
Average Selling Price

The average price per CAD/CAM/CAE/GIS seat continued to fall in 1993 (see Figure 4-4). Over the last five years, the average seat price for a turnkey system declined by 14 percent compounded annually. Dataquest forecasts that the average turnkey system seat price in Europe will decline by a further 7 percent compounded annually to $26,500 in 1998 from $37,400 in 1993. This means that vendors will have to sell more than 12 percent more systems to maintain 1994 revenue at the 1993 level, a difficult task in the current economic climate.

European Service Revenue

We have also seen, as with some other parts of the world, a reduction in service revenue—in spite of the fact that we now include consulting firms and other professional services in this figure. This reduction is a result of several factors, including improved reliability of software, less-frequent software updates, a more educated and experienced user base, and short-term waivers of maintenance charges.

Figure 4-4
Average CAD/CAM/CAE/GIS Seat Price for Turnkey Systems



Source: Dataquest (October 1994)

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Changing Distribution Models

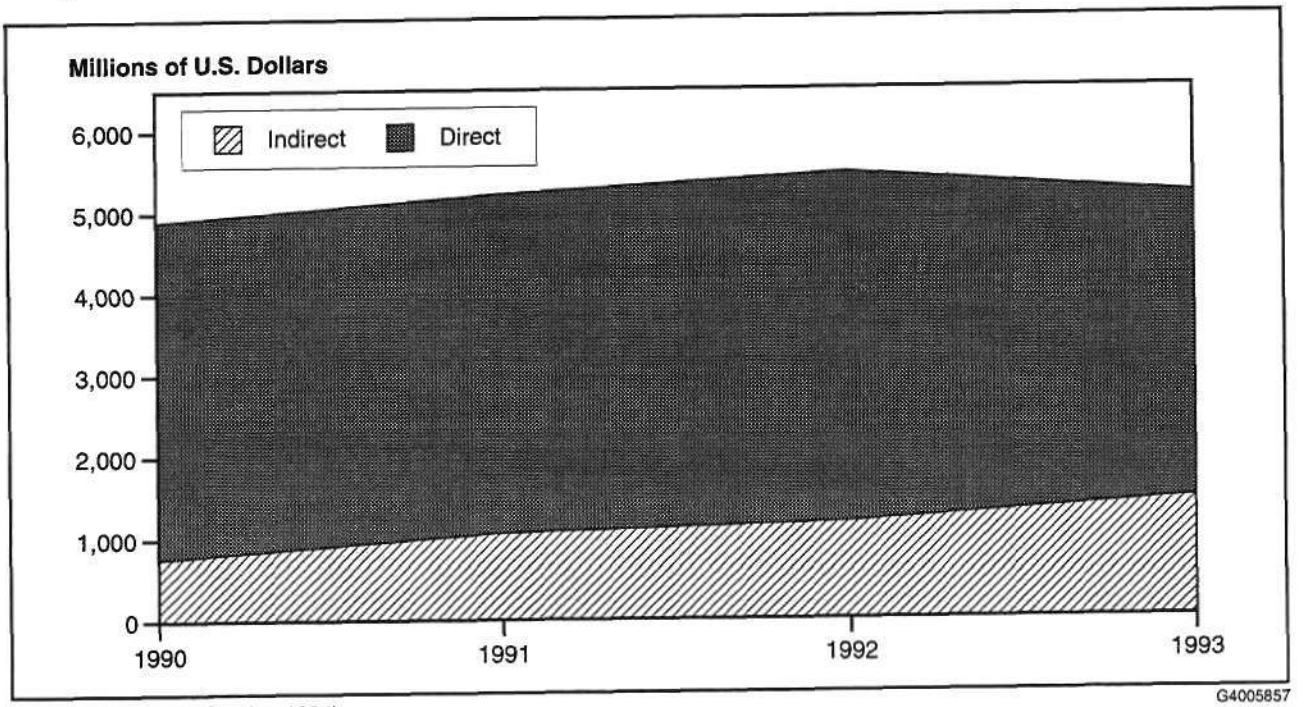
Because Europe comprises a number of separate countries, each with its own language and culture, distribution and support become key issues. It is not possible to emulate a typical U.S. situation and install a single toll-free number as a support hotline for the whole of Europe. Support must be closer to the customer. Each country needs its own sales and support office staffed with people speaking the local language. For that reason, it costs more to do business in Europe.

In general, most vendors (certainly the larger ones) use a direct sales force to reach large companies within the larger markets, and indirect channels (dealers and distributors) to reach smaller companies in more distributed, fragmented markets.

These distribution efforts resulted in a 13 percent decline through direct channels in 1993 and 23 percent growth through indirect channels (see Figure 4-5). It is true that direct channels offer greater margins when the business is available, but they are also where the greatest costs can be found.

This slowdown of the direct channel reflects the relative saturation and retrenchment of large companies.

Figure 4-5
European CAD/CAM/CAE/GIS Revenue: Direct versus Indirect Sales Channels



Source: Dataquest (October 1994)

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Quite a number of small VARs have been making good business out of combining in-house software with tools from several sources and selling the solutions to small and medium-size companies.

A myriad of small companies in Europe are involved in mechanical, electronic, and architectural design. These companies do not have big budgets and they represent a very fragmented market that is expensive to penetrate. The cost of sales as a percentage of the sale value is much higher than selling to a big company.

The requirements of many small companies are quite different than those of large companies. Small companies do not have internal CAD/CAM/CAE support groups, so they need good local support. They often provide subassemblies to larger companies and therefore need to demonstrate compatibility with the larger companies' CAD/CAM/CAE tools.

These small companies offer advantages to the CAD/CAM/CAE vendor. The small-company sector is less penetrated than the large company sector, so the market is wide open for all kinds of tool sales. And many of the larger companies have been hit the hardest by recession. These large companies have more tools than they know what to do with, and they are cutting costs, laying off employees, and restructuring.

Also, small companies may have difficulty finding money, but there is much less bureaucracy involved in getting them to spend that money. If it makes sense for the business, the company will find the money. Large companies are much less flexible in their financing.

Major Market Segments

Following is a brief analysis of the CAD/CAM/CAE/GIS market in Europe by application. Because the drivers for each of these applications differ, depending on regional, economic, and cultural differences, it is more meaningful to analyze these drivers on a regional level. (Appendix A highlights leading vendors in the various European regions in terms of total revenue and software revenue.)

The proportional split of software revenue by application changed in distribution from 1992 to 1993, with actual percentages varying by only 1 percentage point or less from last year's picture or from the general worldwide pattern. Mechanical lost 2 percentage points, and it is expected that the share for mechanical applications will decrease to 42 percent of the total CAD/CAM/CAE/GIS software market by 1998. GIS software gained 2 percentage points over 1992, and its share will increase to 20 percent by 1998. AEC and EDA applications remained almost static and are expected to continue to grow at the average market growth rate until 1998 (see Figure 4-6). In terms of actual software revenue growth based on ECU for the various applications in 1993, the GIS/mapping sector showed a 25.1 percent gain over 1992, followed by EDA applications with 10.3 percent growth. AEC grew 5.4 percent, and mechanical applications decreased by 0.2 percent (see Figure 4-1).

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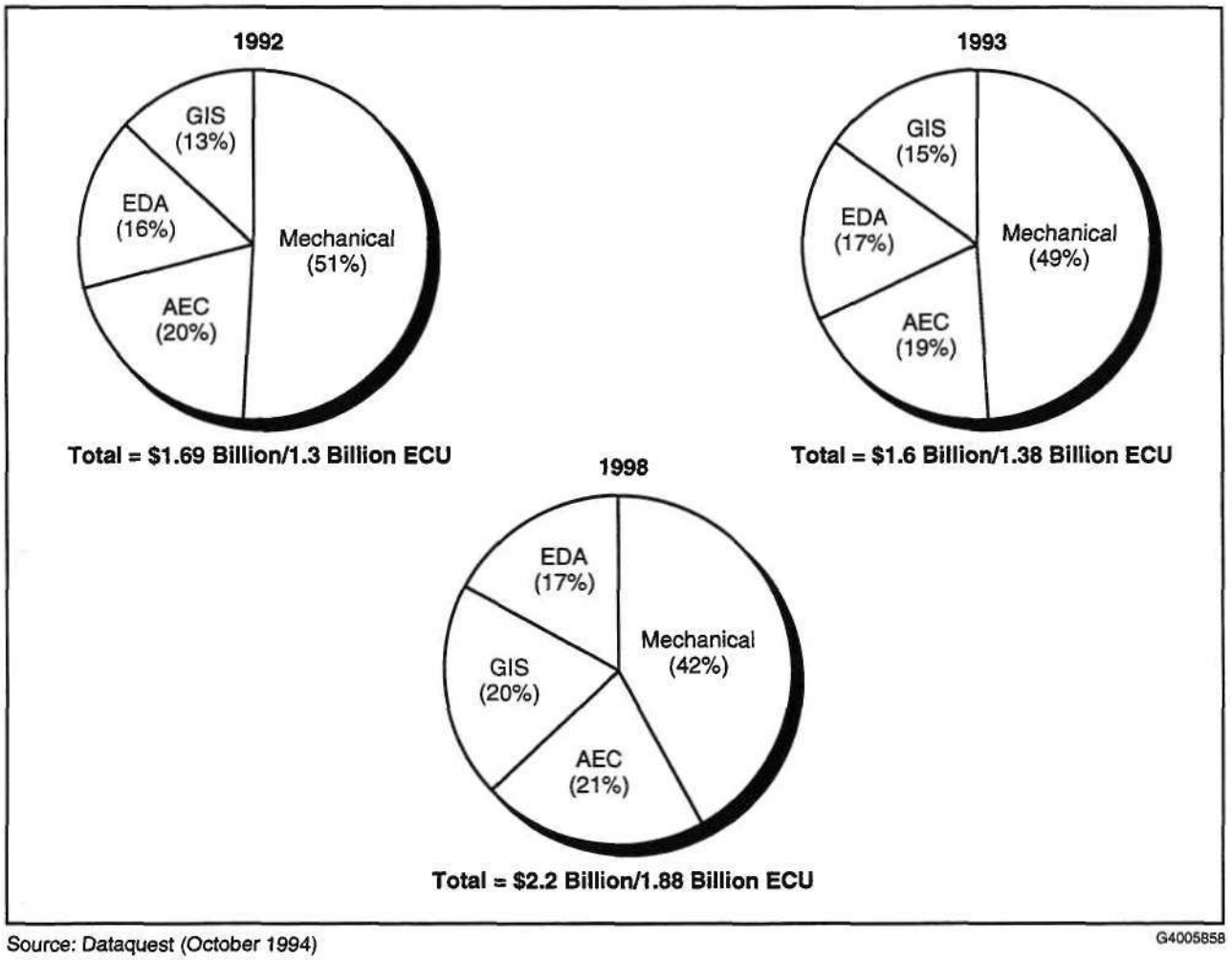
Figure 4-6
Software Revenue Distribution by Application



Source: Dataquest (October 1994) G4005858

Mechanical

The market for mechanical CAD/CAM/CAE software was badly affected during 1993 by the overall economic situation in the manufacturing industry in Europe. The spare capacity generated by the decline in industrial production throughout Europe in 1992 and 1993 resulted in a sharp decline in machinery and equipment investment in the manufacturing industry during this period. The German manufacturing industry in particular, which is the largest consumer of mechanical CAD/CAM/CAE products in Europe, was badly affected, and this dragged down the growth rate of the overall European mechanical CAD/CAM/CAE software market (see Figure 4-7).

Mechanical applications, which totaled $782 million, had a 48.6 percent share of the total European CAD/CAM/CAE/GIS software market in 1993, compared with 51.5 percent in 1992 and 53.9 percent in 1991, and dropped 0.2 percent in software revenue based on ECU in 1993. The top 10 vendors actually grew 2.2 percent and now control 64 percent of this

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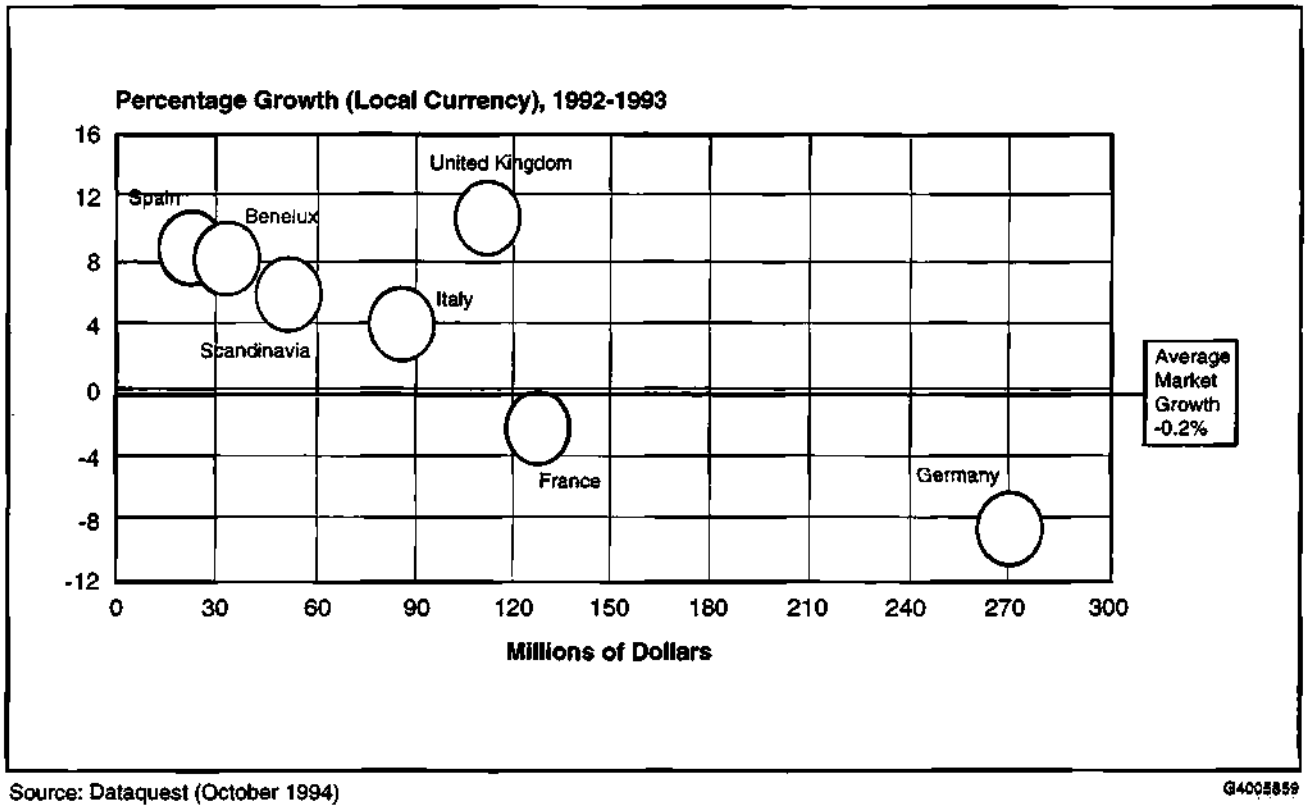
Figure 4-7
1993 European Mechanical CAD/CAM/CAE Software Market Portfolio



Source: Dataquest (October 1994)

G4005859

market, compared with 63 percent in 1992 (see Table 4-2). New entrants among the top 10 were Parametric Technology and MacNeal-Schwendler, which made the top 10 list at the expense of Siemens Nixdorf and Applicon. U.S.-based vendors had a 70 percent share of the mechanical CAD/CAM/CAE software market, with European vendors holding the rest. Over the last few years we have seen the share of European vendors decline in favor of U.S.-based vendors. This trend is caused by three factors: U.S. vendors' acquisitions of several European companies (Norsk Data, Isykon product line), local mergers and acquisitions (Straessle acquired Nestler and Fides), and the fact that companies have simply pulled out of this market.

The recovery of the European manufacturing industry, which started again in 1994, will gather momentum in 1995. Overall investment in the manufacturing industry is still somewhat sluggish; however, the pace is expected to accelerate through 1995, which in turn will also give a boost to investment in mechanical CAD/CAM/CAE tools. For 1994 we expect mechanical software revenue to show slight positive results, with growth of 1.3 percent expected. In 1995 growth should accelerate to nearly 5 percent over 1994. The CAGR for software revenue until 1998 will be about 4 percent (see Figure 4-8). Figure 4-9 shows mechanical CAD market growth by European region.

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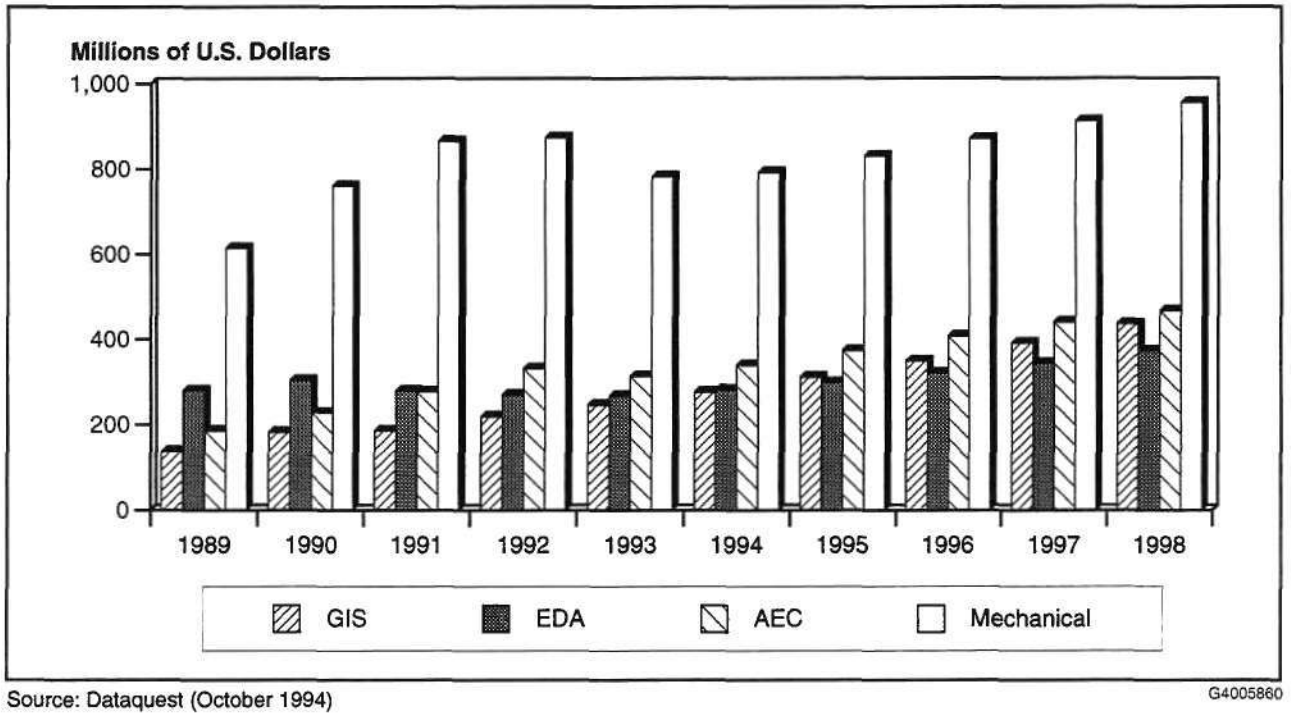
Table 4-2
Top 10 Mechanical CAD/CAM/CAE Software Vendors' Size and Growth

Ranking 1993	Company	1993 ($M)	Growth (%)	Ranking 1992
1	IBM	136.4	4.1	1
2	Computervision	86.3	-32.0	2
3	Autodesk	52.9	3.8	3
4	Matra Datavision	43.1	0.7	5
5	Parametric Technology	40.4	122.9	11
6	Hewlett-Packard	35.8	-15.2	6
7	SDRC	35.0	-24.9	4
8	EDS Unigraphics	33.2	12.6	7
9	MacNeal-Schwendler	20.8	23.5	12
10	Intergraph	19.9	-26.9	9
	Top 10 Companies	503.7	2.2	
	All Companies	782.0	-0.2	

Source: Dataquest (October 1994)

Figure 4-8
European CAD/CAM/CAE/GIS Software Revenue Forecast by Application



Source: Dataquest (October 1994)

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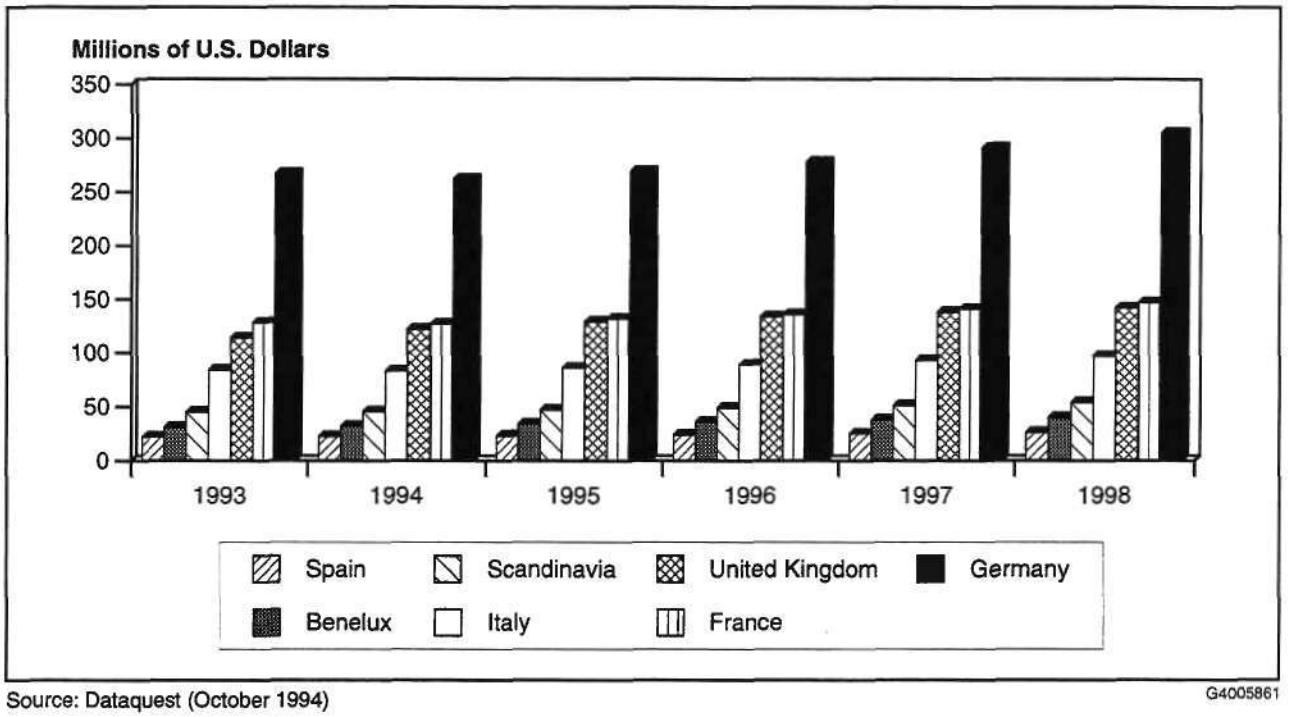
Figure 4-9
European Mechanical CAD/CAM/CAE Software Revenue Forecast by Region



Source: Dataquest (October 1994)

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In general, other factors influencing the performance of the mechanical CAD/CAM/CAE market are the drop in average turnkey system prices of 19 percent based on ECU in 1993, compared with a 16 percent drop in average system price for the overall CAD/CAM/CAE/GIS industry (see Figure 4-4). Also, unlike the other applications segments in the CAD/CAM/CAE/GIS software industry, host-dependent solutions still have a small but significant share of the mechanical software market, and this share is expected to continue to decline. As these host-based installations are replaced with lower-cost software, revenue performance is held down (see Figure 4-10).

An initiative that has the potential to transform the European manufacturing industry came to life at the end of 1993. Advanced Information Technology in Design and Manufacturing (AIT), headed up by Daimler Benz, is intended to strengthen the competitiveness of European key manufacturing industries (automotive, aerospace, component supplier, machine-tools/equipment, and so on). It aims to achieve this goal via two consecutive actions initiated by industry with support of the European Commission. The first is a consensus among the European users and suppliers of information technology (IT) for the most important future requirements on design and manufacturing practice; the second is an IT R&D initiative to support these commonly defined requirements.

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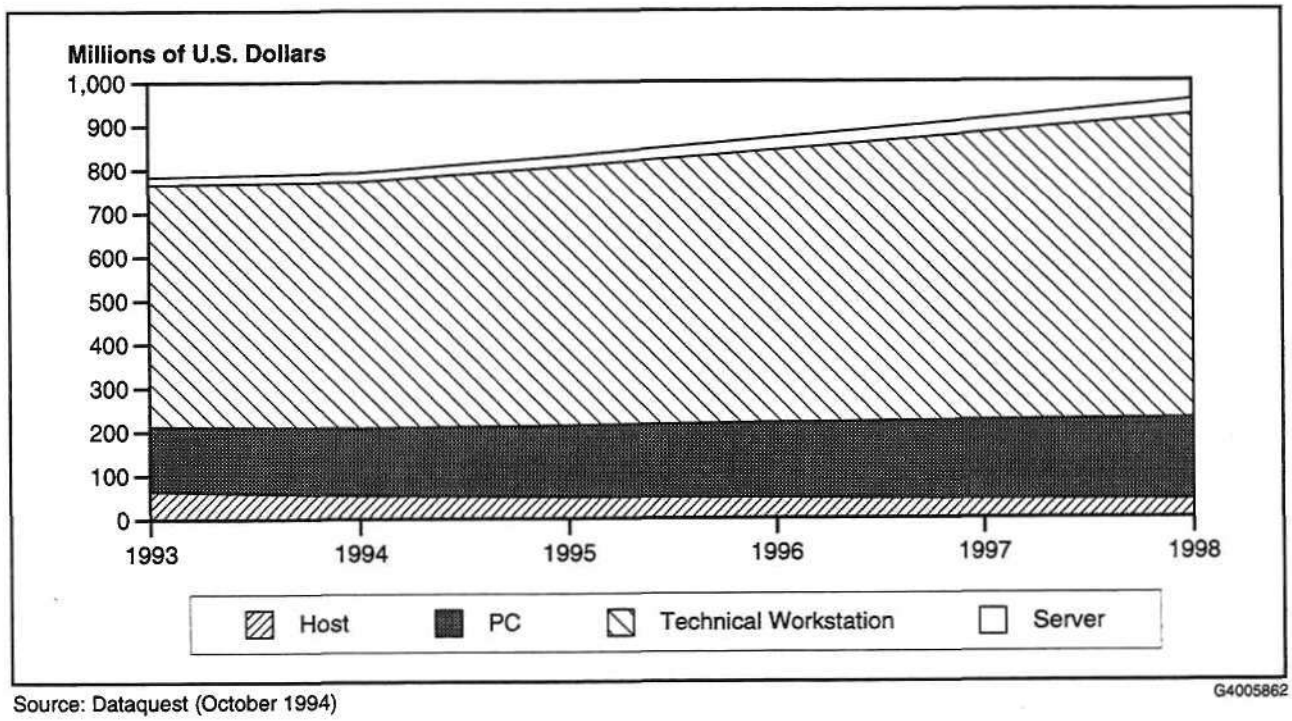
Figure 4-10
Mechanical CAD/CAM/CAE Software Revenue Forecast by Platform in Europe



Source: Dataquest (October 1994)

These trends give a clear indication that the European manufacturing industry is going through a major transformation to remain competitive in a more and more global economy.

AEC

The European construction industry, like the economy of the region, was in retreat during 1993. Economic recession, high interest rates, and mounting unemployment have hit exports and undermined consumer confidence. Private investment, which accounts for 60 percent of the European building/construction industry, has declined as demand for these products has fallen. Companies are unlikely to invest in improved premises or new buildings when their own sales remain weak, and public-sector spending on construction is unlikely to see much improvement in light of the budget deficits most countries have accumulated. The situation has not been helped by overdevelopment of offices in the late 1980s; many office buildings remain empty.

The European AEC software market reached $313.4 million in software revenue in 1993. Based on ECU, AEC software revenue in Europe actually increased by 5.4 percent. This growth was driven by the top 10 vendors, which grew 9.1 percent in aggregate. These top 10 vendors, 6 of which are European companies, control 71 percent of this market segment (see Table 4-3). In the AEC segment, European vendors keep gaining market share and now control 56.2 percent of the market; U.S.-based vendors control the rest in terms of software revenue. This compares with a 54.4 percent share for European vendors in 1992 and 52.7 percent in 1991.

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Table 4-3
Top 10 AEC Software Vendors' Size and Growth in Europe

Ranking 1993	Company	1993 ($M)	Growth (%)	Ranking 1992
1	Autodesk	56.9	3.9	1
2	Nemetschek	44.7	37.6	3
3	Intergraph	40.1	-8.0	2
4	IEZ	27.8	5.9	4
5	IBM	13.0	-13.1	6
6	Soft-Tech Software Technologies	11.4	9.8	8
7	Computervision	7.6	-58.1	5
8	Han Dataport	6.5	0.5	11
9	RIB/Bausoftware	6.1	13.8	12
10	CAD Centre	7.6	-30.4	9
	Top 10 Companies	221.7	9.1	
	All Companies	313.4	5.4	

Source: Dataquest (October 1994)

Dataquest expects growth for AEC software to pick up again in 1994, reaching 8 percent as most European economies emerge from the recession. Until 1998, we expect a CAGR of 8 percent in software revenue (see Figure 4-11).

The largest regional market for AEC software is Germany, which absolutely dominates this market segment in Europe with a 47 percent share of the total European AEC software revenue. Among the top 10 European AEC software vendors, 5 are German companies (see Figure 4-12).

The AEC market segment is dominated by PC-based solutions, not only in terms of unit shipments, which accounted for 86 percent of all seats shipped in Europe throughout 1993, but also in terms of software revenue, which accounted for 51 percent of the total European AEC software revenue (see Figure 4-13).

A similar initiative to AIT in the discrete manufacturing industry was established in 1994 for the European process industry. The Process Industries Manufacturing Advantage through IT (PRIMA) project aims to set up a network of process industries companies in Europe to establish the mid- and long-term requirements for IT (including standards) of many of the industries using continuous or batch processes for manufacturing or for the provision of services. The project will establish a dialogue between these process sectors and the IT vendors as well as with the relevant European R&D programs. Its output will be a description of how key business requirements for the future can be translated into projects and systems using the mechanisms of EU R&D programs.

GIS

There is a tendency around Europe to make the public sector smaller. In countries where, for example, the utility sector was privatized, we have

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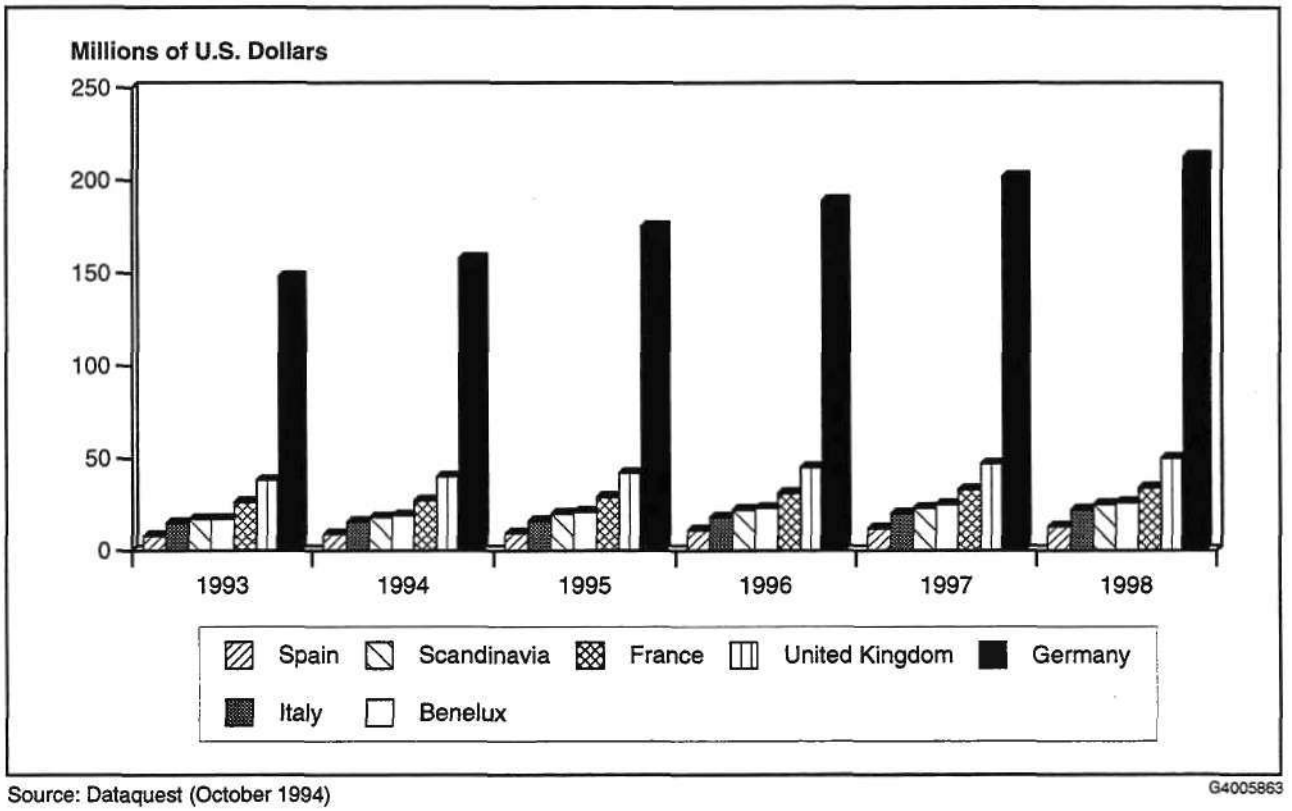
Figure 4-11
European AEC Software Revenue Forecast by Region



Source: Dataquest (October 1994)

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seen a surge in GIS spending almost as a direct result. Also, the telecommunications sector is becoming increasingly deregulated, and in order for telecommunications companies to have a competitive edge, they have had to become more efficient in managing territories. This trend has resulted in large orders for GIS from German Telekom and France Telecom, among others.

Growth in Europe for GIS software accelerated in 1993 to 25.1 percent based on the ECU, reaching $246 million in revenue. Although Germany is again the largest region in terms of software revenue size, its lead in this market is not as large as in the other applications (see Figure 4-14). The top 10 vendors, which control 73 percent of this market segment, increased their software revenue by 43 percent in aggregate (see Table 4-4). European vendors held a 52 percent share of the European GIS software market in 1991; in 1993, U.S.-based vendors hold 55 percent of the market despite the fact that there are 6 European vendors among the top 10.

In terms of software revenue, the European GIS market is very much dominated by technical workstation-based solutions. PC-based solutions are constantly gaining more ground, and host-based solutions have almost become extinct (see Figure 4-15). In terms of actual GIS seats shipped in 1993, 37 percent were workstation based, compared with 58 percent PC-based solutions.

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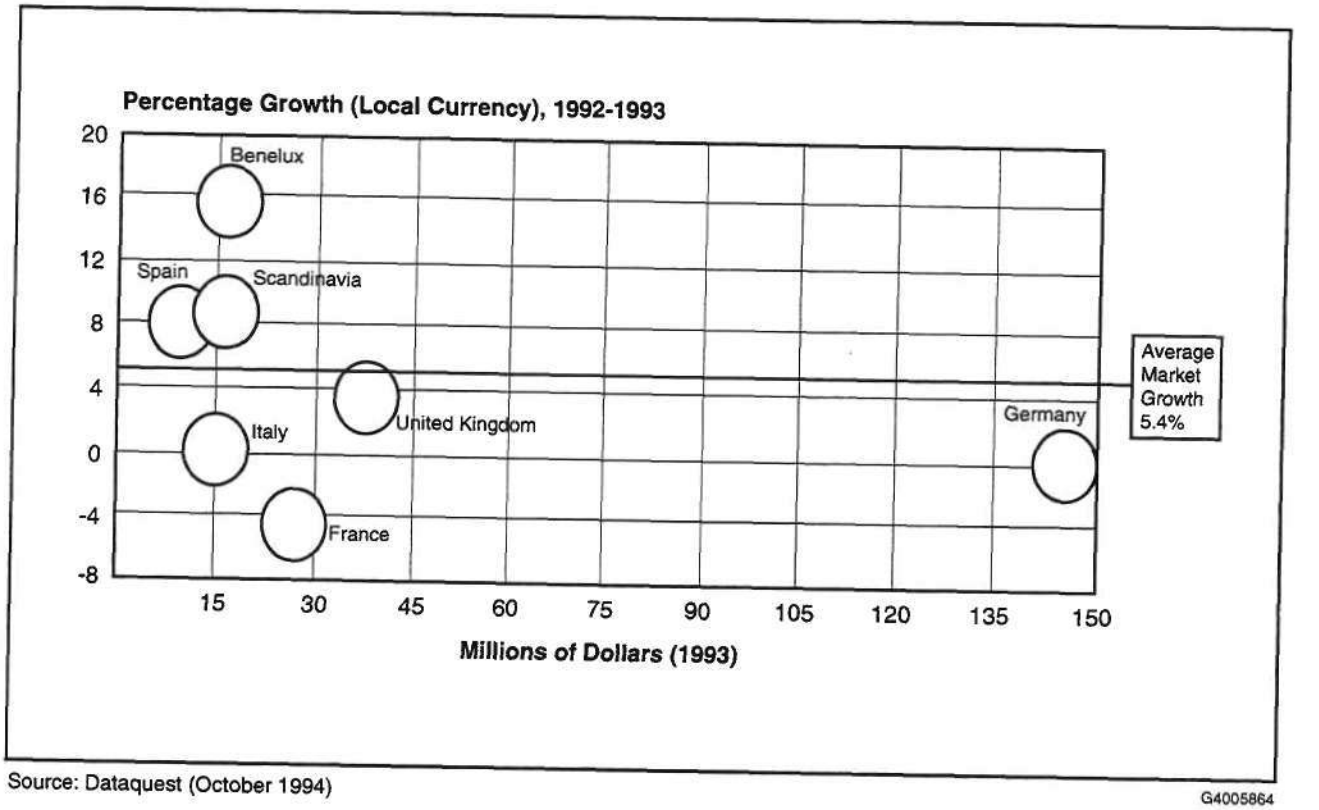
Figure 4-12
European AEC Software Market Portfolio



Source: Dataquest (October 1994)

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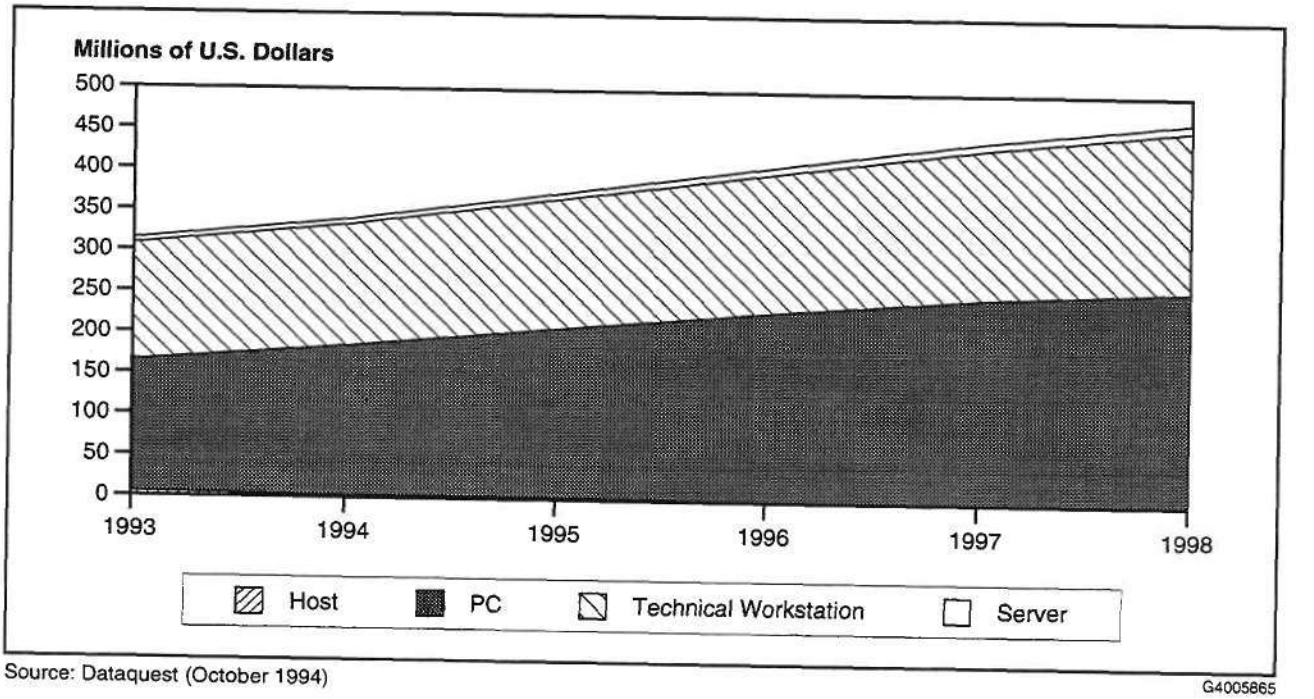
Figure 4-13
AEC Software Revenue Forecast by Platform in Europe



Source: Dataquest (October 1994)

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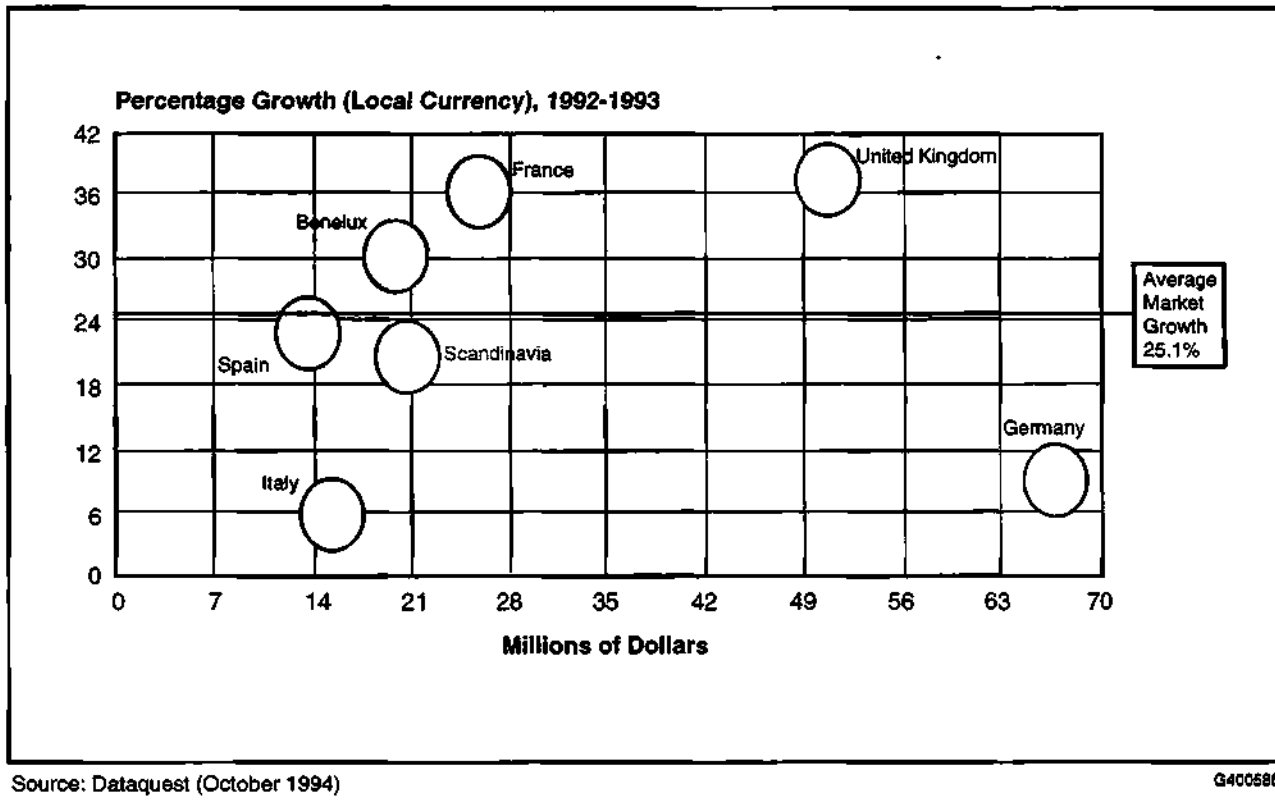
Figure 4-14
1993 European GIS Software Market Portfolio



Source: Dataquest (October 1994)

G4005886

Table 4-4
Top 10 GIS Software Vendors' Size and Growth in Europe

Ranking 1993	Company	1993 ($M)	Growth (%)	Ranking 1992
1	Siemens Nixdorf Informationssysteme	48.2	-4.1	1
2	Intergraph	43.0	19.0	2
3	ESRI	36.0	54.1	3
4	Autodesk	14.5	3.9	4
5	Smallworld Systems	13.8	138.6	6
6	Straessle Informationssysteme	6.5	142.2	14
7	Sysdeco Ltd.	5.9	270.6	19
8	Genasys II	4.4	11.2	8
9	Laser-Scan	4.2	22.0	9
10	APIC Systemes	4.0	24.5	13
	Top 10 Companies	180.5	43.1	
	All Companies	246.0	25.1	

Source: Dataquest (October 1994)

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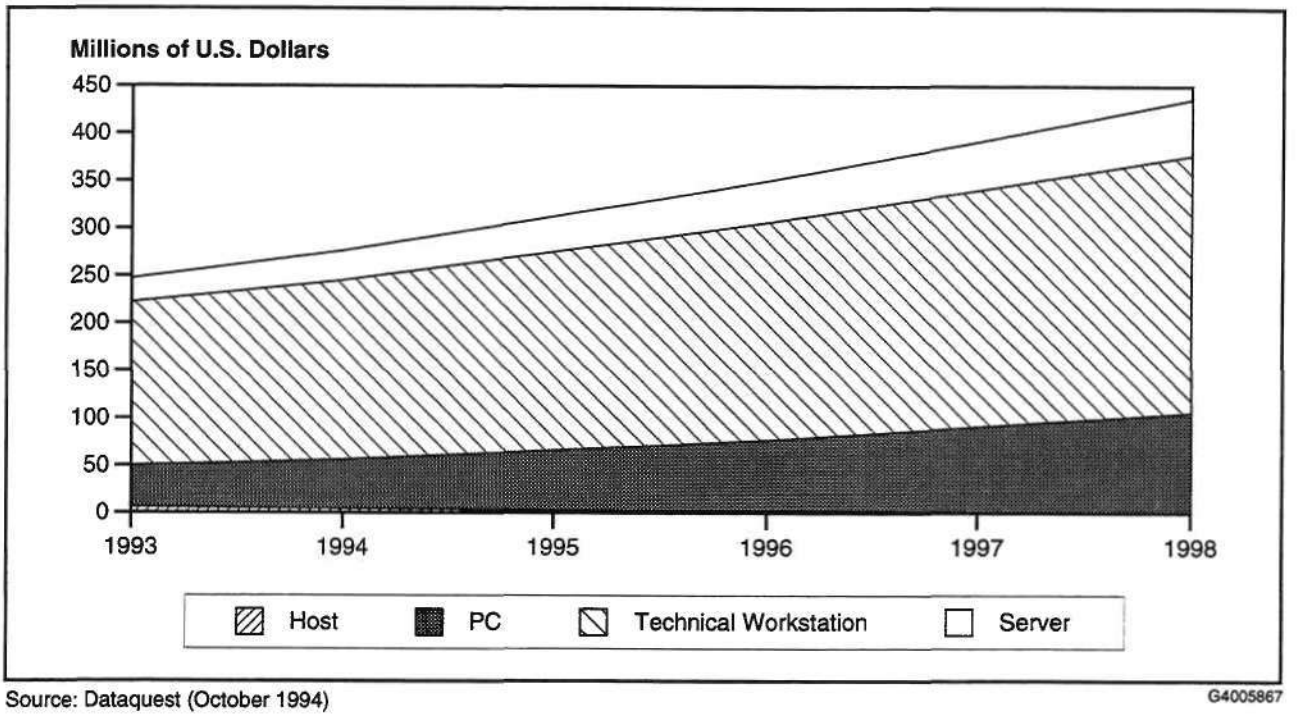
Figure 4-15
GIS Software Revenue Forecast by Platform in Europe



Source: Dataquest (October 1994)

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In 1994, the European GIS software market is expected to increase another 12 percent, and the CAGR until 1998 is also expected to be around 12 percent. See Figure 4-16 for the European GIS software revenue forecast by region. Areas where we expect GIS investment to increase because of EC regulations or EC-funded projects are oil/gas exploration and the water, telecom, freight/transportation, aviation, railway, energy, and mining industries. For example, the EC has proposals for a combined carbon and energy tax to combat the threat of global warming. There may be a long-term place for nuclear power, which does not emit carbon dioxide, with greater use of natural gas. The EC has introduced new standards on drinking and bathing water, requiring a major cleanup operation by the individual member countries. Transport emissions are the fastest-growing type of air pollution, and they need to be closely monitored and reduced. Also, on an ecological scale, it is becoming vital to manage forests, acid rain, and so on.

All of this means that there is plenty of scope for the European GIS market to exhibit strong growth over the next decades; however, some projects in Europe are stuck because of nonavailability of data. Cadastral and utility applications need high-precision data, which in some cases does not exist, and where it does exist, the cost of good topological data is prohibitive.

There are some European initiatives to address these problems. One is the EC's IMPACT initiative, which tries to encourage cross-border development of new geographical information sources aimed at strategic business

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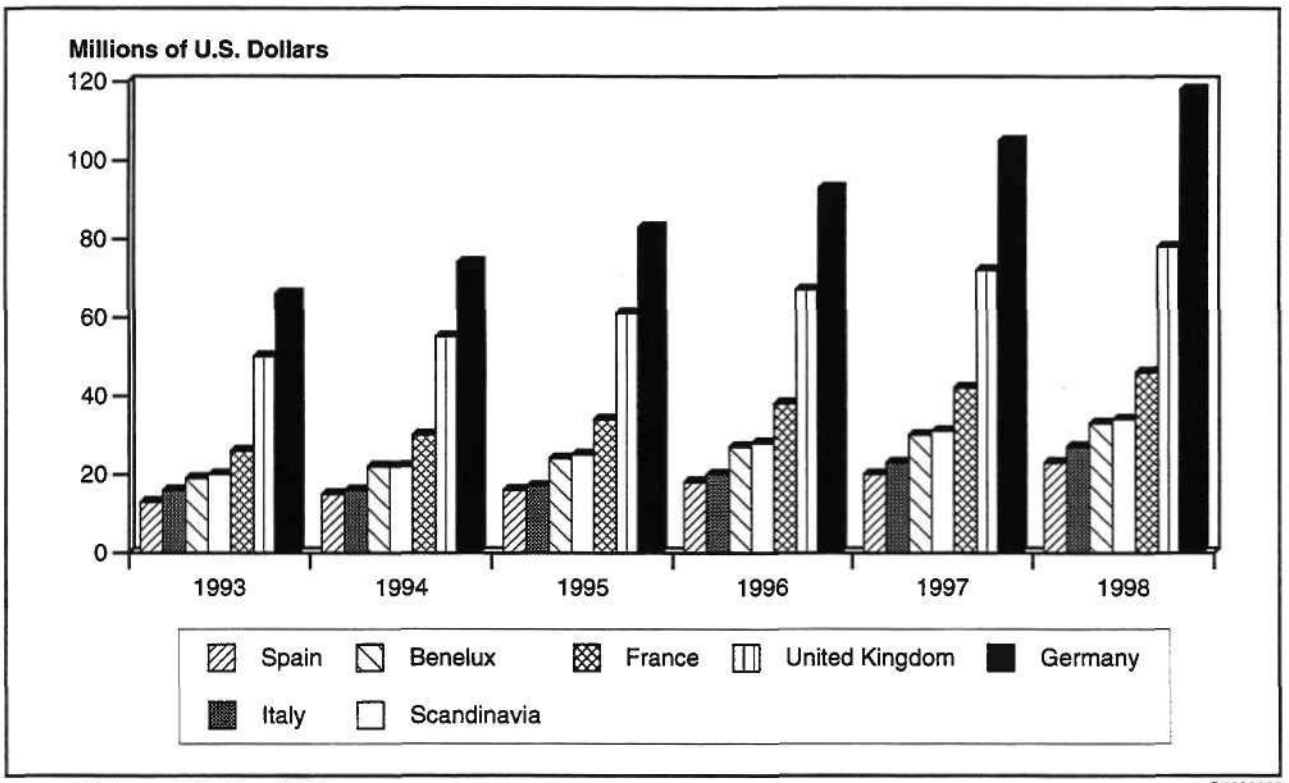
Figure 4-16
European GIS Software Revenue Forecast by Region



Source: Dataquest (October 1994)

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applications. The European Umbrella Organization for Geographical Information (EUROGI) was formed to encourage various groups within the European geographic information community to start working together. It will consider topics such as standards in GIS, cost-benefit studies, teaching, and training.

The European end-user market is fragmented and differs by country depending on the level of privatization of government sectors and how the various sectors are structured. In several of the countries, such as Belgium, the public authority is responsible for roads and wastewater but not for utilities such as gas, electricity, and drinking water. Because there is usually no coordination between the public authority and the utility sector in countries where these sectors are independent of each other, it is impossible to create a single good database. In most cases, these two sectors do not share costs for political reasons.

EDA

The European EDA software market showed relatively healthy growth in 1993. Overall EDA software revenue growth in Europe was 10.3 percent based on ECU. In U.S. dollars, the market reached $267.6 million. Figure 4-17 shows the size of the country markets in millions of dollars: Germany is by far the biggest market, and France and the United Kingdom, the next-largest markets, are about half its size.

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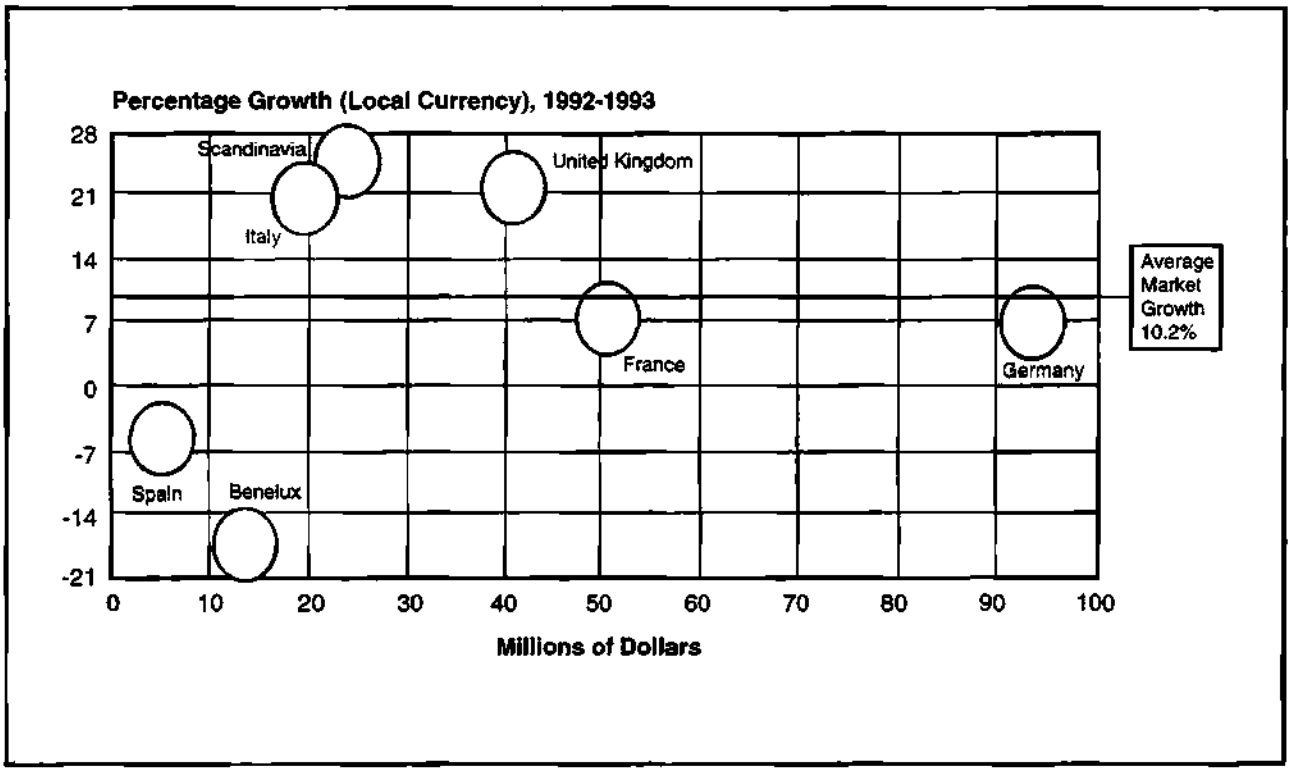
Figure 4-17
1993 European EDA Software Market Portfolio



Source: Dataquest (October 1994) G4005869

Based on an overall improvement in the European economy and the fact that many user companies that deferred investments during the years of recession are going to replace outdated systems, we anticipate that the European EDA software market will increase 5 percent in 1994, reaching a 7 percent CAGR until 1998. See Figure 4-18 for the European EDA software revenue forecast by region.

The top 10 vendors had a 63 percent share of the total EDA software market. The positions of these vendors changed significantly in 1993 compared with 1992 (see Table 4-5). When compared with the other application sectors, these top 10 vendors had only a marginally higher growth rate, 10.7 percent, than the average EDA software growth rate. The EDA market is heavily dominated by U.S.-based vendors, which held an 81 percent share of the overall European EDA software market in 1993. In 1991, this share was 68 percent. U.S.-based vendors have been steadily increasing their hold on the European EDA market, and now that Racal-Redac has become a Japanese company, the European vendors' share will plunge even further in 1994. Other acquisitions of European vendors include Cadis by Synopsys and Anacad by Mentor Graphics.

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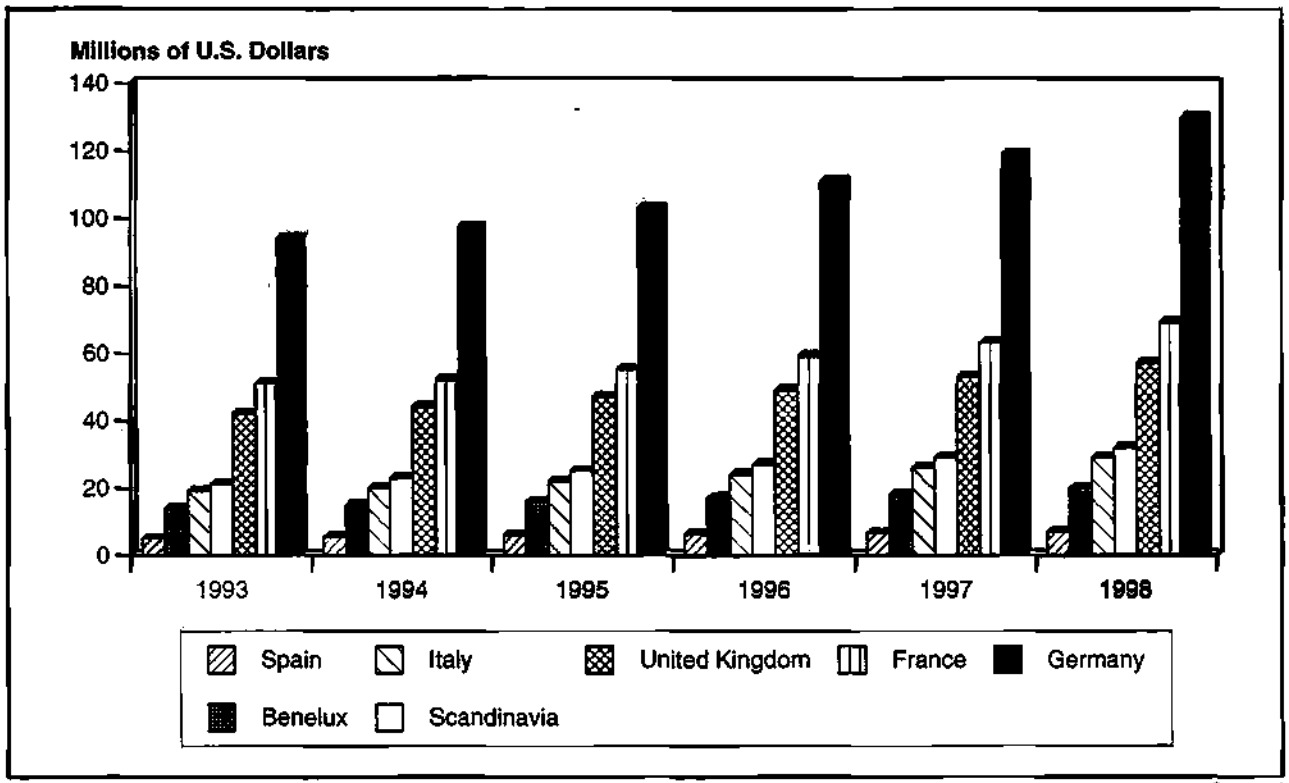
Figure 4-18
European EDA Software Revenue Forecast by Region



Source: Dataquest (October 1994)

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Table 4-5
Top 10 EDA Software Vendors' Size and Growth in Europe

Ranking 1993	Company	1993 ($M)	Growth (%)	Ranking 1992
1	Cadence	46.6	-14.9	1
2	Mentor Graphics	40.2	13.5	2
3	Synopsys	17.5	64.5	5
4	Racal-Redac	12.2	-33.6	3
5	Intergraph	10.2	-6.3	4
6	Viewlogic Systems	9.3	2.9	6
7	Hewlett-Packard	9.1	7.7	8
8	COMPASS Design Automation	8.7	-3.2	7
9	Logic Modeling Corp.	8.1	104.8	15
10	Autodesk	7.9	4.2	9
	Top 10 Companies	169.7	10.7	
	All Companies	267.6	10.2	

Source: Dataquest (October 1994)

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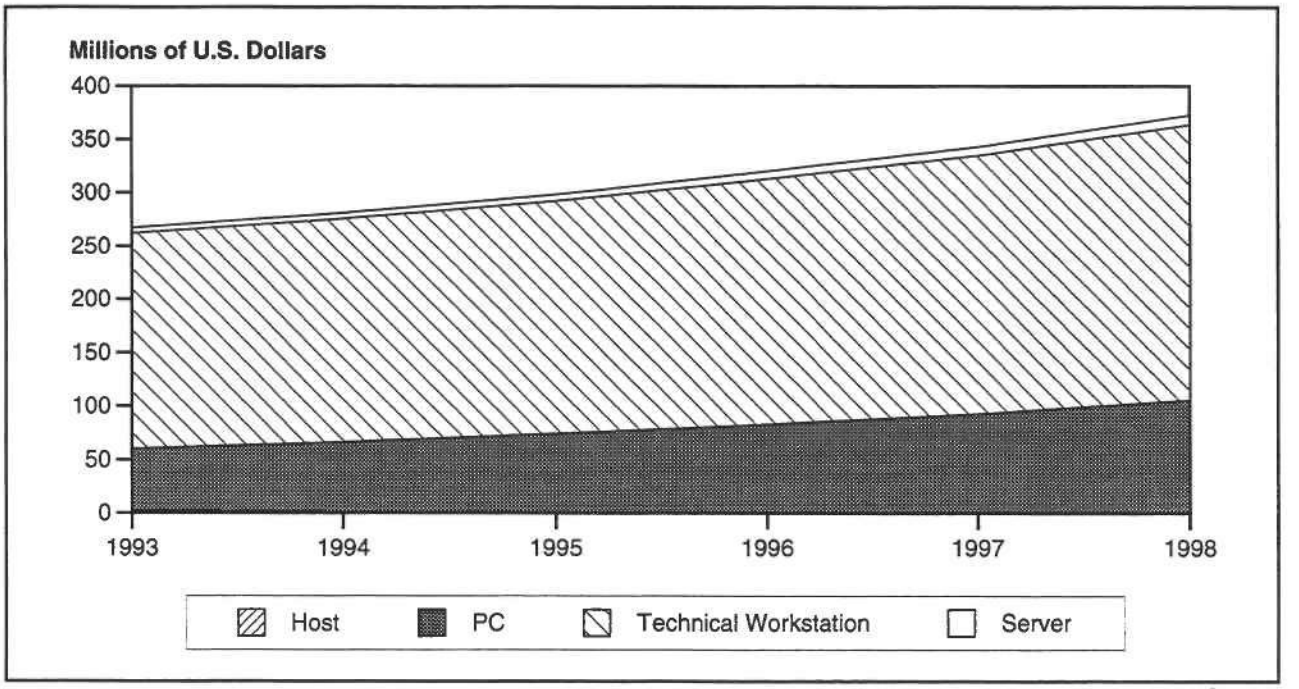
The EDA market, more than any other segment of the European CAD/CAM/CAE/GIS software industry, is dominated by technical workstation-based solutions and will continue to be so for the foreseeable future. See Figure 4-19 for the EDA revenue forecast by platform in Europe.

As in other industries, a lot of equipment is produced in Europe but is not necessarily designed in Europe. Much of it is produced by Japanese or North American companies, which tend to design their products at their home bases. Major differences therefore exist between what is produced and what is designed in Europe. In particular, telecommunications, which is No. 3 in production, is way ahead when it comes to design investment. The main investment in EDA software revenue in Europe during 1993 came from the telecommunications sector, which continues to dominate electronic design in Europe. Forty percent of the EDA software generated in Europe came from the telecommunications sector (see Figure 4-20). Of the top 13 worldwide telecommunications companies, 8 are headquartered in Europe, including the top 2. In addition to this sector, the semiconductor and even the defense industries in Europe increased their investment in EDA software tools.

Figure 4-19
EDA Software Revenue Forecast by Platform in Europe



Source: Dataquest (October 1994)

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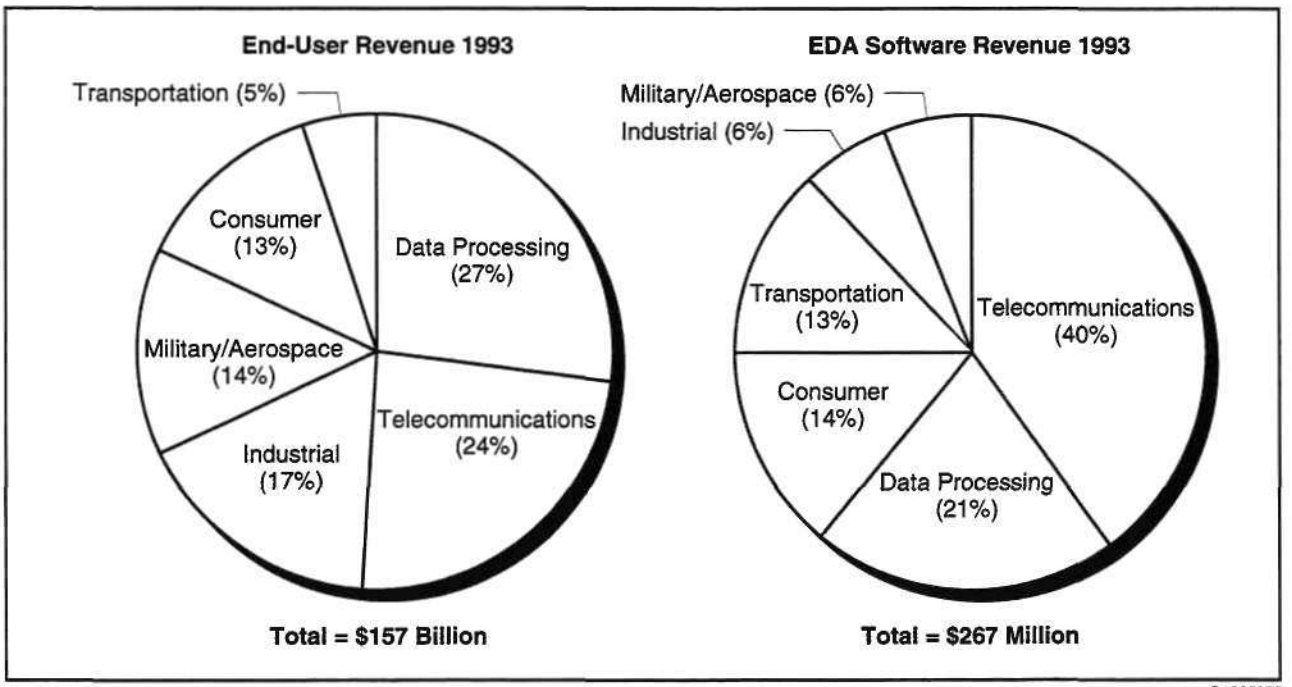
Figure 4-20
European Electronics Production versus Design



Source: Dataquest (October 1994)

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Electrical

Dataquest estimates the size of the electrical engineering software market in Europe to have been $91 million in 1992 and $95 million in 1993. Approximately 50 percent of this revenue comes from Germany. This market is headed by companies such as Intergraph, IGE, Aucotec, TCS, debis, Siemens Nixdorf, and Klöckner-Moeller.

The electrical engineering software market is composed of applications for designing electrical wiring and associated systems (switchgear, relay panels, and so on). The biggest part of the market is for electrical wiring design in buildings and factories (shop-floor wiring applications). Other important sectors are automotive and aircraft wiring design, mainframe computer cabinets, washing machines, dishwashers, and printers.

As in the EDA market, these applications have front-end applications for schematic capture, and back-end applications for physical wire harness/cable design. Some companies focus on just one of these areas (debis, for example, concentrates on schematics), while others support all areas (such as Intergraph and Computervision).

In Germany, Verfahrensneutrale Schnittstelle (VNS), a neutral data interchange standard for electrical applications, is being developed. Phase 1 applied to a graphics interface; Phase 2, which began in autumn 1993, includes data exchange of attributes, part lists, and so on. This standard has opened the German software systems in this segment. This standard will be tied in with the Standard for the Exchange of Product Data (STEP).

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Appendix A
European CAD/CAM/CAE/GIS Market Statistics

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Table A-1
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	909.7	606.6	156.9	39,592	16.7	22.2	9.6	16.4
Hewlett-Packard	477.2	344.1	45.0	18,445	8.7	12.6	2.7	7.6
Digital	455.2	359.2	0	18,490	8.3	13.2	0	7.7
Intergraph	338.4	128.5	114.6	6,181	6.2	4.7	7.0	2.6
Computervision	313.0	70.6	96.4	4,341	5.7	2.6	5.9	1.8
Sun Microsystems	274.2	218.7	0	9,578	5.0	8.0	0	4.0
Siemens Nixdorf Info systeme	211.9	84.1	65.3	6,025	3.9	3.1	4.0	2.5
Autodesk	132.2	0	132.2	0	2.4	0	8.1	0
Silicon Graphics	119.4	104.5	0	3,184	2.2	3.8	0	1.3
Dassault*	92.9	0	80.7	0	1.7	0	4.9	0
Mentor Graphics	91.8	13.0	40.2	439	1.7	0.5	2.5	0.2
Cadence	78.9	0	56.5	0	1.4	0	3.5	0
Matra Datavision	77.5	26.1	43.6	1,427	1.4	1.0	2.7	0.6
Nemetschek	73.4	22.2	44.7	1,793	1.3	0.8	2.7	0.7
EDS Unigraphics	70.0	20.8	33.2	1,062	1.3	0.8	2.0	0.4
IEZ	54.0	18.2	27.8	1,295	1.0	0.7	1.7	0.5
SDRC	51.3	0	35.0	0	0.9	0	2.1	0
Parametric Technology	49.3	0	40.4	0	0.9	0	2.5	0
ESRI	44.6	0	36.0	0	0.8	0	2.2	0
Applicon	38.5	12.7	15.0	424	0.7	0.5	0.9	0.2
Other Companies	227.8	364.7	0	96,637	4.2	13.4	0	40.1
All Companies	5,455.5	2,728.3	1,636.1	241,146	100.0	100.0	100.0	100.0

(Continued)

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Table A-1 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	4,206.2	2,323.2	1,038.8	209,801	77.1	85.2	63.5	87.0
All Asian-Based Companies	29.3	4.2	13.6	153	0.5	0.2	0.8	0.1
All European-Based Companies	1,220.0	400.9	583.7	31,193	22.4	14.7	35.7	12.9
All Hardware Companies	1,883.2	1,644.2	2.5	189,997	34.5	60.3	0.2	78.8
All Turnkey & SW Companies	3,572.3	1,084.1	1,633.5	51,149	65.5	39.7	99.8	21.2

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-2
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share (%) Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	635.9	381.0	136.4	18,756	22.2	25.7	17.4	18.9
Hewlett-Packard	306.6	208.6	35.8	10,409	10.7	14.1	4.6	10.5
Computervision	278.9	62.8	86.3	3,847	9.7	4.2	11.0	3.9
Digital	274.7	217.8	0	9,804	9.6	14.7	0	9.9
Silicon Graphics	105.2	92.1	0	2,789	3.7	6.2	0	2.8
Sun Microsystems	86.7	69.5	0	2,848	3.0	4.7	0	2.9
Dassault*	85.1	0	73.9	0	3.0	0	9.4	0
Matra Datavision	76.7	25.9	43.1	1,414	2.7	1.7	5.5	1.4
EDS Unigraphics	70.0	20.8	33.2	1,062	2.4	1.4	4.2	1.1
Siemens Nixdorf Info systeme	62.9	24.8	16.0	1,754	2.2	1.7	2.0	1.8
Intergraph	62.7	22.3	20.3	942	2.2	1.5	2.6	0.9
Autodesk	52.9	0	52.9	0	1.8	0	6.7	0
SDRC	51.3	0	35.0	0	1.8	0	4.5	0
Parametric Technology	49.3	0	40.4	0	1.7	0	5.2	0
Applicon	38.5	12.7	15.0	424	1.3	0.9	1.9	0.4
Other Companies	30.0	11.2	9.3	267	1.0	0.8	1.2	0.3
ASCAD/ASCAM	28.2	16.7	8.7	436	1.0	1.1	1.1	0.4
CAD Lab	24.7	7.6	11.4	580	0.9	0.5	1.5	0.6
Straessle Informationssysteme	23.6	3.9	14.3	405	0.8	0.3	1.8	0.4
Investronica SA	23.6	14.8	6.2	808	0.8	1.0	0.8	0.8
Other Companies	40.5	163.8	0	32,400	1.4	11.1	0	32.6
All Companies	2,869.3	1,480.7	784.7	99,482	100.0	100.0	100.0	100.0

(Continued)

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Table A-2 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	2,317.5	1,285.0	538.2	85,446	80.8	86.8	68.6	85.9
All Asian-Based Companies	0	0	0	0	0	0	0	0
All European-Based Companies	551.8	195.8	246.6	14,035	19.2	13.2	31.4	14.1
All Hardware Companies	910.1	790.0	0	71,204	31.7	53.4	0	71.6
All Turnkey & SW Companies	1,959.3	690.7	784.7	28,277	68.3	46.6	100.0	28.4

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-3
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: AEC
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	128.4	101.3	13.0	11,362	14.4	22.8	4.1	15.1
Intergraph	126.7	46.4	42.8	3,006	14.2	10.4	13.5	4.0
Nemetschek	73.4	22.2	44.7	1,793	8.2	5.0	14.1	2.4
Autodesk	56.9	0	56.9	0	6.4	0	17.9	0
IEZ	54.0	18.2	27.8	1,295	6.1	4.1	8.8	1.7
Hewlett-Packard	28.5	24.4	0	1,692	3.2	5.5	0	2.2
Computervision	25.7	5.9	7.6	374	2.9	1.3	2.4	0.5
Digital	24.5	21.1	0	3,621	2.8	4.7	0	4.8
Apple Computer	20.4	20.4	0	4,292	2.3	4.6	0	5.7
Siemens Nixdorf Info systeme	20.0	9.0	4.0	559	2.3	2.0	1.3	0.7
Soft-Tech Software Technologies	14.7	1.9	11.4	948	1.6	0.4	3.6	1.3
RIB/Bausoftware	13.0	1.2	10.7	65	1.5	0.3	3.4	0.1
Han Dataport	12.7	3.7	6.5	392	1.4	0.8	2.1	0.5
Microway	12.5	7.5	3.8	138	1.4	1.7	1.2	0.2
Data Technology/DATECH*	11.2	2.1	7.8	5,709	1.3	0.5	2.5	7.6
CAD Centre	8.3	.8	5.3	44	0.9	0.2	1.7	0.1
Kockums Computer Systems	8.0	2.1	1.4	370	0.9	0.5	0.5	0.5
Technische Computer Systeme	7.9	1.5	5.6	148	0.9	0.3	1.8	0.2
Dassault*	7.8	0	6.8	0	0.9	0	2.1	0
Hochtief	7.4	1.3	3.5	91	0.8	0.3	1.1	0.1
Other Companies	89.2	112.2	0	36,689	10.0	25.3	0	48.8
All Companies	890.1	443.8	317.3	75,255	100.0	100.0	100.0	100.0

(Continued)

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Table A-3 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: AEC
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	564.5	346.7	139.7	65,876	63.4	78.1	44.0	87.5
All Asian-Based Companies	0	0	0	0	0	0	0	0
All European-Based Companies	325.6	97.1	177.6	9,379	36.6	21.9	56.0	12.5
All Hardware Companies	281.6	268.1	0	63,241	31.6	60.4	0	84.0
All Turnkey & SW Companies	608.5	175.8	317.3	12,014	68.4	39.6	100.0	16.0

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-4
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Intergraph	137.5	59.7	41.5	2,215	18.1	17.2	17.1	8.2
Siemens Nixdorf Info systeme	126.5	49.2	44.8	3,644	16.7	14.2	18.5	13.5
IBM	56.3	46.6	3.0	2,874	7.4	13.4	1.3	10.6
Digital	50.1	37.2	0	2,176	6.6	10.7	0	8.1
ESRI	44.6	0	36.0	0	5.9	0	14.8	0
Sun Microsystems	39.0	31.8	0	1,010	5.2	9.1	0	3.7
Landmark Graphics	37.1	7.8	14.9	95	4.9	2.2	6.2	0.4
Hewlett-Packard	30.0	25.6	0	1,412	4.0	7.4	0	5.2
ICL	26.0	15.2	9.0	749	3.4	4.4	3.7	2.8
Sysdeco Ltd.	23.7	11.9	5.9	207	3.1	3.4	2.4	0.8
Smallworld Systems	23.2	1.1	13.8	43	3.1	0.3	5.7	0.2
Autodesk	14.5	0	14.5	0	1.9	0	6.0	0
Laser-Scan	9.5	2.8	4.2	58	1.2	0.8	1.7	0.2
Straessle Informationssysteme	9.4	0.7	6.5	75	1.2	0.2	2.7	0.3
Unisys	8.6	1.9	3.5	84	1.1	0.6	1.5	0.3
Sysdeco Innovation	8.5	3.4	2.5	88	1.1	1.0	1.0	0.3
Kohns & Poppenhaeger	6.6	3.0	2.6	76	0.9	0.9	1.1	0.3
Genasys II	6.2	0.6	4.4	26	0.8	0.2	1.8	0.1
Star Informatic	6.0	1.2	3.8	81	0.8	0.3	1.6	0.3
APIC Systemes	5.9	0	4.0	0	0.8	0	1.7	0
Other Companies	37.5	34.5	2.2	11,155	4.9	9.9	0.9	41.3
All Companies	757.7	347.6	242.3	26,996	100.0	100.0	100.0	100.0

(Continued)

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Table A-4 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share (%) Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	487.0	251.6	133.7	21,110	64.3	72.4	55.2	78.2
All Asian-Based Companies	0	0	0	0	0	0	0	0
All European-Based Companies	270.7	96.0	108.6	5,886	35.7	27.6	44.8	21.8
All Hardware Companies	198.4	170.2	0	18,656	26.2	49.0	0	69.1
All Turnkey & SW Companies	559.2	177.4	242.3	8,341	73.8	51.0	100.0	30.9

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-5
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	142.5	112.7	0	5,495	15.2	24.7	0	13.9
Hewlett-Packard	112.1	85.5	9.1	4,931	11.9	18.8	3.1	12.5
Digital	105.9	83.1	0	2,890	11.3	18.2	0	7.3
Mentor Graphics	91.8	13.0	40.2	439	9.8	2.9	13.8	1.1
IBM	89.0	77.8	4.5	6,600	9.5	17.0	1.5	16.7
Cadence	78.9	0	56.5	0	8.4	0	19.4	0
Racal-Redac	26.4	3.3	12.2	135	2.8	0.7	4.2	0.3
Synopsys	25.4	0	17.5	0	2.7	0	6.0	0
Wiechers Datentechnik	17.7	3.2	11.2	344	1.9	0.7	3.8	0.9
Viewlogic Systems	11.5	0	9.3	0	1.2	0	3.2	0
Intergraph	11.5	0.2	10.1	19	1.2	0	3.4	0
Harris EDA	10.4	0.9	6.4	60	1.1	0.2	2.2	0.2
COMPASS Design Automation	9.6	0	7.7	0	1.0	0	2.6	0
Logic Modeling Corp.	9.3	0	8.1	0	1.0	0	2.8	0
Silicon Graphics	9.0	7.9	0	253	1.0	1.7	0	0.6
Aucotec	8.8	2.4	4.4	348	0.9	0.5	1.5	0.9
Autodesk	7.9	0	7.9	0	0.8	0	2.7	0
Sagantec	6.7	0	6.1	0	0.7	0	2.1	0
Computervision	6.3	1.5	1.8	93	0.7	0.3	0.6	0.2
Zycad	5.3	0	3.0	8	0.6	0	1.0	0
Other Companies	60.7	54.2	4.3	16,393	6.5	11.9	1.5	41.6
All Companies	938.3	456.1	291.7	39,414	100.0	100.0	100.0	100.0

(Continued)

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Table A-5 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	837.1	440.0	227.2	37,369	89.2	96.5	77.9	94.8
All Asian-Based Companies	29.3	4.2	13.6	153	3.1	0.9	4.6	0.4
All European-Based Companies	71.9	11.9	51.0	1,892	7.7	2.6	17.5	4.8
All Hardware Companies	493.1	415.9	2.5	36,896	52.5	91.2	0.9	93.6
All Turnkey & SW Companies	445.3	40.2	289.2	2,517	47.5	8.8	99.1	6.4

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-6
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	47.3	37.3	0	1,943	16.9	24.9	0	16.2
IBM	40.2	27.6	6.4	1,892	14.3	18.4	8.4	15.8
Hewlett-Packard	31.6	22.9	2.9	1,223	11.2	15.3	3.8	10.2
Intergraph	27.7	10.5	9.5	526	9.9	7.0	12.5	4.4
Autodesk	10.2	0	10.2	0	3.6	0	13.4	0
Sun Microsystems	10.2	8.1	0	353	3.6	5.4	0	2.9
Computervision	10.1	2.3	3.1	147	3.6	1.5	4.1	1.2
Silicon Graphics	9.6	8.4	0	255	3.4	5.6	0	2.1
Siemens Nixdorf Info systeme	6.4	2.5	2.1	184	2.3	1.7	2.8	1.5
ESRI	5.8	0	4.6	0	2.0	0	6.1	0
EDS Unigraphics	5.3	1.6	2.5	80	1.9	1.0	3.3	0.7
Star Informatic	5.0	1.0	3.2	76	1.8	0.7	4.2	0.6
Parametric Technology	4.9	0	4.0	0	1.8	0	5.3	0
IEZ	4.0	1.4	2.1	96	1.4	0.9	2.7	0.8
Mentor Graphics	3.7	0.5	1.6	18	1.3	0.3	2.1	0.1
Apple Computer	3.5	3.5	0	737	1.2	2.3	0	6.2
Smallworld Systems	2.1	0.1	1.2	4	0.7	0.1	1.6	0
Data Technology/DATECH*	1.9	0.5	1.2	315	0.7	0.3	1.6	2.6
Hochtief	1.8	0.3	0.8	22	0.6	0.2	1.1	0.2
Synopsys	1.7	0	1.1	0	0.6	0	1.5	0
Other Companies	13.2	15.5	0	3,655	4.7	10.3	0	30.5
All Companies	280.7	149.9	76.0	11,975	100.0	100.0	100.0	100.0

(Continued)

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Table A-6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	240.5	139.3	54.8	11,002	85.7	92.9	72.1	91.9
All Asian-Based Companies	1.1	0.1	0.5	5	0.4	0.1	0.6	0
All European-Based Companies	39.2	10.5	20.7	968	14.0	7.0	27.2	8.1
All Hardware Companies	121.7	104.2	0	9,811	43.4	69.5	0	81.9
All Turnkey & SW Companies	159.0	45.7	76.0	2,164	56.6	30.5	100.0	18.1

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-7
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Germany
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	353.3	237.4	59.7	15,785	18.6	24.4	10.8	18.4
Hewlett-Packard	184.6	132.4	17.8	7,087	9.7	13.6	3.2	8.3
Siemens Nixdorf Info systeme	157.1	62.7	46.4	4,453	8.3	6.4	8.4	5.2
Digital	127.3	100.9	0	5,151	6.7	10.4	0	6.0
Computervision	90.8	20.6	27.7	1,255	4.8	2.1	5.0	1.5
Sun Microsystems	88.2	70.2	0	3,182	4.6	7.2	0	3.7
Intergraph	81.0	29.1	28.6	1,517	4.3	3.0	5.2	1.8
Nemetschek	66.8	20.2	40.7	1,632	3.5	2.1	7.4	1.9
Autodesk	37.0	0	37.0	0	2.0	0	6.7	0
Mentor Graphics	31.2	4.4	13.7	149	1.6	0.5	2.5	0.2
IEZ	28.7	9.7	14.8	689	1.5	1.0	2.7	0.8
Dassault*	27.8	0	24.2	0	1.5	0	4.4	0
Silicon Graphics	26.3	23.0	0	700	1.4	2.4	0	0.8
ASCAD/ASCAM	25.9	15.3	8.0	401	1.4	1.6	1.5	0.5
Wiechers Datentechnik	25.8	4.8	16.5	506	1.4	0.5	3.0	0.6
Cadence	25.2	0	18.1	0	1.3	0	3.3	0
EDS Unigraphics	18.9	5.6	9.0	287	1.0	0.6	1.6	0.3
Matra Datavision	18.8	6.3	10.6	346	1.0	0.6	1.9	0.4
Straessle Informationssysteme	18.7	2.7	11.7	282	1.0	0.3	2.1	0.3
Applicon	18.5	6.1	7.2	204	1.0	0.6	1.3	0.2
Other Companies	103.6	135.7	0	35,928	5.5	13.9	0	42.0
All Companies	1,898.4	973.3	551.4	85,613	100.0	100.0	100.0	100.0

(Continued)

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Table A-7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Germany
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	1,310.3	779.4	274.6	72,890	69.0	80.1	49.8	85.1
All Asian-Based Companies	11.1	1.4	5.1	55	0.6	0.1	0.9	0.1
All European-Based Companies	576.9	192.5	271.7	12,667	30.4	19.8	49.3	14.8
All Hardware Companies	620.9	546.2	0	64,662	32.7	56.1	0	75.5
All Turnkey & SW Companies	1,277.4	427.0	551.4	20,951	67.3	43.9	100.0	24.5

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-8
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: France
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	128.2	83.1	23.7	5,072	17.2	22.0	11.0	17.2
Digital	72.4	57.3	0	2,922	9.7	15.2	0	9.9
Sun Microsystems	67.1	53.6	0	2,332	9.0	14.2	0	7.9
Hewlett-Packard	56.6	40.6	5.5	2,167	7.6	10.7	2.6	7.3
Computervision	54.3	12.3	16.8	759	7.3	3.2	7.8	2.6
Intergraph	51.5	20.4	17.1	897	6.9	5.4	7.9	3.0
Matra Datavision	42.6	14.4	23.9	784	5.7	3.8	11.1	2.7
Dassault*	40.3	0	35.0	0	5.4	0	16.2	0
Silicon Graphics	21.5	18.8	0	573	2.9	5.0	0	1.9
Autodesk	19.9	0	19.9	0	2.7	0	9.2	0
Cadence	18.2	0	13.0	0	2.4	0	6.0	0
Mentor Graphics	15.8	2.3	6.9	76	2.1	0.6	3.2	0.3
Cisigraph	13.4	3.6	7.1	200	1.8	1.0	3.3	0.7
Parametric Technology	12.3	0	10.1	0	1.7	0	4.7	0
SDRC	9.1	0	6.2	0	1.2	0	2.9	0
Apple Computer	9.0	9.0	0	1,901	1.2	2.4	0	6.4
EDS Unigraphics	8.4	2.5	4.0	127	1.1	0.7	1.8	0.4
Framasoft + CSI	7.8	0.3	3.5	17	1.0	0.1	1.6	0.1
Serbi	7.0	0.9	6.1	273	0.9	0.2	2.8	0.9
ESRI	5.7	0	4.6	0	0.8	0	2.1	0
Other Companies	0.2	41.9	0	10,319	0	11.1	0	34.9
All Companies	746.0	378.2	216.0	29,559	100.0	100.0	100.0	100.0

(Continued)

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Table A-8 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: France
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	626.1	344.9	150.5	27,330	83.9	91.2	69.7	92.5
All Asian-Based Companies	3.7	0.5	1.7	18	0.5	0.1	0.8	0.1
All European-Based Companies	116.3	32.8	63.8	2,211	15.6	8.7	29.6	7.5
All Hardware Companies	283.9	244.5	0	23,629	38.1	64.7	0	79.9
All Turnkey & SW Companies	462.1	133.7	216.0	5,930	61.9	35.3	100.0	20.1

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-9
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	95.3	62.5	17.1	3,915	20.7	26.4	13.4	21.3
Digital	47.6	37.5	0	1,957	10.4	15.8	0	10.7
Hewlett-Packard	46.9	33.6	4.6	1,804	10.2	14.2	3.6	9.8
Computervision	41.7	9.3	13.1	570	9.1	3.9	10.3	3.1
Sun Microsystems	24.0	19.2	0	806	5.2	8.1	0	4.4
CAD Lab	23.2	7.2	10.7	546	5.1	3.0	8.4	3.0
Intergraph	14.3	5.4	4.7	255	3.1	2.3	3.7	1.4
Siemens Nixdorf Info systeme	14.0	5.4	4.8	401	3.0	2.3	3.8	2.2
ItalCad	12.7	3.6	5.3	280	2.8	1.5	4.2	1.5
Autodesk	12.4	0	12.4	0	2.7	0	9.8	0
Matra Datavision	8.9	3.0	5.0	163	1.9	1.3	3.9	0.9
Silicon Graphics	8.4	7.3	0	223	1.8	3.1	0	1.2
Mentor Graphics	8.3	1.2	3.6	40	1.8	0.5	2.8	0.2
Cimatron	7.0	3.1	3.2	253	1.5	1.3	2.5	1.4
Investronica SA	6.6	4.1	1.7	226	1.4	1.7	1.4	1.2
Cadence	6.3	0	4.5	0	1.4	0	3.6	0
ESRI	5.9	0	4.8	0	1.3	0	3.8	0
Dassault*	5.9	0	5.1	0	1.3	0	4.0	0
SDRC	5.5	0	3.8	0	1.2	0	3.0	0
Parametric Technology	4.4	0	3.6	0	1.0	0	2.9	0
Other Companies	17.3	24.5	0	5,766	3.8	10.4	0	31.4
All Companies	459.9	236.6	127.0	18,376	100.0	100.0	100.0	100.0

(Continued)

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Table A-9 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	366.3	205.6	84.0	16,115	79.6	86.9	66.1	87.7
All Asian-Based Companies	1.1	0.1	0.5	6	0.2	0.1	0.4	0
All European-Based Companies	92.6	30.9	42.6	2,256	20.1	13.1	33.5	12.3
All Hardware Companies	165.8	143.5	0	13,912	36.1	60.6	0	75.7
All Turnkey & SW Companies	294.1	93.2	127.0	4,464	63.9	39.4	100.0	24.3

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-10
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	72.6	48.3	12.5	3,116	20.6	27.0	12.8	22.7
Intergraph	45.0	17.4	15.0	841	12.8	9.7	15.3	6.1
Digital	43.3	34.2	0	1,781	12.3	19.1	0	13.0
Hewlett-Packard	31.9	23.2	2.9	1,237	9.0	13.0	3.0	9.0
Computervision	22.4	5.1	6.9	318	6.4	2.8	7.0	2.3
Sun Microsystems	14.6	11.6	0	500	4.1	6.5	0	3.6
Mentor Graphics	11.9	1.7	5.2	57	3.4	1.0	5.3	0.4
Autodesk	11.5	0	11.5	0	3.3	0	11.8	0
Data Technology/DATECH*	10.7	2.6	6.9	5,852	3.0	1.4	7.0	42.6
Cadence	6.3	0	4.5	0	1.8	0	4.6	0
ESRI	6.0	0	4.9	0	1.7	0	5.0	0
Silicon Graphics	6.0	5.2	0	159	1.7	2.9	0	1.2
Apple Computer	5.6	5.6	0	1,185	1.6	3.2	0	8.6
EDS Unigraphics	5.6	1.7	2.7	85	1.6	0.9	2.7	0.6
Parametric Technology	4.4	0	3.6	0	1.3	0	3.7	0
SDRC	4.2	0	2.9	0	1.2	0	3.0	0
Sysdeco Innovation	4.0	1.6	1.2	41	1.1	0.9	1.2	0.3
Racal-Redac	3.2	0.4	1.5	16	0.9	0.2	1.5	0.1
Harris EDA	2.4	0.2	1.5	16	0.7	0.1	1.6	0.1
Synopsys	2.2	0	1.5	0	0.6	0	1.5	0
Other Companies	4.3	15.1	0	0	1.2	8.5	0	0
All Companies	352.4	178.8	97.9	13,729	100.0	100.0	100.0	100.0

(Continued)

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Table A-10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	327.4	172.8	85.5	13,356	92.9	96.6	87.4	97.3
All Asian-Based Companies	3.2	0.4	1.5	16	0.9	0.2	1.5	0.1
All European-Based Companies	21.9	5.7	10.9	357	6.2	3.2	11.2	2.6
All Hardware Companies	132.0	114.5	0	11,172	37.5	64.0	0	81.4
All Turnkey & SW Companies	220.4	64.4	97.9	2,557	62.5	36.0	100.0	18.6

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-11
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Spain
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share (%) Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Hewlett-Packard	29.6	21.3	2.8	1,133	17.8	24.4	6.2	14.1
IBM	24.0	16.9	3.6	1,216	14.4	19.3	8.0	15.1
Intergraph	19.3	7.5	6.4	338	11.6	8.6	14.5	4.2
ABB Industria*	13.7	6.0	6.6	510	8.3	6.9	14.8	6.3
Computervision	12.8	2.9	3.9	175	7.7	3.3	8.8	2.2
Siemens Nixdorf Info systeme	7.6	3.0	2.7	219	4.6	3.4	6.0	2.7
Digital	7.1	5.5	0	309	4.3	6.3	0	3.8
Sun Microsystems	6.8	5.5	0	216	4.1	6.2	0	2.7
CIMTEK*	6.6	2.3	3.5	60	4.0	2.6	7.8	0.7
Autodesk	4.7	0	4.7	0	2.8	0	10.6	0
Softronics	4.2	0.9	3.4	322	2.5	1.0	7.5	4.0
Investronica SA	3.8	2.4	1.0	129	2.3	2.7	2.2	1.6
FHECOR*	3.6	0	3.6	0	2.2	0	8.1	0
Silicon Graphics	3.6	3.1	0	95	2.2	3.6	0	1.2
ESRI	3.0	0	2.4	0	1.8	0	5.4	0
Tebis	2.1	0.5	0.3	14	1.3	0.6	0.7	0.2
Logic System Designers*	1.7	0.7	0.7	42	1.0	0.7	1.6	0.5
Aplein*	1.7	1.6	0.1	20	1.0	1.8	0.2	0.3
	1.6	0.6	0.5	14	1.0	0.7	1.1	0.2
Cadence	1.6	0	1.1	0	0.9	0	2.5	0
Other Companies	0	2.4	0	2,744	0	2.7	0	34.1
All Companies	165.8	87.3	44.5	8,036	100.0	100.0	100.0	100.0

(Continued)

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Table A-11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Spain
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	138.5	78.2	32.4	7,161	83.5	89.6	72.8	89.1
All Asian-Based Companies	0	0	0	2	0	0	0	0
All European-Based Companies	27.3	9.1	12.1	872	16.5	10.4	27.2	10.9
All Hardware Companies	60.1	53.1	0	6,192	36.2	60.8	0	77.1
All Turnkey & SW Companies	105.7	34.3	44.5	1,844	63.8	39.2	100.0	22.9

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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Table A-12
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	90.3	64.2	13.2	4,774	11.3	15.9	5.8	14.6
Digital	86.8	68.4	0	3,530	10.8	16.9	0	10.8
Computervision	69.2	15.6	21.3	955	8.6	3.9	9.3	2.9
Intergraph	59.7	22.5	20.4	1,094	7.4	5.6	8.9	3.4
Sun Microsystems	57.5	45.9	0	1,965	7.2	11.4	0	6.0
Hewlett-Packard	53.7	38.9	4.9	2,094	6.7	9.6	2.1	6.4
ICL	30.4	17.8	10.5	873	3.8	4.4	4.6	2.7
Silicon Graphics	23.9	20.9	0	637	3.0	5.2	0	2.0
Sysdeco Ltd.	23.2	11.6	5.8	203	2.9	2.9	2.5	0.6
Autodesk	20.0	0	20.0	0	2.5	0	8.7	0
Data Technology/DATECH*	19.3	4.4	13.0	836	2.4	1.1	5.7	2.6
Mentor Graphics	17.4	2.5	7.6	83	2.2	0.6	3.3	0.3
Radan Computational	16.9	5.8	8.5	339	2.1	1.4	3.7	1.0
Engineering Computer Services*	15.7	6.2	5.5	427	2.0	1.5	2.4	1.3
Cadence	14.2	0	10.2	0	1.8	0	4.4	0
EDS Unigraphics	13.7	4.1	6.5	207	1.7	1.0	2.8	0.6
Parametric Technology	9.9	0	8.1	0	1.2	0	3.5	0
Smallworld Systems	9.3	0.5	5.5	17	1.2	0.1	2.4	0.1
SDRC	8.7	0	6.0	0	1.1	0	2.6	0
PAFEC	8.2	2.6	4.5	107	1.0	0.6	2.0	0.3
Other Companies	13.5	40.6	0	11,555	1.7	10.1	0	35.5
All Companies	802.1	403.5	229.0	32,595	100.0	100.0	100.0	100.0

(Continued)

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Table A-12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share (%)			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	617.1	331.2	150.6	24,178	76.9	82.1	65.8	74.2
All Asian-Based Companies	6.3	0.8	2.9	32	0.8	0.2	1.3	0.1
All European-Based Companies	178.8	71.5	75.5	8,385	22.3	17.7	33.0	25.7
All Hardware Companies	299.3	258.1	0	25,910	37.3	64.0	0	79.5
All Turnkey & SW Companies	502.9	145.5	229.0	6,685	62.7	36.0	100.0	20.5

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (October 1994)

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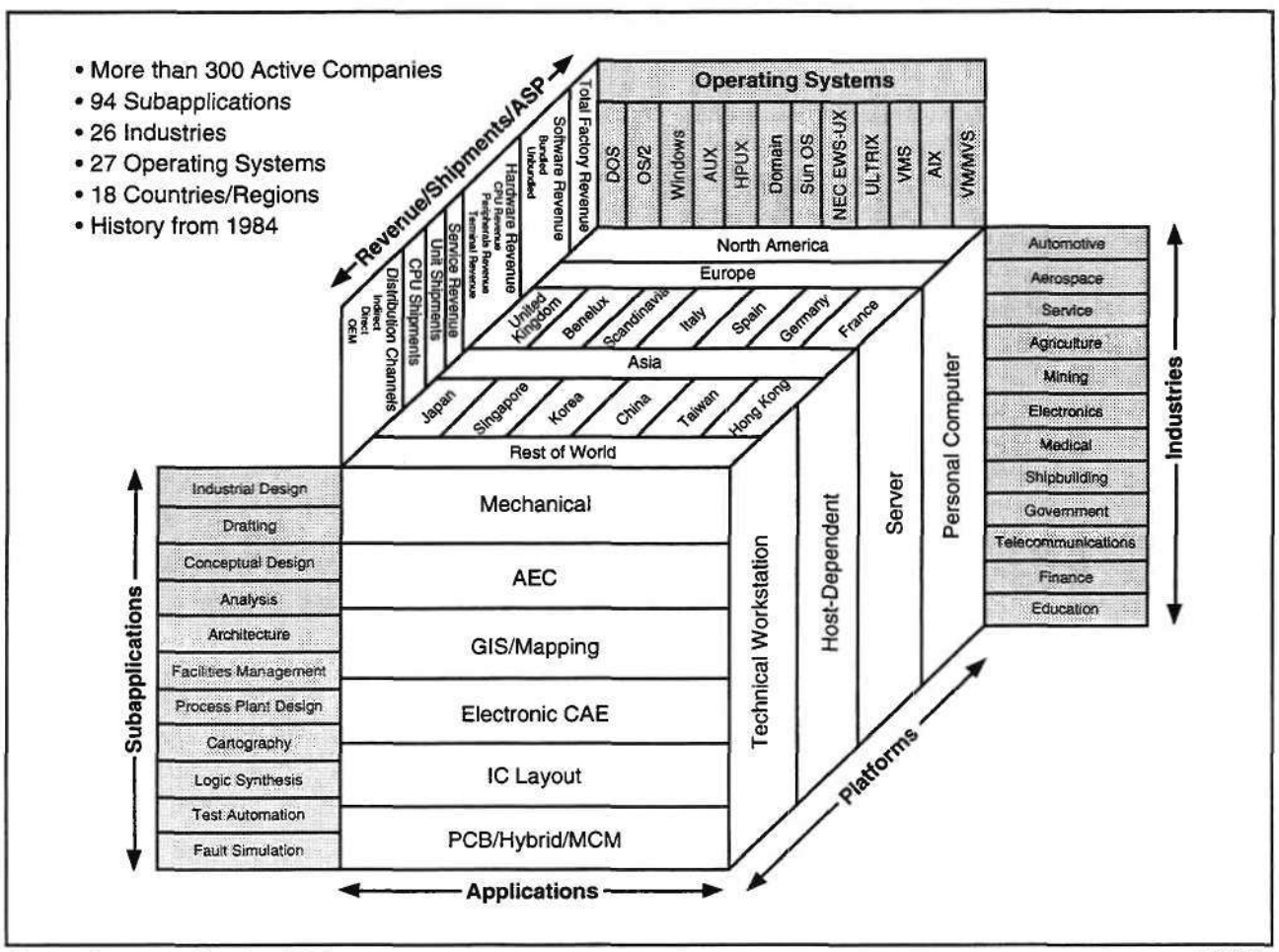
Appendix B
Methodology

To provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure B-1.

Market Share Methodology

Dataquest uses primary and secondary sources to produce our market share data. We survey all participants in each industry in the fourth quarter of each year and the second quarter of the subsequent year. Each vendor is offered the opportunity to report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and geographical regions. Thus, there is a corresponding increase in the number of contacts at large companies.

Figure B-1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (October 1994)

G3005879

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Examples of the job titles of people contacted for information include the following:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning
- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE/GIS marketing programs
- Market research analyst

The Audit Process

Data supplied by vendors is evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks
- Articles in the general and trade presses
- Annual reports, SEC documents, and credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from vendors' competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice. We also check with different sources at companies to cross-check data.

Dataquest analysts have many years of experience in applying the previously cited tools to get the most accurate information possible on a particular company. We believe that ours are the most accurate and meaningful estimates generally available today. It is the CAD/CAM/CAE/GIS group's policy to update its market information to arrive at the most accurate market representation possible.

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Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—which is particularly useful when comparing regions or applications.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is the underlying philosophy that the best data and analyses come from a well-balanced program. This program includes the following: primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from more than 25 separate high-technology industries that Dataquest covers; balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of market researchers.

Dataquest also analyzes trends in the macro environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at gross domestic product (GDP) growth, interest rate fluctuation, business expectations, and capital spending plans. In the geopolitical arena, we look at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1994.

Figure B-2 shows the CAD/CAM/CAE/GIS forecasting model. The overall forecasting process uses a combination of forecasting techniques such as time series and technological modeling.

Market estimates and forecasts are derived using the following research techniques:

- Bottom-up aggregation: This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting: For each application segment tracked by the CAD/CAM/CAE/GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis: Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market model and a satisfied available market figure to accurately assess levels of penetration. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Acceptance and use of new technology are also factored into Dataquest's demand-based models and analyses.

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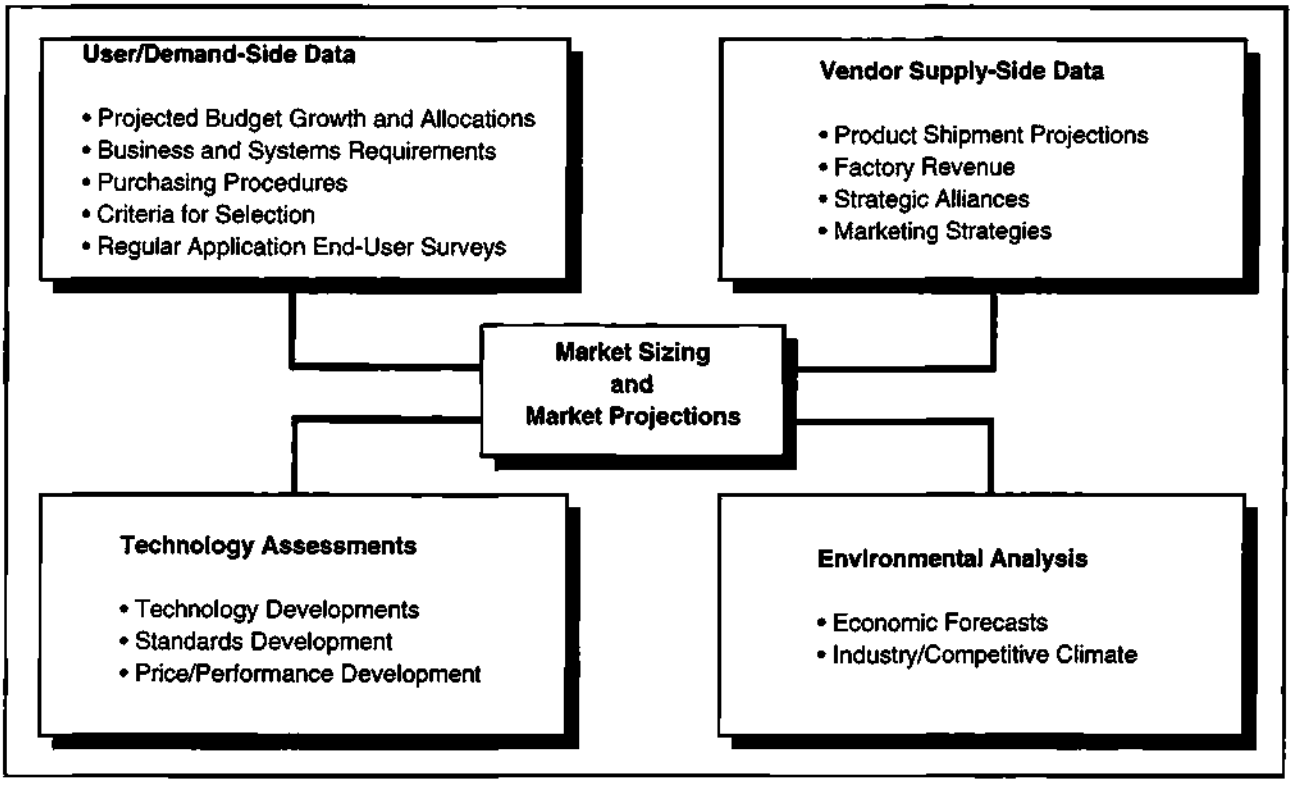
Figure B-2
CAD/CAM/CAE/GIS Forecasting Model



Source: Dataquest (October 1994) G3005879.1

- Capacity-based analysis: This method involves identifying future shipment volume constraints. These constraints, or ceilings, can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below demand level.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and electromechanical design (mechanical design with electrical or electronic components and

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mechanisms). Common manufacturing applications include tools and fixture design, numerical control part programming, offline robotics programming, and interface to quality control systems. Management tools for database control and distribution as well as user-defined application programming are included in this segment.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems/Mapping (GIS/Mapping)

GIS is a computer-based technology composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product including printed circuit boards (PCBs), integrated circuits (ICs), and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic computer-aided engineering (ECAE): These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of ECAE applications are schematic capture and simulation.
- IC layout: This is a software application tool that is used to create and validate the physical implementation of an integrated circuit. The IC layout category consists of polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/hybrid/MCM: This segment covers products that are used to create the placement and routing of the traces and components on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The regions covered in the service database are defined as follows:

- North America: Canada, Mexico, and the United States
- Europe: Benelux (Belgium, the Netherlands, Luxembourg), France, Germany, Italy, Scandinavia (Denmark, Finland, Norway, Sweden), Spain, the United Kingdom, and the Rest of Europe (Austria, Switzerland, and central and eastern Europe [including Russia and all other European countries/principalities])
- Asia: Japan, Hong Kong, Korea, Singapore, Taiwan, and China
- Rest of World: Africa, Australia, Caribbean Islands, Central America, India, Middle East, New Zealand, and South America

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Computing Platforms

The computing platforms used for CAD/CAM/CAE/GIS include everything from notebooks to supercomputers. The Dataquest CAD/CAM/CAE/GIS database uses four platform designations—technical workstations, host-dependent systems, servers, and personal computers—to track the market.

Technical Workstation

A technical workstation is a single-user computer that is distinguished from a personal computer by its features and by the user's potential migration path within the platform. Dataquest classifies workstations based on hardware, software, and product features (as opposed to usage). In general, a workstation must come standard with an integrated floating-point coprocessor, integrated networking, a 32-bit multitasking operating system (UNIX, VMS, DOMAIN), and high-resolution graphics capability.

Host-Dependent System

A host-dependent system is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a workstation, without the high-resolution graphics capability, that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems, the clients. Functions include file storage, database access, and print and compute capabilities. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE/GIS applications:

- Compute servers: These provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (such as vector and parallel processing) and large memories.
- Print servers: These provide access to printers, specialized printing applications software, and print spooling resources to a network.
- File servers: These provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database servers: These manage databases as a shared resource to a network. Database servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is defined as a general-purpose computer that is distinguished from other computers by its adherence to hardware and software compatibility. This compatibility drives high unit volumes of commodity-like products that do not require on-site technical support.

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High-performance features (such as networking, graphics, a floating-point coprocessor, and a virtual, multiuser/multitasking operating system) are normally optional rather than integral features. IBM/IBM-compatible and Macintosh personal computers are two of the platforms in this product segment. A single-user PC's resident operating system typically is DOS, OS/2, or Mac OS. PCs have a performance ceiling that is typically lower than that of workstations: lower in computer performance, I/O channel speed, disk speed, and sophistication or available application software. Optional high-end graphics are limited compared with graphics options on workstations.

Line Items

Line item definitions are as follows:

- Average selling price (ASP) is the average price of a product, inclusive of any discounts.
- Unit shipment is the number of products delivered (that is, seats).
- Seats are the number of possible simultaneous users.
- Installed seats are the total number of seats in active, day-to-day use.
- Terminal revenue is defined as revenue derived from the sale of terminals used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform; terminal revenue is contained within CPU revenue for technical workstations and PCs.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated by subtracting hardware and software revenue from total revenue.
- Total factory revenue, measured in U.S. dollars, is the amount of money received by a manufacturer for its goods and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue from products sold to another company for resale (OEM revenue).

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Global Market Insight For Information Technology Companies

CAD/CAM/CAE ASIA

Dataquest's CAD/CAM/CAE Asia program offers comprehensive coverage of CAD/CAM/CAE market opportunities in the fastest-growing, yet most complicated, marketplace in the world—the Asian market. The service provides in-depth coverage of the dynamics of the individual markets that make up Asia including Japan, Taiwan, Korea, Singapore, Hong Kong, and China. It is an invaluable tool to assist strategic planners and tactical product managers to capitalize on emerging market opportunities in the Asian region.

Personalized Service

Customized inquiry support is a primary component of every Dataquest research program.

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As a client of Dataquest's CAD/CAM/CAE Asia program, you receive direct access to CAD/CAM/CAE industry analysts who can provide answers tailored to the unique needs of your organization.

Special Briefings
Dataquest analysts are also available to conduct special briefings at Dataquest, your location, or at other off-site settings.

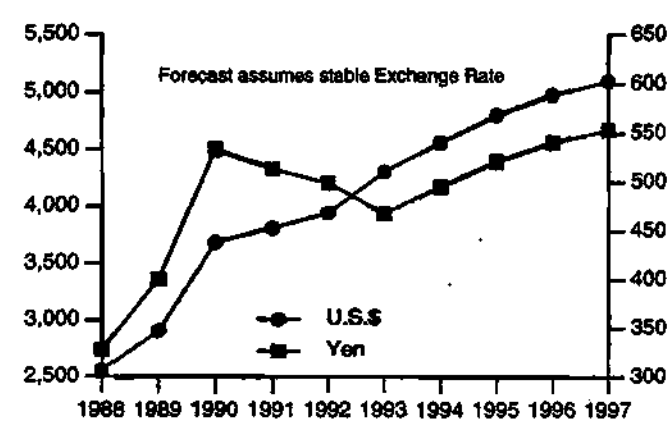
Information Resource Centers
Clients have unlimited access to Dataquest's extensive paper and online resource libraries in San Jose, Boston, England, France, Germany, and Japan.

Market Coverage

Dataquest provides software shipments, market share, revenue, and market forecasts for Asian CAD/CAM/CAE applications and players, including the following:

- Major Data Points
  - Total factory, hardware, and software revenue
  - Service revenue
  - Computer shipments
  - Distribution channels
- Regions Covered
  - Japan
  - Singapore
  - Korea
  - China
  - Taiwan
  - Hong Kong
  - Total Asian Market
- Platforms
  - Personal computer
  - Technical workstation
  - Host-based
  - Server
- Applications
  - Mechanical
  - AEC
  - GIS/mapping
  - Electronic CAE
  - IC layout
  - PCB/MCM/hybrid

Projected Japanese CAD/CAM/CAE Revenue



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The declining yen-to-dollar exchange rate means opportunity for U.S. companies competing in the Japanese CAD market.

Dataquest
Worldwide Software Group

WHAT YOU'LL RECEIVE IN 1994

CAD/CAM/CAE ASIA

Market Statistics Report

The premiere quantitative statistics report on the Asian CAD/CAM/CAE market

Dataquest's Asian CAD/CAM/CAE Market Statistics report provides the most reliable and comprehensive set of market data and forecasts available on markets for CAD software and systems in Asia. The report presents comprehensive hardware, software, and service forecasts and market share information on major Asian CAD applications and companies. A total of four reports are published each year: two reports presenting market share and five-year forecasts are published in the first half of the year and then are updated during the second half.

Market Trends Reports

Asian CAD/CAM/CAE market dynamics are examined in detail in the 1994 Market Trends report

The Asian CAD/CAM/CAE Market Trends report includes detailed analysis from several perspectives on the forces driving the market. Detailed trends and issues are discussed as they relate to evolving technology, changing end-user requirements, regional differences, and related developments in the computer industry. High-level worldwide CAD/CAM/CAE market statistics balance the opinions presented in this expert analysis of Asian CAD industry dynamics.

Focus Reports

Special reports on "hot" software topics to watch

A detailed analysis of software distribution channels is the tentatively scheduled topic for the special focus report that will be published by Dataquest's Software Group services.

Company Profiles

The organizational structure, product portfolio strengths and weaknesses, and strategic directions of top CAD/CAM/CAE players in Asia. NEC Corporation will be profiled in 1994.

Dataquest Perspectives

Timely newsletters presenting analysis and commentary on key industry events and issues that will be published on an event-driven basis throughout the year, with a minimum of four to be published in 1994.

News and analysis of late-breaking Asian CAD/CAM/CAE industry events will be delivered by fax.

DQ Software QuickTakes

A new online product being piloted by the services that comprise Dataquest's Software Group, DQ Software QuickTakes provides weekly summaries of the top news stories in the software industry, accompanied by the "Dataquest Take" for the most important events. This document is delivered electronically every Monday morning to subscribers at any e-mail address accessible via the Internet (including AppleLink, cc:Mail, CompuServ, IBM Mail, MCI Mail, AT&T Mail, and so on).

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CAD/CAM/CAE/GIS Worldwide

In This Issue

HP Joins the Taligent Team
Hewlett-Packard agrees to purchase a portion of Taligent in exchange for a seat on Taligent's board of directors. This agreement will also give HP early access to Taligent's technology.
By Rikki Kirzner ..... *Page 1*

UNIX International Is Dead—RIP
UNIX International stops operations at the end of 1993. Board members will soon meet to dissolve the organization.
By Rikki Kirzner ..... *Page 3*

HP Joins the Taligent Team

Just when one begins to wonder if things in the operating system world are finally settling down and becoming predictable, along comes two announcements that remind us that competition in the computer industry in 1994 is alive, well, and still able to shake up the users.

On January 6, Hewlett-Packard announced that it will join Apple Computer and IBM as an equity investor in Taligent Inc. HP has agreed to purchase 15 percent of Taligent. In exchange, HP will have a seat on Taligent's board of directors and gain early access to the technology and products. HP will license Taligent's object-oriented technology and deploy the Taligent product suite as a strategic part of its HP-UX distributed object computing environment. The Taligent product suite consists of the Taligent Application Frameworks (the building blocks or functions), the Taligent Development System (the application development environment), and the Taligent Object Services (the object operating system services).

As part of a cross-licensing agreement, Taligent will license components of DCE/9000 and incorporate them into its own product suite. It will also integrate the HP Distributed Object Management Facility (DOMF) with IBM's System Object Module (SOM) to provide a common messaging mechanism for sending and receiving objects particularly across distributed network environments.

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Program: CAD/CAM/CAE/GIS Worldwide
Product Code: CCAM-WW-DP-9401
Publication Date: March 7, 1994

In the agreement, Taligent will issue new shares of stock to HP. Apple and IBM's original shares remain equal and unchanged. This is possible because Taligent was founded with the premise that the company would continue to sign up additional investors and licensees for its products.

Taligent and its investors intend to work with X/Open to standardize the application programming interfaces (APIs) as an open specification and will make the APIs available to all developers.

Taligent is scheduled to deliver the initial toolkit of its Application Frameworks technology in the first half of this year. Beta versions of the product are scheduled for the second half of this year with a commercial release of the Systems Developer Kit (SDK) planned for the end of 1994 or early 1995. The HP-UX version of Taligent will be available in early 1995.

Dataquest Analysis—HP and Taligent

All the major operating system developers have chosen which team they will be playing for in the race to develop the world's next generation of object-based operating system environments. HP has been an active developer of object-based technology for some time. It has partnered with Sun and IBM to develop some of its object-based technology products jointly. In 1992, HP announced a relationship with NeXT Computer to support NeXTSTEP on some of its PCs. HP has been evaluating its alternatives for some time. Instead of aligning with Sun and NeXT or Digital and Microsoft, HP is gambling that the products that Taligent is producing will be more advanced than anything that exists today. Therefore, HP's acquisition of Taligent is the next logical investment in HP's object computing future.

HP, as well as all the other companies that have been developing object-based technology, have discovered that it is not easy or cost-effective to reinvent what object-oriented companies such as NeXT and the Taligent partners and developers have already spent millions of dollars and thousands of hours developing. They are discovering that it is much better and more effective to build on an existing foundation technology and add value to those products. This is particularly important because the risk of developing another new operating system is so high. There are already too many companies developing partnerships and submitting similar, competing technologies to the Object Management Group (OMG). Unless companies unite to drive one single foundation technology through the standards process and create one set of industrywide set of interfaces, the entire object development effort could become as incompatible as the existing operating systems environments are.

HP's acquisition further legitimizes the Taligent company and its product family as a credible object-oriented environment and as an effective alternative to Microsoft's future CAIRO product. HP's presence, together with IBM, should help to ensure that the interfaces to the Taligent framework are incorporated into future COSE specifications as well as the OMG and CORBA specifications. If this effort succeeds, it would help unite the top

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UNIX vendors around a single set of object standards and help move the entire user community (DOS and UNIX) toward one set of object-based interfaces.

This is not a slap in Sun's face. HP has been carefully examining its alternatives for some time and ultimately chose what it considers to be the technology of the future. HP will continue to offer NeXTSTEP to its customers that require an object-based development environment. The reality is that compatibility among systems is more easily achieved in the world of objects than in the world of operating systems. In theory, there should be a high degree of compatibility between Taligent's objects and NeXTSTEP's objects so that all existing development efforts will not be wasted when the new products are introduced. But, at this stage this is only conjecture. The ultimate burden of compatibility lies at the doorstep of the standards bodies. If they do not accept any of the current technology submissions for standardization, the incompatibility between systems would rise to a whole new layer—middleware.

By Rikki Kirzner

UNIX International Is Dead—RIP

UNIX International (UI) announced that it ceased operations on December 31, 1993. Its original mission when it formed in December 1988 was to represent the user community's input into the development of UNIX System V. The formal reasons given for the termination of the consortium was that it had achieved its five-year mission to work together with the supplier of UNIX to ensure the success and evolution of the UNIX operating system. The board of directors will meet sometime in the first quarter of 1994 to dissolve the corporation formally.

Dataquest Analysis of UI's Demise

Dataquest believes that because Novell acquired USL and transferred the UNIX trademark to X/Open, UI simply did not have a reason to exist any longer. Although UNIX belonged to the public (or at least to 13 different companies), there was an opportunity for UI to represent a portion of the voice of the UNIX users. Once UNIX was acquired by a single, private corporation, UI became just another standards consortium in a world of too many UNIX standards bodies and consortia.

The demise of UI, 88open, ACE, and other standards organizations may be the beginning of the death knells for many more standards bodies and consortia. In a recent study of worldwide users conducted by Dataquest, users expressed their dissatisfaction with the sluggishness of the standards process and cited their belief that there were too many standards bodies creating confusion and slowing the standards process down. Standards organizations should better start looking over their progress, their books, and their shoulders. If they are not a part of the solution, then they

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are becoming a part of the problem, and users and vendors are getting tired of funding problems. We believe that there will be more organizations following UI to its grave.

By Rikki Kirzner

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Market Statistics

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Software

CAD/CAM/CAE and GIS Asia Forecast Update

Market Statistics

1994

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Program: CAD/CAM/CAE/GIS Asia/Pacific
Product Code: CCAM-AP-MS-9404
Publication Date: September 12, 1994

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Software

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CAD/CAM/CAE and GIS Asia Forecast Update

Fluctuating exchange rates masked true market performance in the 1993 CAD/CAM/CAE and GIS market. Japanese CAD/CAM/CAE and GIS total revenue grew a surprising 2.8 percent from 1992 to 1993 when measured in U.S. dollars, contrary to what would be expected in the worst recession Japan has experienced in 50 years. However, the dollar depreciated against the yen at a rate of 12.3 percent, so when measured in yen, Japanese CAD/CAM/CAE and GIS total revenue declined 9.8 percent from 1992 to 1993.

In the meantime, European CAD/CAM/CAE and GIS total revenue declined 7.8 percent from 1992 to 1993 when measured in U.S. dollars. With the dollar appreciating 10.0 percent against the ECU, European CAD/CAM/CAE and GIS total revenue grew 2.8 percent from 1992 to 1993 when measured in ECU. Table 1 shows the dramatic impact that currency fluctuation has on the CAD/CAM/CAE and GIS.

The yen has been strengthening against the dollar for the past three years, changing in 1993 at a rate twice that of previous years. And the end is not in sight. In contrast, Hong Kong and Singapore had relatively stable currency during 1993, while the currencies in China, Korea, and Taiwan weakened against the dollar. In Europe, 1993 was a year for weakening of local currencies against the dollar after having currencies strengthened against the dollar in 1992.

The midyear indications are that currencies are beginning to stabilize (see Table 2). Although Dataquest does not forecast currency exchange rates, we do forecast with the best information available. The exchange rate is calculated as the simple arithmetic mean of the 12 average monthly rates for each country. For the purpose of this forecast, Dataquest assumes the June exchange rate will apply for the future.

Dataquest's forecast is based on the updated market share data, gathered in March and April of this year. It includes country-level forecast for Asia and Europe.

This document contains Dataquest's detailed forecast information for the CAD/CAM/CAE and GIS industry. Included are the following:

- Five-year historical data
- Five-year forecast data

More detailed data is available through Dataquest's Client Inquiry service, which can provide custom analysis of the multidimensional database.

The CAD/CAM/CAE and GIS *Dataquest Perspective* (CCAM-WW-DP-9404), available in September, contains additional tables and analysis and is a companion piece to this book.

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Table 1
CAD/CAM/CAE and GIS Revenue Growth Comparison
(U.S. Dollars versus Local Currency for Both Europe and Japan)

	1992	1993	Forecast 1998	Growth (%) 1992-1993	Growth (%) 1993-1998
Europe (U.S.$ Million)					
Software Revenue	1,693.8	1,608.7	2,231.4	-5.0	6.8
Hardware Revenue	3,037.8	2,701.7	3,388.8	-11.1	4.6
Service Revenue	1,106.6	1,072.2	1,381.4	-3.1	5.2
Total Factory Revenue	5,838.2	5,382.6	7,001.6	-7.8	5.4
ECU/U.S.$ Exchange Rate	*0.7686*	*0.8566*	*0.8419**	*11.4*	*-0.3*
Europe (ECU Million)					
Software Revenue	1,301.8	1,378.0	1,878.6	5.9	6.4
Hardware Revenue	2,334.9	2,314.3	2,853.0	-0.9	4.3
Service Revenue	850.5	918.5	1,163.0	8.0	4.8
Total Factory Revenue	4,487.3	4,610.8	5,894.6	2.8	5.0
Japan (U.S.$ Million)					
Software Revenue	1,270.4	1,371.2	2,010.2	7.9	8.0
Hardware Revenue	2,420.1	2,397.0	2,759.8	-1.0	2.9
Service Revenue	617.4	665.5	887.7	7.8	5.9
Total Factory Revenue	4,317.8	4,438.8	5,657.8	2.8	5.0
Yen/U.S.$ Exchange Rate	*126.34*	*110.85*	*101.56**	*-12.3*	*-1.7*
Japan (Yen Million)					
Software Revenue	160,506	152,001	204,155	-5.3	6.1
Hardware Revenue	305,752	265,706	280,289	-13.1	1.1
Service Revenue	78,000	73,768	90,158	-5.4	4.1
Total Factory Revenue	545,508	492,037	574,603	-9.8	3.2
North America (U.S.$ Million)					
Software Revenue	1,562.5	1,754.6	3,085.6	12.3	12.0
Hardware Revenue	2,672.1	2,824.5	4,477.9	5.7	9.7
Service Revenue	931.5	1,092.3	1,904.2	17.3	11.8
Total Factory Revenue	5,166.6	5,671.3	9,467.7	9.8	10.8
Worldwide (U.S.$ Million)					
Software Revenue	4,717.1	5,021.5	7,956.1	6.5	9.6
Hardware Revenue	8,424.4	8,308.7	11,367.1	-1.4	6.5
Service Revenue	2,776.3	2,989.5	4,496.3	7.7	8.5
Total Factory Revenue	15,928.3	16,325.7	23,819.0	2.5	7.8

*Assuming a stable currency, the 1998 exchange rate is the June 1994 exchange rate.

Source: Dataquest (September 1994)

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Table 2
Foreign Currency/U.S. Dollar

		Actual				Current	Current	Year-to-Year Change (%)				
		1990	1991	1992	1993	1994	1995-1998	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995
European Community	ECU	NA	0.8079	0.7686	0.8566	0.8561	0.8419		-5	11	0	-2
France	Franc	5.4277	5.6183	5.2571	5.6641	5.6343	5.5346	4	-6	8	-1	-2
Germany	Mark	1.6111	1.6523	1.5513	1.6543	1.6485	1.6163	3	-6	7	0	-2
Italy	Lira	1195.03	1235.03	1220.85	1575.05	1610.71	1584.79	3	-1	29	2	-2
Netherlands	Guilder	1.81	1.86	1.75	1.86	1.85	1.8126	3	-6	6	0	-2
Spain	Peseta	101.70	103.48	101.50	127.10	135.40	133.39	2	-2	25	7	-1
Sweden	Krona	5.9137	6.0314	5.7770	7.8003	7.7955	7.7340	2	-4	35	0	-1
United Kingdom	Pound	0.5599	0.5658	0.5652	0.6665	0.6604	0.6549	1	0	18	-1	-1
China	Renminbi	4.7912	5.3340	5.5076	5.7580	8.5534	8.6895	11	3	5	49	2
Hong Kong	Dollar	7.7900	7.7712	7.7399	7.7351	7.7271	7.7280	0	0	0	0	0
Japan	Yen	144.05	134.59	126.34	110.85	103.08	101.56	-7	-6	-12	-7	-1
Korea	Won	242.70	730.67	782.41	799.42	806.49	805.80	201	7	2	1	0
Singapore	Dollar	1.8129	1.7277	1.6284	1.6155	1.5481	1.5300	-5	-6	-1	-4	-1
Taiwan	Dollar	26.64	26.49	24.93	26.15	26.77	26.98	-1	-6	5	2	1

NA = Not applicable

Source: Dataquest (September 1994)

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A new forecasting process for each application is being used to improve revenue and unit shipment control by region and by platform. This new process may cause some mismatch in market share tables and forecast tables. Please use the forecast tables to understand the year-to-year changes. Use the market share tables to compare company-to-company performance.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is the underlying philosophy that the best data and analyses come from a well-balanced program. This program includes the following: balance between primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from the more than 25 separate high-technology industries Dataquest covers; and balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macro environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at gross national product (GNP) growth, interest rate fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1994.

Figure 1 shows the CAD/CAM/CAE and GIS forecasting model. The overall forecasting process uses a combination of techniques such as time series and technological modeling. Market estimates and forecasts are derived using the following research techniques:

- "Bottom-up" aggregation—This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting—For each application segment tracked by the CAD/CAM/CAE and GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis—Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market model and a satisfied available market figure to assess the levels of penetration accurately. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Dataquest analysts also factor in the acceptance or ability for users to consume new technology.

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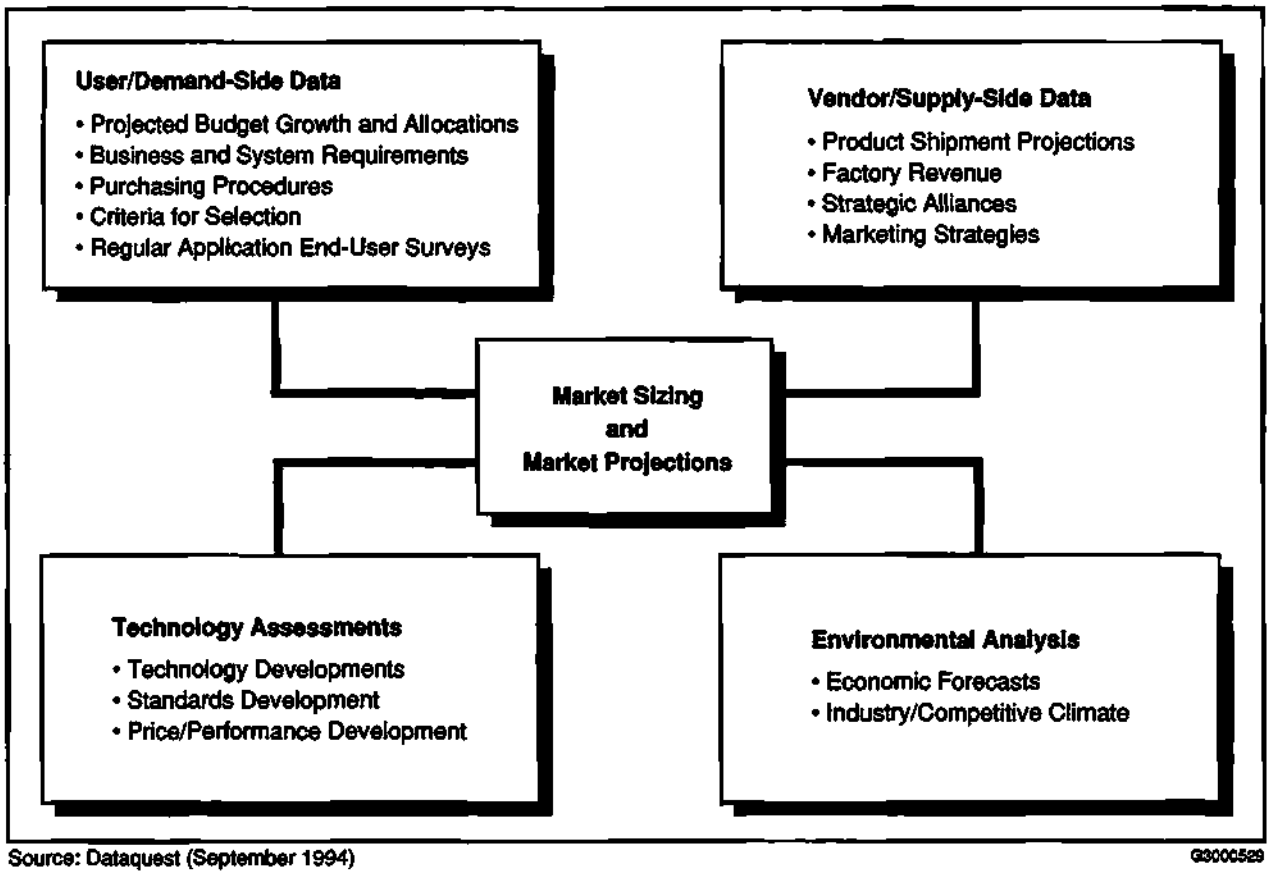
Figure 1
CAD/CAM/CAE and GIS Forecasting Model



Source: Dataquest (September 1994) G3000529

- Capacity-based analysis—This method involves identifying future shipment volume constraints. These constraints, or "ceilings," can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below the demand level.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and

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electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic computer-aided engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of ECAE applications are schematic capture and simulation.
- IC layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe (which includes Austria, Switzerland, and eastern Europe)

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong.

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Rest of World

Rest of World includes all other countries and regions, including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

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Line Items

Line item definitions are as follows:

- Average selling price (ASP) is defined as the average price of a product, inclusive of any discounts.
- CPU revenue is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
- CPU shipment is defined as the number of CPUs delivered.
- CPU installed base is defined as the total number of CPUs in active, day-to-day use.
- Unit shipment is defined as the number of products delivered (that is, seats).
- Seats are defined as the number of possible simultaneous users.
- Installed seats are defined as the total number of seats in active, day-to-day use.
- Hardware revenue is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
- Peripherals revenue is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
- Terminal revenue is defined as revenue derived from the sale of terminals used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform, as terminal revenue is contained within CPU revenue for technical workstations and PCs.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
- Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue that a company may receive from products sold to another company for resale (OEM revenue).

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Table 3
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	110,288	126,322	160,420	163,639	152,220	165,900	181,400	198,300	217,700	236,700	8	9
Unit Shipments or Seats	118,041	130,821	166,231	170,420	160,181	172,700	187,400	203,500	222,400	240,900	8	9
CPU Installed Base	205,242	319,364	455,497	577,126	662,098	723,700	777,400	844,800	922,300	1,000,000	34	9
Installed Seats	233,955	352,118	492,996	618,980	708,035	771,200	825,000	891,100	965,700	1,039,900	32	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	51.5	48.5	40.6	39.0	40.1	38.4	36.8	35.1	33.7	32.6	-6	-4
Hardware-Only ASP	5.7	5.9	5.4	8.4	10.6	10.6	10.5	10.4	10.3	10.3	17	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,834	2,159	2,195	2,551	2,591	2,687	2,777	2,876	3,008	3,162	9	4
CPU Revenue	1,393	1,673	1,752	2,069	2,121	2,219	2,316	2,423	2,557	2,710	11	5
Terminal Revenue	120	96	75	105	99	89	80	70	64	59	-5	-10
Peripheral Revenue (Turnkey)	321	390	367	377	371	379	381	383	387	393	4	1
Software Revenue	949	1,113	1,236	1,352	1,534	1,694	1,846	2,011	2,187	2,381	13	9
Bundled	663	714	673	770	859	899	936	969	995	1,016	7	3
Unbundled	286	399	563	582	675	795	910	1,042	1,192	1,365	24	15
Service Revenue	363	476	522	674	751	807	865	926	997	1,077	20	7
Total Factory Revenue	3,146	3,748	3,953	4,577	4,875	5,187	5,488	5,813	6,193	6,620	12	6
Increase over Prior Year (%)	7	19	5	16	7	6	6	6	7	7		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 4
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Asia
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	27,103	34,061	38,519	43,104	49,442	57,300	63,700	70,400	77,200	85,000	16	11
Unit Shipments or Seats	27,103	34,061	38,519	43,104	49,442	57,300	63,700	70,400	77,200	85,000	16	11
CPU Installed Base	47,847	80,145	114,389	149,691	185,755	224,100	262,100	300,400	339,300	374,300	40	15
Installed Seats	47,847	80,145	114,389	149,691	185,755	224,100	262,100	300,400	339,300	374,300	40	15
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	54.8	48.4	52.1	53.7	56.9	53.7	50.9	48.5	46.7	45.3	1	-4
Hardware-Only ASP	17.6	21.4	20.2	25.0	24.3	24.1	23.9	23.7	23.4	23.2	8	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	820	1,038	1,147	1,393	1,563	1,696	1,775	1,863	1,961	2,083	18	6
CPU Revenue	618	773	884	1,103	1,280	1,399	1,474	1,558	1,651	1,768	20	7
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	201	265	263	290	284	297	301	305	310	315	9	2
Software Revenue	555	623	729	853	1,056	1,215	1,341	1,475	1,610	1,764	17	11
Bundled	409	409	413	509	606	665	706	741	766	784	10	5
Unbundled	146	213	317	344	450	550	636	734	844	979	33	17
Service Revenue	169	245	308	438	540	607	662	720	783	854	34	10
Total Factory Revenue	1,543	1,905	2,185	2,684	3,160	3,518	3,778	4,058	4,354	4,700	20	8
Increase over Prior Year (%)	40	23	15	23	18	11	7	7	7	8		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 5
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Asia
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	3,616	5,419	4,147	3,940	3,866	3,400	3,400	3,400	3,400	3,600	2	-1
Unit Shipments or Seats	11,369	9,918	9,958	10,721	11,827	10,200	9,400	8,600	8,100	7,800	1	-8
CPU Installed Base	9,443	14,553	18,017	21,000	23,458	24,800	25,600	25,700	26,000	26,300	26	2
Installed Seats	38,155	47,307	55,516	62,854	69,394	72,300	73,100	72,100	69,400	66,300	16	-1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	253.3	196.1	165.5	146.8	119.6	111.4	103.8	96.1	89.0	82.9	-17	-7
Hardware-Only ASP	92.9	77.0	262.3	396.8	360.9	374.5	359.5	345.4	330.0	315.8	40	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	606	693	577	554	437	370	344	311	292	280	-8	-8
CPU Revenue	411	523	445	408	298	248	232	212	200	194	-8	-8
Terminal Revenue	120	96	75	105	99	89	80	70	64	59	-5	-10
Peripheral Revenue (Turnkey)	74	73	56	41	40	34	32	29	28	27	-14	-8
Software Revenue	204	254	177	142	146	119	108	96	88	83	-8	-11
Bundled	154	200	135	118	122	100	91	82	76	72	-6	-10
Unbundled	50	54	42	24	24	19	17	14	12	11	-17	-15
Service Revenue	155	187	152	145	122	103	97	90	85	83	-6	-7
Total Factory Revenue	964	1,134	906	841	705	593	549	497	465	446	-8	-9
Increase over Prior Year (%)	-28	18	-20	-7	-16	-16	-7	-10	-6	-4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 6
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Asia
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	1,399	1,547	1,454	1,500	1,700	1,800	2,000	2,100	NA	8
Unit Shipments or Seats	NA	NA	1,399	1,547	1,454	1,500	1,700	1,800	2,000	2,100	NA	8
CPU Installed Base	NA	NA	1,399	2,946	4,307	5,600	6,800	7,900	8,500	9,100	NA	16
Installed Seats	NA	NA	1,399	2,946	4,307	5,600	6,800	7,900	8,500	9,100	NA	16
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	75.1	80.0	97.1	93.3	89.2	85.2	81.6	78.3	NA	-4
Hardware-Only ASP	NA	NA	31.5	54.8	60.0	62.8	62.0	61.5	60.9	60.4	NA	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	53	85	93	98	103	108	113	118	NA	5
CPU Revenue	NA	NA	47	81	87	93	98	103	107	112	NA	5
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	6	4	5	6	6	6	6	6	NA	1
Software Revenue	NA	NA	17	21	27	29	32	36	40	44	NA	11
Bundled	NA	NA	12	12	13	14	16	19	22	25	NA	14
Unbundled	NA	NA	5	8	14	15	16	17	18	19	NA	7
Service Revenue	NA	NA	18	29	31	33	36	38	41	44	NA	7
Total Factory Revenue	NA	NA	87	135	150	160	171	183	194	206	NA	6
Increase over Prior Year (%)	NA	NA	NA	55	11	7	6	7	6	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 7
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Asia
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	79,569	86,842	116,355	115,048	97,458	103,600	112,600	122,700	135,100	146,100	5	8
Unit Shipments or Seats	79,569	86,842	116,355	115,048	97,458	103,600	112,600	122,700	135,100	146,100	5	8
CPU Installed Base	147,952	224,665	321,692	403,489	448,579	469,100	483,000	510,800	548,600	590,200	32	6
Installed Seats	147,952	224,665	321,692	403,489	448,579	469,100	483,000	510,800	548,600	590,200	32	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	18.2	18.2	12.8	12.0	12.2	12.1	11.8	11.5	11.3	11.1	-10	-2
Hardware-Only ASP	2.9	2.6	2.0	3.3	3.9	3.9	4.0	4.0	4.0	4.0	8	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	409	428	418	519	498	522	555	594	642	681	5	6
CPU Revenue	364	377	377	476	457	479	512	550	598	636	6	7
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	45	51	41	43	41	43	43	43	44	45	-2	2
Software Revenue	190	237	313	337	305	331	365	404	449	490	13	10
Bundled	100	105	114	131	117	120	123	127	131	135	4	3
Unbundled	90	132	200	206	187	212	242	277	318	355	20	14
Service Revenue	40	45	45	62	58	63	70	78	88	97	10	11
Total Factory Revenue	638	709	775	918	861	916	990	1,075	1,179	1,268	8	8
Increase over Prior Year (%)	28	11	9	18	-6	6	8	9	10	8		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 8
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	55,956	62,959	82,579	87,149	79,070	83,800	88,900	94,600	103,300	112,300	9	7
Unit Shipments or Seats	61,266	66,226	87,102	92,403	85,584	89,300	93,900	99,100	107,300	116,000	9	6
CPU Installed Base	108,686	164,506	233,626	298,333	342,515	372,000	395,000	421,500	452,400	483,800	33	7
Installed Seats	129,719	188,485	261,349	329,570	377,442	408,600	432,000	458,100	487,500	517,000	31	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	57.3	53.3	44.3	42.5	43.5	41.0	39.1	37.3	35.9	34.8	-7	-4
Hardware-Only ASP	5.4	5.8	4.0	7.7	10.1	10.7	10.5	10.3	9.9	9.7	17	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,009	1,231	1,190	1,457	1,469	1,501	1,506	1,507	1,532	1,573	10	1
CPU Revenue	760	946	941	1,164	1,176	1,211	1,225	1,239	1,273	1,319	12	2
Terminal Revenue	79	73	56	77	79	72	65	57	51	48	0	-10
Peripheral Revenue (Turnkey)	170	212	193	216	214	218	216	212	208	206	6	-1
Software Revenue	462	554	601	683	787	854	911	968	1,035	1,113	14	7
Bundled	343	394	380	459	509	534	553	566	571	572	10	2
Unbundled	118	160	221	225	278	320	359	402	464	541	24	14
Service Revenue	205	269	256	353	351	369	384	396	413	434	14	4
Total Factory Revenue	1,676	2,054	2,046	2,493	2,607	2,723	2,801	2,871	2,980	3,120	12	4
Increase over Prior Year (%)	-3	23	-0	22	5	4	3	2	4	5		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 9
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	19,563	25,507	30,235	31,778	32,921	38,500	44,700	51,100	57,200	62,600	14	14
Unit Shipments or Seats	20,727	26,065	30,876	32,592	33,598	39,100	45,300	51,600	57,500	62,900	13	13
CPU Installed Base	33,467	57,201	83,578	108,046	128,648	147,100	166,800	191,500	219,100	246,400	40	14
Installed Seats	36,555	60,798	87,710	112,728	133,582	152,100	171,700	196,300	223,400	250,100	38	13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	34.9	35.4	27.2	30.7	34.0	32.4	30.2	28.3	26.6	25.4	-1	-6
Hardware-Only ASP	4.6	3.6	2.6	4.7	5.5	5.3	5.3	5.2	5.3	5.2	5	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	273	319	299	362	383	414	447	482	519	552	9	8
CPU Revenue	213	248	241	300	317	346	375	406	438	465	10	8
Terminal Revenue	18	9	7	11	7	6	6	6	6	6	-21	-4
Peripheral Revenue (Turnkey)	43	62	51	51	59	62	66	70	75	81	9	6
Software Revenue	109	147	157	173	216	239	265	294	325	354	18	10
Bundled	80	102	95	108	138	147	158	171	186	201	15	8
Unbundled	30	45	62	65	77	91	107	124	139	153	27	15
Service Revenue	47	65	64	90	112	120	129	139	152	164	24	8
Total Factory Revenue	430	531	520	626	711	773	842	915	996	1,070	13	9
Increase over Prior Year (%)	47	24	-2	20	14	9	9	9	9	7		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 10
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	6,487	7,470	8,759	9,879	9,314	10,700	12,300	14,000	16,100	18,200	9	14
Unit Shipments or Seats	6,996	7,827	9,062	10,231	9,797	11,100	12,600	14,200	16,200	18,300	9	13
CPU Installed Base	8,451	15,776	23,903	32,112	38,167	43,300	48,600	55,200	63,100	71,400	46	13
Installed Seats	9,706	17,374	25,771	34,249	40,643	46,000	51,300	57,900	65,400	73,400	43	13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	65.0	51.9	52.0	49.5	49.2	46.1	43.8	42.0	40.7	39.8	-7	-4
Hardware-Only ASP	4.9	5.2	5.1	8.3	9.6	10.8	10.0	9.4	9.1	8.7	18	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	121	164	177	201	192	209	221	235	254	273	12	7
CPU Revenue	84	118	129	152	145	161	172	184	201	218	15	8
Terminal Revenue	10	6	5	7	6	7	5	4	3	3	-14	-13
Peripheral Revenue (Turnkey)	27	40	42	42	41	42	44	47	50	53	11	5
Software Revenue	43	69	75	100	113	124	139	158	180	202	27	12
Bundled	33	51	53	69	73	78	87	97	108	119	22	10
Unbundled	11	18	22	31	39	45	52	61	71	83	39	16
Service Revenue	22	34	39	45	47	54	61	70	80	90	22	14
Total Factory Revenue	186	267	291	346	352	387	421	463	513	566	17	10
Increase over Prior Year (%)	42	44	9	19	2	10	9	10	11	10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 11
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	28,282	30,387	38,847	34,832	30,915	32,900	35,500	38,500	41,200	43,700	2	7
Unit Shipments or Seats	29,052	30,703	39,190	35,195	31,202	33,100	35,600	38,600	41,300	43,800	2	7
CPU Installed Base	54,638	81,881	114,391	138,635	152,768	161,200	167,100	176,600	187,800	198,300	29	5
Installed Seats	57,974	85,460	118,166	142,434	156,367	164,500	169,900	178,900	189,400	199,500	28	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	51.4	48.1	42.2	32.6	31.8	33.1	33.3	33.1	33.1	33.3	-11	1
Hardware-Only ASP	7.0	7.7	9.4	13.1	17.0	16.3	16.5	16.7	17.1	17.7	25	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	430	444	529	532	546	562	603	652	702	764	6	7
CPU Revenue	336	360	441	453	483	502	544	594	646	708	10	8
Terminal Revenue	14	8	7	11	7	4	4	3	3	3	-15	-16
Peripheral Revenue (Turnkey)	81	76	81	69	56	57	55	54	54	53	-9	-1
Software Revenue	334	345	403	396	419	478	530	590	648	712	6	11
Bundled	207	168	145	134	138	139	138	135	130	124	-10	-2
Unbundled	127	177	259	262	281	339	392	455	518	587	22	16
Service Revenue	90	107	164	185	241	264	291	321	352	389	28	10
Total Factory Revenue	854	896	1,096	1,113	1,206	1,305	1,423	1,562	1,703	1,864	9	9
Increase over Prior Year (%)	8	5	22	1	8	8	9	10	9	10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 12
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	16,563	17,818	21,431	21,172	16,168	16,800	17,900	19,400	21,000	22,500	-1	7
Unit Shipments or Seats	16,751	17,897	21,503	21,251	16,195	16,800	17,900	19,400	21,000	22,500	-1	7
CPU Installed Base	29,598	45,938	64,120	79,396	85,805	87,700	87,800	90,500	95,000	100,000	30	3
Installed Seats	30,192	46,600	64,833	80,143	86,515	88,400	88,400	91,000	95,300	100,200	30	3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	41.4	34.3	28.3	23.5	22.1	24.9	26.2	26.5	26.5	26.3	-15	4
Hardware-Only ASP	4.8	5.6	7.6	10.3	15.7	15.6	16.0	16.4	17.0	17.9	34	3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	171	169	202	243	242	259	286	317	354	397	9	10
CPU Revenue	135	141	181	214	210	225	251	281	316	358	12	11
Terminal Revenue	4	2	2	4	3	2	2	2	1	1	-12	-11
Peripheral Revenue (Turnkey)	32	25	19	25	29	33	33	35	36	37	-2	5
Software Revenue	144	138	170	188	205	229	251	276	303	332	9	10
Bundled	89	57	47	46	47	47	45	43	39	34	-15	-6
Unbundled	55	81	122	142	158	183	206	234	264	298	30	14
Service Revenue	35	49	69	92	118	131	144	159	175	195	35	11
Total Factory Revenue	351	356	441	523	565	619	682	752	832	923	13	10
Increase over Prior Year (%)	32	2	24	19	8	10	10	10	11	11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 13
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	2,803	3,343	3,834	2,788	3,405	3,700	4,100	4,700	5,100	5,600	5	10
Unit Shipments or Seats	2,911	3,350	3,845	2,821	3,399	3,700	4,100	4,700	5,100	5,600	4	10
CPU Installed Base	6,846	9,807	12,832	14,379	16,059	17,700	19,300	21,300	23,400	25,400	24	10
Installed Seats	7,264	10,218	13,229	14,764	16,386	18,000	19,500	21,400	23,400	25,300	23	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	87.6	62.0	67.7	63.2	61.9	60.5	58.8	57.1	56.0	55.5	-8	-2
Hardware-Only ASP	16.3	17.3	19.4	33.2	27.7	25.6	26.2	26.7	27.2	27.8	14	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	66	79	91	96	97	98	109	123	136	153	10	9
CPU Revenue	59	71	84	87	92	94	106	120	134	151	12	10
Terminal Revenue	1	0	0	2	1	0	0	0	0	0	-8	-100
Peripheral Revenue (Turnkey)	7	8	7	7	4	4	3	3	2	2	-9	-14
Software Revenue	67	78	89	80	72	91	105	123	141	163	2	18
Bundled	21	18	22	19	17	16	15	15	15	14	-5	-3
Unbundled	46	60	67	61	56	75	90	109	127	149	5	22
Service Revenue	20	20	47	40	54	62	70	82	93	107	28	15
Total Factory Revenue	153	178	227	215	223	250	284	328	371	422	10	14
Increase over Prior Year (%)	-24	16	28	-5	4	12	14	16	13	14		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 14
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	8,916	9,226	13,582	10,872	11,342	12,400	13,500	14,400	15,100	15,500	6	6
Unit Shipments or Seats	9,389	9,456	13,842	11,123	11,608	12,600	13,600	14,500	15,200	15,600	5	6
CPU Installed Base	18,194	26,136	37,439	44,860	50,904	55,800	60,000	64,900	69,500	73,000	29	7
Installed Seats	20,518	28,642	40,104	47,526	53,466	58,100	61,900	66,500	70,800	74,000	27	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	57.9	59.8	50.8	38.3	39.6	38.6	37.5	37.0	37.1	37.3	-9	-1
Hardware-Only ASP	7.9	8.6	9.7	13.3	14.5	13.4	13.2	13.1	12.9	13.0	16	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	193	196	236	193	206	205	208	211	212	214	2	1
CPU Revenue	142	147	176	151	180	182	187	192	195	199	6	2
Terminal Revenue	8	6	5	5	4	2	2	2	2	1	-18	-16
Peripheral Revenue (Turnkey)	43	43	56	36	22	20	19	17	15	14	-16	-8
Software Revenue	124	129	145	128	142	158	174	191	204	217	3	9
Bundled	97	93	76	69	74	76	78	78	77	76	-6	1
Unbundled	27	35	69	59	67	82	96	113	127	141	26	16
Service Revenue	34	38	47	53	69	72	76	80	84	87	19	5
Total Factory Revenue	351	362	428	374	417	436	458	482	500	519	4	4
Increase over Prior Year (%)	9	3	18	-13	11	5	5	5	4	4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 15
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: China
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,298	1,067	1,586	857	1,701	3,400	4,300	5,500	7,300	9,600	7	41
Unit Shipments or Seats	1,559	1,197	1,753	926	1,755	3,500	4,400	5,700	7,400	9,800	3	41
CPU Installed Base	1,703	2,739	4,201	4,739	5,825	8,200	11,300	15,600	21,300	28,600	36	37
Installed Seats	2,305	3,468	5,087	5,665	6,748	9,100	12,200	16,500	22,300	29,600	31	34
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	177.0	162.1	133.5	81.5	55.5	44.0	41.0	38.3	35.9	34.2	-25	-9
Hardware-Only ASP	6.9	9.9	6.1	16.7	16.0	11.3	10.8	10.4	10.1	9.9	23	-9
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	22	20	18	19	31	45	54	66	83	105	9	28
CPU Revenue	16	14	13	16	28	40	49	60	76	97	15	28
Terminal Revenue	4	3	3	1	1	3	3	2	3	3	-29	20
Peripheral Revenue (Turnkey)	2	3	2	1	1	3	3	4	4	5	-5	29
Software Revenue	6	5	5	15	29	38	48	61	78	101	50	28
Bundled	5	4	4	4	8	11	13	16	20	26	13	25
Unbundled	0	1	1	10	21	27	35	44	57	76	156	30
Service Revenue	5	6	6	9	16	20	24	30	38	49	34	25
Total Factory Revenue	33	31	28	42	76	103	126	157	199	256	23	27
Increase over Prior Year (%)	6	-8	-9	51	81	34	23	24	27	29		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 16
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: China
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	105	92	91	317	920	1,100	1,400	1,900	2,400	3,200	72	28
Unit Shipments or Seats	105	92	91	317	920	1,100	1,400	1,900	2,400	3,200	72	28
CPU Installed Base	278	358	425	697	1,560	2,600	3,900	5,500	7,500	10,000	54	45
Installed Seats	278	358	425	697	1,560	2,600	3,900	5,500	7,500	10,000	54	45
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	65.2	83.1	82.3	64.7	52.2	49.3	46.5	44.2	42.2	40.6	-5	-5
Hardware-Only ASP	23.3	114.9	34.0	25.2	22.8	22.8	22.6	22.4	22.1	21.6	-1	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	4	6	4	9	21	25	31	40	50	65	49	25
CPU Revenue	4	4	3	8	20	24	30	38	49	63	55	25
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	2	1	1	1	1	1	1	1	2	5	12
Software Revenue	2	2	3	8	23	27	35	44	57	74	81	26
Bundled	2	2	2	3	7	7	9	12	15	19	41	21
Unbundled	0	0	1	5	16	20	25	32	42	55	165	28
Service Revenue	1	3	3	6	14	16	20	26	33	42	85	25
Total Factory Revenue	8	11	9	24	58	69	87	110	140	181	66	25
Increase over Prior Year (%)	-11	41	-12	148	147	18	26	27	27	30		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 17
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: China
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	47	46	24	18	17	30	30	30	30	40	-23	19
Unit Shipments or Seats	307	176	191	87	71	200	200	200	200	200	-31	23
CPU Installed Base	82	128	150	163	167	200	200	200	200	200	19	4
Installed Seats	684	857	1,035	1,089	1,090	1,100	1,100	1,100	1,100	1,200	12	2
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	649.6	1,019.8	472.0	589.8	585.7	542.9	499.6	458.0	419.0	385.8	-3	-8
Hardware-Only ASP	197.7	149.5	378.2	248.5	218.6	243.4	230.9	219.7	209.1	198.1	3	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	15	11	9	6	4	9	9	9	9	11	-27	19
CPU Revenue	10	7	5	4	3	6	6	6	6	7	-25	19
Terminal Revenue	4	3	3	1	1	3	3	2	3	3	-29	20
Peripheral Revenue (Turnkey)	1	1	1	0	0	0	0	0	0	0	-44	39
Software Revenue	3	2	1	2	1	2	2	2	2	3	-20	14
Bundled	3	2	1	1	0	1	1	2	2	2	-38	34
Unbundled	0	NA	NA	1	1	1	1	1	1	1	159	-8
Service Revenue	4	3	2	2	1	2	2	2	3	3	-25	21
Total Factory Revenue	23	16	13	9	7	13	13	13	14	16	-26	19
Increase over Prior Year (%)	4	-27	-24	-28	-24	89	1	-1	10	13		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 18
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: China
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	22	32	37	10	10	20	20	30	NA	-4
Unit Shipments or Seats	NA	NA	22	32	37	10	10	20	20	30	NA	-4
CPU Installed Base	NA	NA	22	54	89	100	100	100	100	100	NA	2
Installed Seats	NA	NA	22	54	89	100	100	100	100	100	NA	2
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	86.5	75.2	72.2	71.8	66.8	62.8	61.0	58.8	NA	-4
Hardware-Only ASP	NA	NA	49.0	76.0	77.4	84.4	81.7	80.2	78.7	76.7	NA	-0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	1	2	2	1	1	1	1	2	NA	-8
CPU Revenue	NA	NA	1	2	2	1	1	1	1	1	NA	-8
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	0	0	0	0	0	0	0	0	NA	-8
Software Revenue	NA	NA	0	3	2	1	1	1	2	2	NA	2
Bundled	NA	NA	0	0	0	0	0	0	0	1	NA	8
Unbundled	NA	NA	NA	3	1	1	1	1	1	1	NA	0
Service Revenue	NA	NA	1	1	1	1	1	1	1	1	NA	-2
Total Factory Revenue	NA	NA	2	6	5	2	2	3	4	5	NA	-3
Increase over Prior Year (%)	NA	NA	NA	221	-9	-62	17	24	25	27		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 19
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: China
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,146	929	1,449	490	727	2,200	2,800	3,600	4,800	6,300	-11	54
Unit Shipments or Seats	1,146	929	1,449	490	727	2,200	2,800	3,600	4,800	6,300	-11	54
CPU Installed Base	1,343	2,253	3,605	3,826	4,010	5,300	7,100	9,800	13,500	18,300	31	35
Installed Seats	1,343	2,253	3,605	3,826	4,010	5,300	7,100	9,800	13,500	18,300	31	35
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	31.7	24.6	21.0	17.2	16.3	15.6	14.9	14.4	NA	-7
Hardware-Only ASP	2.4	3.1	2.2	3.7	3.7	3.9	3.9	4.0	4.0	4.0	11	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	3	3	2	3	10	13	17	22	28	3	56
CPU Revenue	3	3	3	2	3	9	11	15	19	25	1	55
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	1	2	2	2	3	46	66
Software Revenue	0	0	1	1	3	8	10	13	17	23	108	54
Bundled	NA	NA	0	0	0	2	2	2	3	4	NA	78
Unbundled	0	0	0	1	2	6	8	11	14	19	104	51
Service Revenue	0	0	0	0	0	1	1	2	2	3	1	73
Total Factory Revenue	3	3	4	4	6	19	24	31	41	54	18	56
Increase over Prior Year (%)	193	12	17	-11	66	222	28	29	32	31		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 20
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: China
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	405	342	624	498	610	1,400	1,800	2,400	3,300	4,500	11	49
Unit Shipments or Seats	591	429	743	557	651	1,500	1,900	2,500	3,400	4,600	2	48
CPU Installed Base	658	979	1,543	1,917	2,308	3,400	4,700	6,600	9,200	12,700	37	41
Installed Seats	1,142	1,547	2,221	2,631	3,015	4,100	5,400	7,200	9,800	13,300	27	35
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	190.9	274.0	166.1	91.3	60.6	51.5	48.7	46.0	44.1	42.7	-25	-7
Hardware-Only ASP	10.0	15.1	8.0	14.9	17.3	8.7	8.8	8.8	8.6	8.5	15	-13
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	15	12	11	11	13	18	22	27	35	47	-3	29
CPU Revenue	10	8	8	9	11	15	19	24	32	42	2	30
Terminal Revenue	3	2	2	1	1	1	1	1	1	1	-28	11
Peripheral Revenue (Turnkey)	1	2	1	1	1	2	2	2	3	3	-7	30
Software Revenue	4	3	3	7	12	15	20	26	34	47	30	32
Bundled	4	3	3	3	5	7	8	10	13	16	8	24
Unbundled	0	0	0	4	6	9	11	16	22	31	156	37
Service Revenue	4	4	4	5	6	6	8	11	14	19	13	27
Total Factory Revenue	22	19	17	23	31	39	50	64	84	113	8	30
Increase over Prior Year (%)	0	-15	-8	34	31	29	26	29	31	35		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 21
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: China
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	286	401	518	87	226	600	800	1,100	1,500	1,900	-6	53
Unit Shipments or Seats	315	414	532	92	231	600	800	1,100	1,500	2,000	-7	54
CPU Installed Base	323	723	1,222	1,240	1,305	1,600	2,100	2,900	4,000	5,500	42	33
Installed Seats	371	783	1,296	1,318	1,385	1,700	2,200	3,000	4,200	5,700	39	33
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	170.8	92.2	94.1	57.6	44.0	32.6	29.9	27.7	25.7	24.3	-29	-11
Hardware-Only ASP	6.2	6.0	3.7	9.7	9.3	4.9	4.9	4.9	4.9	4.9	11	-12
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	4	3	1	3	5	7	9	11	14	-1	35
CPU Revenue	2	3	2	1	3	5	6	7	9	12	3	35
Terminal Revenue	1	0	0	0	0	0	0	0	1	1	-33	43
Peripheral Revenue (Turnkey)	0	1	0	0	0	1	1	1	1	1	5	34
Software Revenue	1	1	1	1	3	4	6	7	10	12	52	32
Bundled	1	1	0	0	2	3	4	5	6	8	44	29
Unbundled	0	0	0	0	1	1	2	2	3	4	102	38
Service Revenue	1	1	1	0	2	2	2	3	4	5	22	27
Total Factory Revenue	5	6	4	2	8	12	15	19	25	32	15	32
Increase over Prior Year (%)	68	22	-19	-48	238	48	29	28	29	28		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 22
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: China
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	199	49	214	49	215	500	600	700	900	1,200	2	41
Unit Shipments or Seats	217	60	226	52	223	500	600	700	900	1,200	1	40
CPU Installed Base	222	269	470	482	628	1,000	1,400	2,000	2,700	3,600	30	42
Installed Seats	253	312	524	539	690	1,100	1,600	2,200	2,900	3,800	29	41
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	144.0	61.1	79.3	63.2	55.5	38.8	36.8	34.8	34.1	32.5	-21	-10
Hardware-Only ASP	6.1	27.5	4.5	23.9	12.8	17.0	14.0	11.6	10.5	9.5	20	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	2	2	2	3	8	9	9	10	12	17	30
CPU Revenue	1	1	1	1	3	7	7	7	9	11	24	30
Terminal Revenue	0	0	0	0	0	2	1	1	1	1	-19	40
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	4	19
Software Revenue	0	0	0	3	3	4	5	6	7	10	91	27
Bundled	0	0	0	0	0	0	0	0	1	1	8	20
Unbundled	0	0	0	3	3	4	4	5	7	9	207	27
Service Revenue	0	1	1	1	2	2	3	3	4	5	44	25
Total Factory Revenue	2	3	3	5	8	14	16	17	21	26	35	28
Increase over Prior Year (%)	31	23	-6	101	44	87	10	8	23	25		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 23
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: China
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	408	275	231	223	651	900	1,100	1,400	1,700	2,000	12	25
Unit Shipments or Seats	436	294	252	224	650	900	1,100	1,400	1,700	2,000	11	25
CPU Installed Base	500	769	967	1,100	1,584	2,200	3,000	4,100	5,400	6,800	33	34
Installed Seats	539	826	1,046	1,178	1,658	2,300	3,100	4,100	5,400	6,800	32	33
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	110.7	78.2	72.3	65.6	64.7	62.5	60.6	59.0	57.5	57.7	-13	-2
Hardware-Only ASP	5.1	7.7	8.0	21.3	17.4	14.7	14.9	15.2	15.4	15.8	36	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	2	2	5	12	13	17	21	26	32	42	22
CPU Revenue	2	2	2	5	12	13	17	21	26	32	53	23
Terminal Revenue	1	0	0	0	0	0	0	0	0	0	-36	-28
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-17	0
Software Revenue	1	0	1	4	11	15	18	22	27	32	91	24
Bundled	1	0	0	0	1	1	1	1	1	1	-3	16
Unbundled	0	0	0	4	11	14	17	21	26	31	155	24
Service Revenue	1	1	1	2	7	9	11	14	17	21	95	22
Total Factory Revenue	4	3	3	11	30	37	46	57	69	85	64	23
Increase over Prior Year (%)	-10	-18	-3	234	171	23	23	23	22	22		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 24
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: China
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	273	153	66	118	468	600	800	900	1,100	1,200	14	21
Unit Shipments or Seats	281	160	73	118	468	600	800	900	1,100	1,200	14	21
CPU Installed Base	331	480	525	583	947	1,400	2,100	2,800	3,600	4,400	30	36
Installed Seats	341	497	549	607	970	1,500	2,100	2,800	3,600	4,400	30	35
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	74.7	43.1	51.3	63.9	65.4	63.2	61.2	59.4	58.5	58.0	-3	-2
Hardware-Only ASP	3.3	6.0	9.9	20.8	15.2	13.5	14.0	14.5	15.2	16.1	46	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1	1	1	3	7	9	11	14	16	19	65	21
CPU Revenue	1	1	1	2	7	9	11	14	16	19	76	21
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-36	-100
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	0	-4
Software Revenue	0	0	0	2	8	11	13	15	17	19	138	19
Bundled	0	0	0	0	0	0	0	0	0	0	18	-1
Unbundled	0	0	0	2	8	10	12	15	17	19	199	19
Service Revenue	0	0	0	1	5	6	7	9	10	12	159	19
Total Factory Revenue	1	1	1	6	21	26	31	37	44	50	97	19
Increase over Prior Year (%)	-43	-4	-22	500	238	24	22	19	17	15		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 25
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: China
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	2	1	3	34	86	100	100	100	200	200	175	18
Unit Shipments or Seats	5	2	4	34	85	100	100	100	200	200	107	19
CPU Installed Base	9	9	11	44	128	200	300	500	600	700	96	41
Installed Seats	12	14	17	49	132	200	300	500	600	700	80	40
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	100.0	64.5	32.3	62.5	52.6	50.3	47.4	49.7	46.5	48.8	-15	-1
Hardware-Only ASP	176.9	195.7	37.4	33.2	27.1	25.5	26.0	26.5	27.1	27.6	-37	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	0	0	0	1	2	3	3	4	4	5	77	17
CPU Revenue	0	0	0	1	2	3	3	4	4	5	98	17
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-41	-100
Peripheral Revenue (Turnkey)	0	0	NA	0	0	0	0	0	0	0	19	-13
Software Revenue	0	0	0	1	2	2	3	4	4	5	269	23
Bundled	0	0	NA	0	0	0	0	0	0	0	41	0
Unbundled	NA	NA	0	1	2	2	3	4	4	5	NA	23
Service Revenue	0	0	0	1	2	2	2	3	4	4	139	21
Total Factory Revenue	0	0	0	3	6	7	8	10	12	15	110	20
Increase over Prior Year (%)	30	-53	57	1136	114	23	18	21	18	20		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 26
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: China
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	134	121	162	71	97	100	200	300	500	700	-8	49
Unit Shipments or Seats	150	132	175	72	97	100	200	300	500	700	-10	49
CPU Installed Base	161	279	431	473	509	500	600	800	1,200	1,700	33	27
Installed Seats	185	315	480	522	556	600	700	900	1,200	1,700	32	25
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	125.8	100.0	85.9	68.8	67.7	64.7	62.4	60.1	58.0	58.3	-14	-3
Hardware-Only ASP	7.2	9.1	6.6	16.4	19.4	11.8	11.7	11.7	11.7	11.9	28	-9
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	1	1	1	2	2	3	4	5	8	5	32
CPU Revenue	1	1	1	1	2	2	3	4	5	8	13	33
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-35	-20
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-37	15
Software Revenue	1	0	0	1	1	2	2	3	5	8	14	51
Bundled	0	0	0	0	0	0	0	0	1	1	-21	35
Unbundled	0	0	0	0	1	1	2	3	5	7	52	54
Service Revenue	0	0	0	1	1	1	1	2	3	5	26	38
Total Factory Revenue	3	2	2	2	4	4	6	9	14	20	11	39
Increase over Prior Year (%)	24	-21	5	12	62	13	43	49	48	47		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 27
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Hong Kong
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,333	1,090	1,786	878	1,435	2,000	2,200	2,400	2,700	3,000	2	16
Unit Shipments or Seats	1,559	1,182	1,896	927	1,489	2,000	2,300	2,500	2,800	3,100	-1	16
CPU Installed Base	1,899	2,948	4,585	5,105	5,873	6,800	7,700	9,000	10,400	11,900	33	15
Installed Seats	2,494	3,632	5,368	5,907	6,669	7,500	8,400	9,600	11,000	12,400	28	13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	162.2	116.3	99.4	71.8	59.4	50.2	47.4	44.4	42.4	40.8	-22	-7
Hardware-Only ASP	5.5	9.7	7.6	16.5	12.1	8.8	8.9	8.9	8.8	8.8	22	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	22	19	20	18	22	24	25	27	29	31	-0	8
CPU Revenue	16	13	16	15	19	20	22	24	26	29	4	9
Terminal Revenue	4	2	2	1	1	1	1	1	1	1	-24	-10
Peripheral Revenue (Turnkey)	2	4	2	2	2	2	2	2	2	2	-5	7
Software Revenue	7	6	10	12	18	21	23	26	29	32	28	12
Bundled	6	5	4	4	7	7	8	8	8	9	3	5
Unbundled	1	1	6	8	11	14	16	18	20	23	94	16
Service Revenue	5	6	8	9	10	10	11	12	14	15	18	9
Total Factory Revenue	34	31	38	39	49	55	60	65	71	78	10	10
Increase over Prior Year (%)	-4	-7	23	2	27	11	10	9	9	10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 28
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Hong Kong
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	135	141	339	330	479	600	700	800	900	1,000	37	16
Unit Shipments or Seats	135	141	339	330	479	600	700	800	900	1,000	37	16
CPU Installed Base	372	497	801	1,069	1,456	1,900	2,400	2,900	3,400	3,900	41	22
Installed Seats	372	497	801	1,069	1,456	1,900	2,400	2,900	3,400	3,900	41	22
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	66.5	81.9	77.3	65.8	59.0	54.7	51.7	49.1	47.2	45.5	-3	-5
Hardware-Only ASP	19.2	65.2	21.6	26.1	23.5	22.8	22.4	21.9	21.3	20.7	5	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	5	8	10	10	12	13	15	16	18	20	23	11
CPU Revenue	4	5	8	8	11	12	14	15	17	19	26	11
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	3	1	1	1	1	1	1	1	1	2	-2
Software Revenue	3	4	8	9	13	14	16	18	20	23	43	12
Bundled	2	3	3	4	6	5	6	6	6	6	23	2
Unbundled	1	1	5	5	7	9	11	12	14	16	90	18
Service Revenue	1	4	5	7	8	9	10	11	12	13	53	11
Total Factory Revenue	10	15	23	25	32	37	41	45	50	56	35	11
Increase over Prior Year (%)	-13	60	50	9	29	13	12	11	10	11		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 29
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Hong Kong
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	48	54	24	15	15	10	10	10	10	10	-25	-8
Unit Shipments or Seats	274	147	134	64	69	100	100	100	100	100	-29	8
CPU Installed Base	88	141	163	172	173	200	100	100	100	100	19	-10
Installed Seats	682	825	945	974	970	900	800	700	600	600	9	-9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	647.9	646.4	353.8	578.2	586.2	545.6	502.2	460.6	421.3	387.9	-2	-8
Hardware-Only ASP	127.0	106.1	254.7	252.5	231.9	273.1	260.7	245.3	232.7	221.1	16	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	14	8	6	4	4	3	3	3	3	3	-27	-7
CPU Revenue	9	6	4	3	3	2	2	2	2	2	-26	-7
Terminal Revenue	4	2	2	1	1	1	1	1	1	1	-24	-10
Peripheral Revenue (Turnkey)	1	1	0	0	0	0	0	0	0	0	-46	18
Software Revenue	3	1	1	2	1	1	1	1	1	1	-23	-5
Bundled	3	1	1	0	0	1	1	1	1	1	-44	16
Unbundled	0	NA	0	1	1	0	0	0	0	0	156	-23
Service Revenue	4	2	2	1	1	1	1	1	1	1	-27	-6
Total Factory Revenue	21	12	9	7	6	5	5	5	5	4	-26	-7
Increase over Prior Year (%)	-8	-41	-28	-21	-12	-12	-4	-10	-4	-3		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 30
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Hong Kong
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	30	33	36	10	10	10	10	10	NA	-23
Unit Shipments or Seats	NA	NA	30	33	36	10	10	10	10	10	NA	-23
CPU Installed Base	NA	NA	30	63	97	100	100	100	100	100	NA	1
Installed Seats	NA	NA	30	63	97	100	100	100	100	100	NA	1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	78.4	72.3	70.1	68.2	67.0	64.5	59.5	58.7	NA	-3
Hardware-Only ASP	NA	NA	39.3	66.5	72.6	78.5	75.9	74.3	73.9	72.8	NA	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	1	2	2	1	1	1	1	1	NA	-21
CPU Revenue	NA	NA	1	2	2	1	1	1	1	1	NA	-21
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	0	0	0	0	0	0	0	0	NA	-29
Software Revenue	NA	NA	0	1	1	1	1	1	1	1	NA	-9
Bundled	NA	NA	0	0	0	0	0	0	0	0	NA	-11
Unbundled	NA	NA	NA	0	1	0	0	0	0	1	NA	-8
Service Revenue	NA	NA	1	1	1	0	0	0	0	0	NA	-15
Total Factory Revenue	NA	NA	2	3	4	1	1	2	2	2	NA	-16
Increase over Prior Year (%)	NA	NA	NA	54	29	-68	4	10	6	7		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 31
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Hong Kong
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,150	894	1,393	500	905	1,400	1,500	1,600	1,800	2,000	-6	17
Unit Shipments or Seats	1,150	894	1,393	500	905	1,400	1,500	1,600	1,800	2,000	-6	17
CPU Installed Base	1,439	2,310	3,592	3,801	4,147	4,600	5,100	5,900	6,800	7,800	30	13
Installed Seats	1,439	2,310	3,592	3,801	4,147	4,600	5,100	5,900	6,800	7,800	30	13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	24.4	NA	31.7	22.7	21.2	21.0	20.0	19.3	18.5	18.0	-3	-3
Hardware-Only ASP	2.4	3.2	2.2	3.6	3.5	3.5	3.5	3.6	3.6	3.5	10	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	3	3	2	3	6	7	7	8	8	6	19
CPU Revenue	3	3	3	2	3	5	6	6	7	7	5	18
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	1	1	1	1	1	48	32
Software Revenue	0	0	1	1	3	5	5	6	7	7	86	21
Bundled	0	NA	0	0	0	1	1	1	1	1	121	38
Unbundled	0	0	1	1	3	4	4	5	5	6	84	19
Service Revenue	0	0	0	0	0	0	1	1	1	1	3	31
Total Factory Revenue	3	4	4	4	7	11	12	14	15	17	20	20
Increase over Prior Year (%)	105	11	16	-14	87	73	10	9	11	9		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 32
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: Hong Kong
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	406	451	804	503	744	1,200	1,300	1,400	1,600	1,800	16	19
Unit Shipments or Seats	576	509	880	542	785	1,300	1,400	1,500	1,700	1,900	8	19
CPU Installed Base	691	1,118	1,858	2,225	2,721	3,500	4,300	5,100	6,100	7,000	41	21
Installed Seats	1,167	1,649	2,456	2,839	3,328	4,100	4,800	5,600	6,500	7,400	30	17
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	189.1	168.3	134.4	76.4	61.3	53.1	50.4	47.6	45.7	44.2	-25	-6
Hardware-Only ASP	7.7	12.9	6.7	14.6	13.5	8.9	9.0	9.0	8.8	8.8	15	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	14	12	10	10	13	15	16	17	18	19	-3	9
CPU Revenue	10	8	7	8	11	13	14	15	16	17	2	10
Terminal Revenue	3	2	1	1	1	1	1	1	1	1	-24	-7
Peripheral Revenue (Turnkey)	1	2	1	1	1	2	2	2	1	1	-6	10
Software Revenue	4	3	3	7	12	14	15	17	18	20	30	11
Bundled	4	3	2	3	5	6	6	6	7	7	8	4
Unbundled	0	0	0	4	7	8	9	10	12	14	139	16
Service Revenue	3	4	4	5	6	6	6	7	7	8	13	8
Total Factory Revenue	22	18	16	22	30	34	37	40	43	47	9	10
Increase over Prior Year (%)	-10	-15	-12	36	36	15	8	7	8	9		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 33
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: Hong Kong
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	286	284	366	93	313	300	400	400	500	500	2	10
Unit Shipments or Seats	311	295	376	98	319	300	400	400	500	500	1	9
CPU Installed Base	327	609	955	984	1,161	1,200	1,300	1,500	1,800	2,000	37	11
Installed Seats	389	681	1,037	1,068	1,244	1,300	1,400	1,600	1,800	2,100	34	11
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	158.2	82.9	86.9	55.1	56.2	40.3	37.4	34.3	32.1	30.5	-23	-12
Hardware-Only ASP	5.0	6.5	3.8	8.2	4.2	4.1	4.1	4.2	4.2	4.2	-4	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	3	2	1	2	2	3	3	3	3	-8	8
CPU Revenue	2	2	2	1	2	2	2	2	3	3	-4	8
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-32	0
Peripheral Revenue (Turnkey)	0	1	0	0	0	0	0	0	0	0	-10	4
Software Revenue	1	1	1	1	2	2	2	2	3	3	26	12
Bundled	1	1	0	0	1	1	1	1	1	1	9	8
Unbundled	0	0	0	0	1	1	1	1	2	2	86	15
Service Revenue	1	1	1	1	1	1	1	1	1	1	3	8
Total Factory Revenue	4	5	4	2	5	5	6	6	7	7	2	9
Increase over Prior Year (%)	59	13	-15	-42	92	7	13	10	10	8		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 34
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: Hong Kong
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	199	47	145	43	149	200	200	300	300	400	-7	22
Unit Shipments or Seats	213	57	153	46	155	200	300	300	300	400	-8	21
CPU Installed Base	222	267	399	406	489	600	800	1,000	1,200	1,400	22	23
Installed Seats	251	306	445	453	540	700	800	1,000	1,200	1,400	21	21
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	126.6	53.7	70.1	63.5	52.8	45.5	42.3	39.5	38.1	37.2	-20	-7
Hardware-Only ASP	4.4	19.2	4.7	24.4	10.1	7.5	7.5	7.5	7.6	7.5	23	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	1	2	1	2	2	3	3	3	4	8	12
CPU Revenue	1	1	1	1	2	2	2	3	3	3	11	13
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-18	-38
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	11	9
Software Revenue	0	0	0	1	2	2	2	2	3	3	55	15
Bundled	0	0	0	0	0	0	0	0	0	1	10	10
Unbundled	0	0	0	0	1	2	2	2	2	3	123	16
Service Revenue	0	1	1	1	1	1	1	1	1	2	25	14
Total Factory Revenue	2	2	3	3	4	5	6	6	7	8	20	13
Increase over Prior Year (%)	28	11	12	7	57	21	9	9	14	14		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 35
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Hong Kong
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	442	307	472	240	229	200	300	300	300	300	-15	6
Unit Shipments or Seats	460	322	487	241	229	200	300	300	300	300	-16	6
CPU Installed Base	660	954	1,374	1,490	1,502	1,400	1,300	1,400	1,400	1,500	23	-0
Installed Seats	688	996	1,431	1,548	1,558	1,500	1,400	1,400	1,500	1,500	23	-1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	92.6	84.9	51.6	77.9	54.4	48.4	46.4	44.8	44.0	43.9	-12	-4
Hardware-Only ASP	4.6	7.3	13.1	21.6	19.9	15.3	15.6	15.8	16.0	16.5	44	-4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	3	7	5	5	4	4	5	5	6	10	3
CPU Revenue	3	2	6	5	4	3	4	5	5	6	14	4
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-23	-100
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-1	-6
Software Revenue	2	1	6	4	3	4	4	5	5	6	16	14
Bundled	1	1	0	0	0	0	0	0	0	0	-29	-1
Unbundled	0	1	5	4	3	3	4	4	5	5	54	15
Service Revenue	1	1	3	2	3	3	3	4	4	4	42	10
Total Factory Revenue	6	6	15	12	10	10	11	13	14	16	17	8
Increase over Prior Year (%)	-17	2	171	-23	-12	-3	14	13	10	10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 36
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Hong Kong
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	288	165	191	129	96	100	100	100	200	200	-24	16
Unit Shipments or Seats	292	170	195	128	95	100	100	100	200	200	-24	16
CPU Installed Base	378	536	701	763	739	700	600	600	700	800	18	2
Installed Seats	382	546	715	775	751	700	600	600	700	800	18	1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	73.6	53.6	41.3	68.1	50.9	45.8	44.4	43.1	42.2	42.1	-9	-4
Hardware-Only ASP	3.4	6.4	16.4	21.5	19.4	13.7	14.2	14.6	15.3	16.2	55	-4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1	1	3	3	2	2	2	2	3	3	11	8
CPU Revenue	1	1	3	3	2	1	2	2	2	3	12	10
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-28	-100
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	24	-6
Software Revenue	1	0	3	2	1	2	2	2	3	3	18	15
Bundled	1	0	0	0	0	0	0	0	0	0	-26	-3
Unbundled	0	0	3	2	1	2	2	2	2	3	56	17
Service Revenue	0	0	1	1	1	1	1	2	2	2	48	12
Total Factory Revenue	2	2	8	6	5	5	5	6	7	8	19	11
Increase over Prior Year (%)	-36	-7	244	-17	-24	-2	15	14	15	15		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 37
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Hong Kong
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	3	4	90	44	43	50	100	100	100	100	89	19
Unit Shipments or Seats	5	3	90	43	41	50	100	100	100	100	71	20
CPU Installed Base	95	93	170	191	206	200	200	300	300	300	21	8
Installed Seats	97	96	172	193	205	200	200	300	300	300	21	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	72.7	57.0	24.6	80.9	53.8	56.2	47.6	50.0	52.6	55.6	-7	1
Hardware-Only ASP	94.2	84.6	19.5	37.4	35.9	25.5	26.0	26.4	26.9	27.5	-21	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	0	0	2	2	2	1	1	1	1	1	59	-1
CPU Revenue	0	0	2	2	2	1	1	1	1	1	70	-1
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-33	-100
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-100	NA
Software Revenue	0	0	2	1	1	1	1	1	1	2	92	13
Bundled	0	0	0	0	0	0	0	0	0	0	-20	-13
Unbundled	0	0	2	1	1	1	1	1	1	2	199	14
Service Revenue	0	0	1	1	1	1	1	1	1	1	104	8
Total Factory Revenue	0	0	5	4	3	3	4	4	4	4	74	6
Increase over Prior Year (%)	-43	9	1113	-21	-12	-2	14	12	3	2		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 38
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Hong Kong
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	151	139	191	67	90	100	100	100	100	100	-12	2
Unit Shipments or Seats	163	149	202	70	93	100	100	100	100	100	-13	1
CPU Installed Base	188	324	503	536	556	500	500	500	500	500	31	-2
Installed Seats	208	355	544	580	602	600	500	500	500	500	30	-4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	113.3	112.0	80.0	84.0	65.0	54.2	51.8	48.9	48.6	47.9	-13	-6
Hardware-Only ASP	5.7	7.1	6.9	11.5	12.6	11.2	11.2	11.3	11.1	11.3	22	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	2	2	1	1	1	1	1	1	1	-7	-0
CPU Revenue	1	1	1	1	1	1	1	1	1	1	-3	2
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-20	-100
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-100	NA
Software Revenue	1	1	1	1	1	1	1	1	1	1	-5	13
Bundled	1	1	0	0	0	0	0	0	0	0	-34	2
Unbundled	0	0	1	0	1	1	1	1	1	1	24	15
Service Revenue	0	0	1	0	1	1	1	1	1	1	13	9
Total Factory Revenue	3	3	3	2	2	2	3	3	3	3	-4	6
Increase over Prior Year (%)	18	8	2	-39	28	-7	13	12	8	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 39
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Japan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	102,960	119,728	150,669	158,003	136,884	147,100	159,300	172,600	187,600	201,600	7	8
Unit Shipments or Seats	109,486	123,634	155,739	164,422	144,544	153,000	164,600	177,200	191,600	205,200	7	7
CPU Installed Base	195,320	303,048	430,175	548,014	621,256	669,900	709,200	758,800	816,700	873,600	34	7
Installed Seats	221,032	332,225	463,410	585,384	662,694	712,600	751,800	800,500	855,600	909,100	32	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	49.5	47.4	39.8	38.5	39.6	38.2	36.5	34.9	33.5	32.4	-5	-4
Hardware-Only ASP	5.6	5.6	5.2	8.0	10.6	10.4	10.3	10.2	10.1	10.2	17	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,709	2,047	2,086	2,430	2,402	2,437	2,499	2,565	2,656	2,760	9	3
CPU Revenue	1,299	1,593	1,667	1,963	1,949	1,999	2,067	2,140	2,233	2,337	11	4
Terminal Revenue	100	81	62	98	92	73	66	57	52	48	-2	-12
Peripheral Revenue (Turnkey)	310	373	356	368	360	366	367	368	371	375	4	1
Software Revenue	899	1,080	1,192	1,270	1,371	1,496	1,614	1,739	1,870	2,010	11	8
Bundled	625	690	652	747	819	855	887	915	936	950	7	3
Unbundled	274	391	540	523	552	642	727	824	934	1,060	19	14
Service Revenue	334	442	482	617	665	702	744	786	835	888	19	6
Total Factory Revenue	2,941	3,569	3,759	4,318	4,439	4,635	4,856	5,090	5,361	5,658	11	5
Increase over Prior Year (%)	7	21	5	15	3	4	5	5	5	6		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 40
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Japan
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	25,950	33,223	37,145	40,633	44,673	51,500	56,700	62,100	67,300	73,100	15	10
Unit Shipments or Seats	25,950	33,223	37,145	40,633	44,673	51,500	56,700	62,100	67,300	73,100	15	10
CPU Installed Base	45,424	76,974	110,055	143,255	175,112	208,400	240,600	272,400	303,900	331,300	40	14
Installed Seats	45,424	76,974	110,055	143,255	175,112	208,400	240,600	272,400	303,900	331,300	40	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	54.2	47.7	51.5	53.4	56.9	53.7	51.0	48.6	46.8	45.4	1	-4
Hardware-Only ASP	17.8	20.8	20.1	25.2	24.5	24.3	24.1	23.9	23.6	23.4	8	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	783	996	1,104	1,325	1,447	1,558	1,614	1,675	1,743	1,827	17	5
CPU Revenue	587	744	848	1,042	1,170	1,269	1,321	1,378	1,442	1,522	19	5
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	196	253	256	283	276	290	293	297	300	305	9	2
Software Revenue	525	601	696	789	938	1,074	1,174	1,278	1,379	1,491	16	10
Bundled	390	395	399	491	572	633	669	701	721	735	10	5
Unbundled	136	207	297	298	366	441	505	577	658	756	28	16
Service Revenue	159	227	284	394	468	522	561	601	643	689	31	8
Total Factory Revenue	1,467	1,824	2,083	2,508	2,853	3,155	3,349	3,554	3,765	4,007	18	7
Increase over Prior Year (%)	41	24	14	20	14	11	6	6	6	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 41
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Japan
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	3,338	5,149	4,025	3,841	3,775	3,300	3,300	3,300	3,300	3,400	3	-2
Unit Shipments or Seats	9,864	9,055	9,094	10,260	11,435	9,200	8,600	7,800	7,300	7,000	4	-9
CPU Installed Base	8,974	13,816	17,169	20,082	22,521	23,900	24,600	24,800	25,000	25,400	26	2
Installed Seats	34,687	42,993	50,403	57,452	63,959	66,600	67,300	66,500	64,000	60,900	17	-1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	236.5	188.8	160.9	143.7	117.5	106.1	98.5	90.8	83.7	77.5	-16	-8
Hardware-Only ASP	84.3	69.0	245.0	429.5	391.5	406.2	390.9	375.7	360.0	346.0	47	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	531	640	536	524	414	327	304	276	258	247	-6	-10
CPU Revenue	361	489	420	385	281	222	208	190	179	173	-6	-9
Terminal Revenue	100	81	62	98	92	73	66	57	52	48	-2	-12
Peripheral Revenue (Turnkey)	70	70	54	40	40	33	31	28	27	26	-13	-8
Software Revenue	186	244	171	136	141	111	100	88	81	76	-7	-12
Bundled	136	190	129	115	120	95	86	77	71	67	-3	-11
Unbundled	50	54	41	21	22	16	14	12	10	9	-19	-17
Service Revenue	136	172	141	137	115	93	88	80	76	74	-4	-9
Total Factory Revenue	852	1,056	847	797	671	531	492	445	415	397	-6	-10
Increase over Prior Year (%)	-30	24	-20	-6	-16	-21	-7	-10	-7	-4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 42
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Japan
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	1,243	1,366	1,256	1,300	1,400	1,500	1,600	1,800	NA	7
Unit Shipments or Seats	NA	NA	1,243	1,366	1,256	1,300	1,400	1,500	1,600	1,800	NA	7
CPU Installed Base	NA	NA	1,243	2,609	3,784	4,900	5,800	6,700	7,200	7,700	NA	15
Installed Seats	NA	NA	1,243	2,609	3,784	4,900	5,800	6,700	7,200	7,700	NA	15
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	74.5	79.1	101.5	94.4	90.2	86.4	82.8	79.4	NA	-5
Hardware-Only ASP	NA	NA	30.2	53.0	58.4	58.5	58.1	57.8	57.4	57.1	NA	-0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	46	74	80	80	84	88	91	95	NA	3
CPU Revenue	NA	NA	40	70	76	74	78	82	86	89	NA	3
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	6	4	4	6	5	5	5	5	NA	4
Software Revenue	NA	NA	16	16	20	24	27	31	34	38	NA	14
Bundled	NA	NA	11	11	11	13	15	18	21	23	NA	16
Unbundled	NA	NA	5	5	9	11	12	12	13	14	NA	10
Service Revenue	NA	NA	14	25	25	26	28	31	33	35	NA	7
Total Factory Revenue	NA	NA	76	115	125	130	139	149	158	167	NA	6
Increase over Prior Year (%)	NA	NA	NA	52	9	4	7	7	6	5		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 43
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Japan
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	73,672	81,356	108,257	112,163	87,179	91,000	98,000	105,800	115,300	123,300	4	7
Unit Shipments or Seats	73,672	81,356	108,257	112,163	87,179	91,000	98,000	105,800	115,300	123,300	4	7
CPU Installed Base	140,922	212,258	301,708	382,068	419,840	432,800	438,100	454,900	480,500	509,200	31	4
Installed Seats	140,922	212,258	301,708	382,068	419,840	432,800	438,100	454,900	480,500	509,200	31	4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	18.2	18.2	12.7	12.0	12.1	11.9	11.6	11.3	11.1	10.9	-10	-2
Hardware-Only ASP	3.0	2.6	1.9	3.3	4.0	4.0	4.0	4.1	4.1	4.0	7	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	395	411	400	508	462	472	497	527	564	592	4	5
CPU Revenue	350	360	359	466	422	434	459	489	526	553	5	6
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	45	50	40	42	40	38	38	38	38	39	-3	-1
Software Revenue	188	235	310	329	272	287	313	342	376	405	10	8
Bundled	100	105	113	130	116	113	116	119	123	125	4	2
Unbundled	88	130	197	199	156	174	197	223	253	280	15	12
Service Revenue	39	44	43	61	57	61	67	74	83	90	10	10
Total Factory Revenue	621	689	753	898	790	820	877	943	1,023	1,087	6	7
Increase over Prior Year (%)	26	11	9	19	-12	4	7	8	8	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 44
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: Japan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	53,872	60,801	78,680	84,665	72,994	76,600	80,800	85,500	92,400	99,300	8	6
Unit Shipments or Seats	58,292	63,680	82,672	89,614	79,277	81,600	85,300	89,400	96,000	102,600	8	5
CPU Installed Base	105,160	158,942	224,487	287,391	326,739	351,100	368,800	389,400	413,600	437,800	33	6
Installed Seats	123,784	180,138	248,943	315,178	358,226	384,100	402,300	422,700	445,500	467,800	30	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	54.6	51.7	43.3	41.9	43.0	40.7	38.8	37.0	35.6	34.4	-6	-4
Hardware-Only ASP	5.2	5.4	3.8	7.5	10.2	10.3	10.2	10.0	9.6	9.4	18	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	937	1,169	1,135	1,404	1,395	1,387	1,387	1,380	1,393	1,416	10	0
CPU Revenue	708	905	902	1,122	1,111	1,116	1,124	1,128	1,149	1,178	12	1
Terminal Revenue	65	63	47	72	75	61	55	48	43	40	4	-12
Peripheral Revenue (Turnkey)	164	201	187	210	209	211	208	204	200	197	6	-1
Software Revenue	441	538	586	654	723	779	827	871	922	979	13	6
Bundled	324	379	367	444	484	507	523	534	536	534	11	2
Unbundled	117	159	219	210	238	273	303	337	386	444	19	13
Service Revenue	187	251	238	330	323	332	344	351	363	375	15	3
Total Factory Revenue	1,565	1,958	1,959	2,388	2,441	2,499	2,557	2,603	2,677	2,769	12	3
Increase over Prior Year (%)	-2	25	0	22	2	2	2	2	3	3		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 45
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: Japan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	18,099	23,582	27,726	31,267	29,006	34,000	39,200	44,500	49,400	53,600	13	13
Unit Shipments or Seats	19,121	24,076	28,299	32,046	29,653	34,600	39,700	44,800	49,700	53,800	12	13
CPU Installed Base	31,825	53,645	77,608	101,909	119,391	134,800	150,800	170,800	193,100	215,000	39	12
Installed Seats	34,659	56,925	81,358	106,184	123,908	139,400	155,300	175,000	196,900	218,100	38	12
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	33.9	34.9	26.8	30.5	33.6	32.1	30.0	28.1	26.4	25.3	-0	-6
Hardware-Only ASP	4.5	3.4	2.5	4.6	5.8	5.5	5.5	5.5	5.5	5.5	7	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	258	302	286	355	362	387	415	444	476	503	9	7
CPU Revenue	202	236	230	295	297	321	347	372	399	421	10	7
Terminal Revenue	15	8	6	10	6	5	5	5	5	4	-20	-7
Peripheral Revenue (Turnkey)	41	59	50	50	58	60	64	68	73	78	9	6
Software Revenue	106	143	153	170	195	214	236	259	284	306	16	9
Bundled	77	99	93	107	130	138	147	158	171	182	14	7
Unbundled	29	44	60	63	65	76	89	102	113	124	22	14
Service Revenue	44	60	59	88	106	112	120	128	139	149	25	7
Total Factory Revenue	408	505	498	613	663	713	771	832	899	958	13	8
Increase over Prior Year (%)	46	24	-1	23	8	8	8	8	8	7		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 46
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: Japan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	5,525	7,227	7,891	9,355	7,477	8,100	9,300	10,600	12,000	13,500	8	13
Unit Shipments or Seats	5,954	7,527	8,142	9,681	7,919	8,400	9,400	10,700	12,100	13,500	7	11
CPU Installed Base	7,385	14,475	21,795	29,654	34,197	37,300	40,200	44,100	49,200	54,600	47	10
Installed Seats	8,486	15,862	23,403	31,511	36,365	39,500	42,400	46,200	50,900	56,000	44	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	63.9	51.7	51.5	48.8	49.4	46.5	44.3	42.5	41.2	40.3	-6	-4
Hardware-Only ASP	4.8	4.6	5.2	7.5	9.9	10.4	9.9	9.6	9.3	9.0	20	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	113	157	168	185	171	176	187	200	215	229	11	6
CPU Revenue	78	113	123	139	126	133	142	153	165	177	13	7
Terminal Revenue	8	5	4	6	5	2	2	2	1	1	-13	-28
Peripheral Revenue (Turnkey)	27	39	41	40	40	41	43	46	49	51	11	5
Software Revenue	42	66	73	89	93	101	114	129	146	162	22	12
Bundled	32	49	52	65	70	75	83	93	104	114	22	10
Unbundled	10	17	21	23	23	26	30	36	42	48	22	16
Service Revenue	20	31	36	38	38	43	49	56	63	71	18	13
Total Factory Revenue	175	254	276	312	302	321	349	385	423	462	15	9
Increase over Prior Year (%)	42	45	9	13	-3	6	9	10	10	9		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 47
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Japan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	25,464	28,118	36,373	32,717	27,406	28,400	30,000	32,000	33,700	35,200	2	5
Unit Shipments or Seats	26,119	28,352	36,627	33,081	27,695	28,500	30,100	32,100	33,800	35,200	1	5
CPU Installed Base	50,950	75,987	106,285	129,059	140,930	146,700	149,400	154,500	160,700	166,200	29	3
Installed Seats	54,103	79,300	109,706	132,511	144,196	149,600	151,900	156,600	162,200	167,300	28	3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	50.0	47.5	41.6	32.3	31.3	32.6	32.8	32.6	32.6	32.7	-11	1
Hardware-Only ASP	7.0	7.7	9.3	12.3	16.5	16.3	16.5	16.7	17.1	17.7	24	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	400	419	497	486	474	486	510	541	572	612	4	5
CPU Revenue	311	339	412	408	415	428	455	487	520	561	8	6
Terminal Revenue	11	6	5	10	6	4	4	3	3	3	-13	-14
Peripheral Revenue (Turnkey)	78	73	79	68	53	54	52	51	49	49	-9	-2
Software Revenue	310	333	380	358	360	402	437	480	519	563	4	9
Bundled	193	163	140	131	134	135	133	131	125	120	-9	-2
Unbundled	117	171	240	226	226	267	304	349	394	443	18	14
Service Revenue	83	100	150	162	199	215	231	250	270	293	24	8
Total Factory Revenue	792	852	1,027	1,005	1,034	1,103	1,179	1,271	1,361	1,468	7	7
Increase over Prior Year (%)	6	8	20	-2	3	7	7	8	7	8		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 48
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Japan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	14,789	16,584	20,568	19,958	14,165	14,000	14,600	15,600	16,600	17,500	-1	4
Unit Shipments or Seats	14,950	16,636	20,614	20,046	14,204	14,000	14,600	15,600	16,600	17,500	-1	4
CPU Installed Base	27,379	42,520	59,992	74,444	79,567	79,800	77,800	77,700	79,100	81,100	31	0
Installed Seats	27,938	43,120	60,617	75,113	80,212	80,400	78,300	78,100	79,400	81,300	30	0
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	40.4	33.6	27.7	23.2	21.4	24.3	25.4	25.8	25.8	25.5	-15	4
Hardware-Only ASP	4.8	5.5	7.2	9.5	15.4	16.0	16.4	16.7	17.3	18.2	34	3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	159	156	187	217	205	219	236	257	281	311	7	9
CPU Revenue	125	131	168	189	176	187	204	224	248	277	9	9
Terminal Revenue	4	2	2	4	2	2	2	2	1	1	-9	-9
Peripheral Revenue (Turnkey)	31	24	18	25	27	30	30	31	32	33	-3	4
Software Revenue	132	133	159	165	170	184	197	213	230	249	6	8
Bundled	84	55	46	45	45	44	42	40	37	32	-14	-7
Unbundled	49	78	114	120	125	140	155	173	194	217	27	12
Service Revenue	33	46	63	79	96	105	113	123	133	146	31	9
Total Factory Revenue	324	335	410	461	471	508	547	592	645	706	10	8
Increase over Prior Year (%)	30	3	22	13	2	8	8	8	9	9		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 49
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Japan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	2,671	3,299	3,547	2,429	2,680	2,800	3,100	3,400	3,700	4,100	0	9
Unit Shipments or Seats	2,767	3,306	3,556	2,465	2,680	2,800	3,100	3,400	3,700	4,100	-1	9
CPU Installed Base	6,558	9,484	12,252	13,483	14,519	15,300	16,100	17,100	18,200	19,300	22	6
Installed Seats	6,959	9,877	12,630	13,853	14,837	15,600	16,300	17,200	18,200	19,200	21	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	85.6	61.9	67.2	63.2	62.1	60.8	59.1	57.4	56.4	55.8	-8	-2
Hardware-Only ASP	15.9	17.1	19.3	33.3	27.7	25.7	26.2	26.7	27.3	27.8	15	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	62	77	85	84	77	75	81	90	99	111	6	8
CPU Revenue	55	70	78	76	72	71	78	88	97	109	7	9
Terminal Revenue	1	0	0	1	1	0	0	0	0	0	-1	-100
Peripheral Revenue (Turnkey)	6	7	7	7	4	4	3	3	2	2	-8	-14
Software Revenue	63	77	82	69	57	69	79	92	104	120	-2	16
Bundled	18	17	21	18	16	16	15	15	14	14	-3	-3
Unbundled	44	60	61	51	40	54	64	77	90	106	-2	21
Service Revenue	18	20	43	34	41	45	50	57	65	74	22	13
Total Factory Revenue	143	174	210	187	175	189	210	239	269	305	5	12
Increase over Prior Year (%)	-28	22	21	-11	-6	8	11	14	12	14		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 50
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Japan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	8,004	8,235	12,258	10,330	10,560	11,500	12,300	13,000	13,400	13,500	7	5
Unit Shipments or Seats	8,402	8,410	12,457	10,570	10,810	11,700	12,400	13,100	13,500	13,600	7	5
CPU Installed Base	17,013	23,983	34,041	41,131	46,844	51,600	55,500	59,700	63,400	65,800	29	7
Installed Seats	19,206	26,302	36,460	43,545	49,147	53,600	57,200	61,200	64,600	66,700	26	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	56.3	59.1	50.2	38.0	39.2	38.2	37.2	36.7	36.7	36.9	-9	-1
Hardware-Only ASP	7.9	8.9	10.2	13.3	14.3	13.7	13.4	13.3	13.2	13.3	16	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	179	185	224	185	192	193	193	194	192	190	2	-0
CPU Revenue	131	139	167	144	167	170	173	175	175	175	6	1
Terminal Revenue	7	4	4	5	3	2	2	2	2	1	-17	-15
Peripheral Revenue (Turnkey)	41	42	54	36	22	20	19	17	15	14	-15	-8
Software Revenue	115	123	139	123	134	148	161	175	185	194	4	8
Bundled	91	90	74	68	73	75	76	76	75	74	-5	0
Unbundled	24	32	66	55	61	73	85	99	110	120	27	14
Service Revenue	32	34	43	49	63	65	68	70	72	73	19	3
Total Factory Revenue	326	342	407	357	389	407	422	439	448	457	5	3
Increase over Prior Year (%)	7	5	19	-12	9	5	4	4	2	2		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 51
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Korea
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	2,375	2,180	3,191	1,652	5,833	6,400	7,400	8,500	9,700	10,700	25	13
Unit Shipments or Seats	2,747	2,357	3,415	1,771	5,934	6,600	7,600	8,700	9,900	10,900	21	13
CPU Installed Base	3,111	5,232	8,197	9,280	13,962	18,400	23,400	29,200	35,300	41,100	46	24
Installed Seats	4,015	6,310	9,482	10,642	15,339	19,900	24,900	30,600	36,600	42,400	40	23
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	156.9	132.8	118.4	85.0	61.7	48.8	45.7	42.5	39.8	37.7	-21	-9
Hardware-Only ASP	7.1	8.4	6.7	18.3	9.8	12.6	12.2	12.0	11.9	12.0	8	4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	42	36	35	37	66	88	98	109	121	133	12	15
CPU Revenue	32	26	27	33	61	79	90	101	113	125	18	16
Terminal Revenue	6	5	4	2	2	5	4	4	4	3	-23	9
Peripheral Revenue (Turnkey)	4	5	4	2	3	4	4	4	4	5	-6	9
Software Revenue	20	11	15	24	57	69	81	93	106	119	29	16
Bundled	14	8	7	6	12	13	14	14	15	16	-5	6
Unbundled	6	3	8	19	45	57	67	79	91	104	64	18
Service Revenue	10	10	12	16	29	37	43	49	55	62	30	17
Total Factory Revenue	72	57	61	78	151	194	221	251	282	315	20	16
Increase over Prior Year (%)	33	-21	7	28	95	28	14	13	12	12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 52
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Korea
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	474	285	494	780	1,653	2,100	2,500	2,900	3,300	3,800	37	18
Unit Shipments or Seats	474	285	494	780	1,653	2,100	2,500	2,900	3,300	3,800	37	18
CPU Installed Base	850	1,108	1,530	2,190	3,641	5,500	7,500	9,800	12,200	14,500	44	32
Installed Seats	850	1,108	1,530	2,190	3,641	5,500	7,500	9,800	12,200	14,500	44	32
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	83.9	79.0	77.0	67.0	64.9	60.7	57.6	54.9	52.7	50.8	-6	-5
Hardware-Only ASP	14.9	30.3	20.6	23.8	23.3	23.4	23.4	23.4	23.4	23.4	12	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	14	13	14	21	41	50	58	68	77	87	30	16
CPU Revenue	12	10	11	19	39	48	56	65	74	84	34	17
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	2	3	3	2	2	2	2	3	3	3	1	6
Software Revenue	13	7	11	21	42	51	60	70	80	90	33	17
Bundled	8	4	4	4	10	9	10	11	11	12	4	4
Unbundled	5	3	7	17	32	42	50	59	68	79	59	20
Service Revenue	4	5	7	12	25	30	36	42	48	54	59	17
Total Factory Revenue	31	26	32	54	107	131	154	179	204	232	36	17
Increase over Prior Year (%)	73	-18	25	67	99	22	17	16	14	14		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 53
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Korea
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	90	90	34	30	28	40	40	30	30	30	-26	2
Unit Shipments or Seats	462	267	257	149	128	300	300	200	200	200	-27	9
CPU Installed Base	149	239	269	289	294	300	300	300	300	300	18	0
Installed Seats	1,054	1,316	1,554	1,651	1,671	1,800	1,800	1,700	1,600	1,600	12	-1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	636.2	958.4	504.3	592.9	600.0	552.0	509.0	466.1	428.6	393.1	-1	-8
Hardware-Only ASP	127.2	103.9	357.1	261.0	230.0	308.0	292.5	278.1	264.1	250.5	16	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	23	17	13	9	7	12	11	10	9	9	-25	4
CPU Revenue	15	11	8	7	5	7	7	6	6	5	-24	1
Terminal Revenue	6	5	4	2	2	5	4	4	4	3	-23	9
Peripheral Revenue (Turnkey)	2	1	1	0	0	0	0	0	0	0	-43	13
Software Revenue	6	3	2	1	1	2	2	2	2	2	-37	12
Bundled	6	3	2	1	1	1	1	1	1	1	-40	8
Unbundled	0	NA	0	0	0	1	1	1	1	1	8	25
Service Revenue	6	5	3	3	2	3	3	3	3	3	-24	6
Total Factory Revenue	35	24	18	13	10	18	17	15	14	13	-26	5
Increase over Prior Year (%)	2	-30	-26	-27	-21	72	-6	-10	-7	-5		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 54
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Korea
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	51	64	61	100	100	200	200	200	NA	27
Unit Shipments or Seats	NA	NA	51	64	61	100	100	200	200	200	NA	27
CPU Installed Base	NA	NA	51	114	171	300	400	500	600	700	NA	33
Installed Seats	NA	NA	51	114	171	300	400	500	600	700	NA	33
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	85.0	104.9	78.1	76.8	73.9	71.3	67.8	67.2	NA	-3
Hardware-Only ASP	NA	NA	41.0	61.1	67.4	76.2	74.6	73.1	71.6	70.2	NA	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	2	4	4	10	11	11	12	12	NA	27
CPU Revenue	NA	NA	2	4	4	10	11	11	12	12	NA	28
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	0	0	0	0	0	0	0	0	NA	-25
Software Revenue	NA	NA	0	0	1	1	1	1	1	1	NA	4
Bundled	NA	NA	0	0	0	0	0	0	0	0	NA	-8
Unbundled	NA	NA	NA	0	1	1	1	1	1	1	NA	11
Service Revenue	NA	NA	1	1	1	3	3	3	4	4	NA	22
Total Factory Revenue	NA	NA	4	6	6	14	15	16	17	18	NA	23
Increase over Prior Year (%)	NA	NA	NA	49	15	129	4	5	5	6		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 55
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Korea
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,812	1,805	2,612	778	4,093	4,100	4,800	5,500	6,200	6,700	23	10
Unit Shipments or Seats	1,812	1,805	2,612	778	4,093	4,100	4,800	5,500	6,200	6,700	23	10
CPU Installed Base	2,112	3,886	6,346	6,686	9,856	12,400	15,200	18,600	22,200	25,600	47	21
Installed Seats	2,112	3,886	6,346	6,686	9,856	12,400	15,200	18,600	22,200	25,600	47	21
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	28.6	NA	31.7	19.4	15.7	14.2	13.4	12.8	12.3	11.9	-14	-5
Hardware-Only ASP	2.4	3.1	2.1	3.6	3.3	3.4	3.5	3.5	3.5	3.5	8	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	4	6	6	3	14	15	18	20	23	25	34	12
CPU Revenue	4	5	6	3	14	14	16	19	21	23	34	11
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	1	1	1	1	1	32	24
Software Revenue	1	1	1	2	13	15	17	20	23	26	83	15
Bundled	0	NA	0	0	1	2	2	2	2	2	172	35
Unbundled	1	1	1	2	12	13	15	18	21	23	81	14
Service Revenue	0	0	0	0	0	0	1	1	1	1	4	27
Total Factory Revenue	6	7	7	5	27	30	36	41	47	52	47	14
Increase over Prior Year (%)	283	14	5	-25	421	11	18	16	14	10		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 56
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: Korea
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	631	677	1,220	611	2,272	2,000	2,200	2,300	2,600	2,900	38	5
Unit Shipments or Seats	899	795	1,383	713	2,349	2,200	2,300	2,500	2,800	3,000	27	5
CPU Installed Base	1,073	1,712	2,833	3,235	5,123	6,500	7,800	9,100	10,400	11,600	48	18
Installed Seats	1,795	2,549	3,819	4,287	6,181	7,600	8,900	10,200	11,400	12,600	36	15
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	191.6	256.7	166.0	98.0	60.3	49.2	46.8	44.4	42.6	41.3	-25	-7
Hardware-Only ASP	8.9	11.3	6.0	15.6	7.4	17.3	16.6	15.8	14.7	14.1	-5	14
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	21	18	16	15	22	37	38	39	40	42	0	14
CPU Revenue	15	12	12	12	19	31	32	34	36	38	5	15
Terminal Revenue	4	3	3	2	1	4	4	3	3	3	-23	14
Peripheral Revenue (Turnkey)	2	3	2	1	1	2	2	2	2	1	-6	1
Software Revenue	6	5	4	7	18	20	22	24	26	29	31	10
Bundled	6	5	4	4	6	6	7	7	7	7	1	2
Unbundled	0	0	0	3	12	13	15	17	19	22	176	14
Service Revenue	5	5	5	6	7	11	12	13	14	15	8	16
Total Factory Revenue	33	28	25	28	46	68	72	75	80	86	9	13
Increase over Prior Year (%)	-9	-14	-11	10	69	47	5	5	6	7		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 57
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: Korea
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	445	620	813	171	1,666	1,900	2,300	2,800	3,200	3,600	39	17
Unit Shipments or Seats	488	638	833	183	1,676	1,900	2,400	2,900	3,300	3,600	36	17
CPU Installed Base	493	1,109	1,894	1,960	3,378	4,800	6,600	8,700	10,900	13,000	62	31
Installed Seats	564	1,198	2,003	2,078	3,500	5,000	6,700	8,900	11,100	13,300	58	31
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	162.7	89.9	91.1	56.6	59.6	42.3	38.7	35.5	32.7	30.8	-22	-12
Hardware-Only ASP	5.0	5.3	3.4	7.9	3.9	4.0	4.1	4.1	4.1	4.1	-6	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	4	5	4	2	9	11	13	15	17	18	18	16
CPU Revenue	3	4	4	2	8	10	12	14	15	17	25	16
Terminal Revenue	1	0	0	0	0	0	0	0	0	0	-30	22
Peripheral Revenue (Turnkey)	0	1	0	0	1	1	1	1	1	1	6	16
Software Revenue	1	1	1	1	9	11	13	15	17	19	76	17
Bundled	1	1	1	0	4	4	5	5	6	6	44	13
Unbundled	0	0	1	0	5	7	8	10	11	13	176	20
Service Revenue	1	2	1	1	3	4	4	5	5	6	30	16
Total Factory Revenue	6	8	7	4	20	25	30	34	39	43	34	17
Increase over Prior Year (%)	81	28	-15	-44	427	25	18	16	13	11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 58
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: Korea
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	283	80	255	79	473	400	500	600	700	700	14	8
Unit Shipments or Seats	306	97	270	85	485	400	500	600	700	700	12	8
CPU Installed Base	312	389	626	654	1,031	1,300	1,700	2,100	2,400	2,800	35	22
Installed Seats	357	452	703	734	1,120	1,400	1,700	2,100	2,500	2,800	33	20
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	133.1	55.8	71.0	66.1	56.7	46.0	43.4	40.7	38.9	37.7	-19	-8
Hardware-Only ASP	5.6	20.7	4.6	17.3	6.5	7.4	7.4	7.4	7.4	7.4	4	3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	2	3	2	4	4	5	5	6	7	14	10
CPU Revenue	2	2	2	2	4	4	5	5	6	6	19	11
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-19	-45
Peripheral Revenue (Turnkey)	0	0	1	0	0	0	0	0	0	0	10	10
Software Revenue	0	1	1	1	3	4	4	5	6	6	76	12
Bundled	0	1	1	1	0	1	1	1	1	1	12	7
Unbundled	0	0	0	0	3	3	4	4	5	5	178	13
Service Revenue	1	1	1	1	1	2	2	2	3	3	26	16
Total Factory Revenue	3	4	5	4	9	10	11	12	14	16	28	12
Increase over Prior Year (%)	52	25	10	-7	107	11	13	10	13	10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 59
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Korea
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,017	804	903	791	1,422	2,000	2,400	2,800	3,200	3,500	9	20
Unit Shipments or Seats	1,055	827	929	791	1,424	2,000	2,400	2,800	3,200	3,500	8	20
CPU Installed Base	1,233	2,021	2,843	3,432	4,429	5,800	7,400	9,400	11,600	13,600	38	25
Installed Seats	1,299	2,111	2,957	3,543	4,538	5,900	7,500	9,500	11,600	13,700	37	25
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	121.2	85.2	83.3	81.8	74.3	73.9	71.6	68.3	67.2	67.0	-12	-2
Hardware-Only ASP	7.7	7.7	11.1	22.1	21.1	16.8	17.1	17.4	17.9	18.6	29	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	13	10	12	18	31	35	42	50	58	66	24	16
CPU Revenue	11	8	10	17	30	34	41	49	56	65	28	16
Terminal Revenue	1	1	1	0	0	0	0	0	0	0	-20	-42
Peripheral Revenue (Turnkey)	1	1	1	0	1	1	1	1	2	2	-13	15
Software Revenue	13	4	9	16	27	35	42	50	57	65	20	19
Bundled	7	2	2	1	1	2	2	2	2	2	-33	3
Unbundled	6	3	7	15	25	33	40	48	55	63	44	20
Service Revenue	3	2	4	8	17	20	25	29	34	39	52	17
Total Factory Revenue	30	16	24	42	76	91	109	129	149	170	26	18
Increase over Prior Year (%)	140	-45	49	73	80	20	20	19	15	14		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 60
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Korea
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	628	435	306	497	782	1,200	1,400	1,700	1,900	2,100	6	22
Unit Shipments or Seats	636	442	313	493	778	1,200	1,400	1,700	1,900	2,100	5	22
CPU Installed Base	730	1,157	1,416	1,789	2,330	3,100	4,100	5,400	6,700	8,000	34	28
Installed Seats	740	1,174	1,440	1,809	2,345	3,100	4,100	5,400	6,700	8,000	33	28
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	98.0	75.5	64.4	77.4	70.1	69.1	66.8	64.9	63.6	63.4	-8	-2
Hardware-Only ASP	5.4	7.6	15.1	20.5	18.7	14.3	14.9	15.4	16.1	17.0	36	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	5	5	5	10	16	18	22	26	31	37	34	19
CPU Revenue	4	4	4	10	15	17	21	25	30	35	36	19
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-25	-100
Peripheral Revenue (Turnkey)	0	0	0	0	1	1	1	1	1	2	26	16
Software Revenue	6	2	4	9	15	20	23	27	31	35	28	18
Bundled	2	1	0	0	1	1	1	1	1	1	-21	-1
Unbundled	3	1	3	9	14	19	22	26	30	34	43	19
Service Revenue	1	1	2	5	9	10	12	14	16	19	69	17
Total Factory Revenue	12	8	10	24	39	47	57	67	79	91	36	18
Increase over Prior Year (%)	160	-30	27	138	60	19	21	19	17	15		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 61
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Korea
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	89	19	99	159	398	500	600	700	700	800	45	15
Unit Shipments or Seats	93	19	100	159	397	500	600	700	700	800	44	15
CPU Installed Base	104	122	214	364	734	1,200	1,700	2,200	2,800	3,200	63	34
Installed Seats	110	128	221	370	739	1,200	1,700	2,200	2,800	3,200	61	34
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	125.4	69.2	40.6	71.8	59.3	54.3	57.4	51.3	54.1	56.6	-17	-1
Hardware-Only ASP	21.4	31.2	19.6	30.8	26.6	25.6	26.1	26.6	27.1	27.7	6	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	1	2	5	11	13	15	17	20	22	38	16
CPU Revenue	2	1	2	5	11	13	15	17	20	22	44	16
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-26	-100
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-60	0
Software Revenue	3	0	2	5	9	12	14	17	20	23	31	21
Bundled	2	0	0	0	0	0	0	0	0	0	-64	0
Unbundled	1	0	2	5	9	12	14	17	20	23	65	21
Service Revenue	1	0	1	2	6	8	10	12	14	16	60	20
Total Factory Revenue	7	1	5	12	26	33	39	47	53	61	39	19
Increase over Prior Year (%)	900	-82	311	134	111	28	18	19	14	14		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 62
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Korea
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	300	350	498	135	242	300	400	500	600	600	-5	20
Unit Shipments or Seats	325	366	516	139	248	300	400	500	600	600	-7	19
CPU Installed Base	399	743	1,214	1,279	1,365	1,500	1,600	1,800	2,100	2,400	36	12
Installed Seats	450	809	1,297	1,364	1,454	1,500	1,600	1,800	2,100	2,400	34	11
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	138.7	100.6	104.8	87.0	82.9	82.9	80.4	75.1	73.9	72.7	-12	-3
Hardware-Only ASP	9.5	6.9	7.0	17.5	19.5	11.8	11.7	11.8	11.8	12.0	20	-9
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	6	4	5	3	5	5	6	6	7	8	-1	8
CPU Revenue	4	3	4	2	5	5	5	6	7	8	4	9
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-16	-38
Peripheral Revenue (Turnkey)	1	0	1	0	0	0	0	0	0	0	-55	-8
Software Revenue	5	2	3	2	3	4	5	6	7	7	-11	20
Bundled	3	1	1	0	1	1	1	1	1	1	-34	8
Unbundled	1	1	2	1	2	3	4	5	6	6	15	23
Service Revenue	1	1	1	1	2	2	3	3	3	4	18	10
Total Factory Revenue	11	7	9	5	11	11	13	15	17	19	-2	12
Increase over Prior Year (%)	55	-39	27	-39	98	2	20	17	13	10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 63
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Singapore
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	730	665	1,202	1,206	1,948	2,900	3,300	3,700	4,300	4,800	28	20
Unit Shipments or Seats	861	741	1,296	1,268	1,991	3,100	3,500	3,900	4,400	4,900	23	20
CPU Installed Base	1,006	1,649	2,776	3,795	5,368	7,600	10,100	12,700	15,500	18,200	52	28
Installed Seats	1,312	2,030	3,246	4,312	5,900	8,300	10,800	13,500	16,300	19,000	46	26
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	154.6	144.9	122.2	72.4	49.2	42.8	39.6	37.0	34.8	33.1	-25	-8
Hardware-Only ASP	7.3	9.4	8.0	14.4	12.3	11.8	11.3	10.9	10.7	10.5	14	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	13	12	15	23	29	39	42	44	49	53	22	13
CPU Revenue	9	8	13	20	26	33	36	40	44	50	29	14
Terminal Revenue	2	2	2	1	1	4	4	3	3	2	-23	24
Peripheral Revenue (Turnkey)	1	2	1	2	2	2	2	2	2	2	11	-0
Software Revenue	4	3	8	17	26	30	35	39	45	51	60	14
Bundled	3	3	3	5	7	7	8	8	9	9	19	6
Unbundled	1	1	5	12	19	23	27	31	36	42	139	17
Service Revenue	3	3	7	13	16	18	20	23	26	29	53	13
Total Factory Revenue	20	18	31	52	70	88	97	107	120	134	38	14
Increase over Prior Year (%)	3	-6	67	70	35	24	11	10	12	12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 64
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Singapore
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	85	78	277	602	887	900	1,100	1,300	1,500	1,700	80	14
Unit Shipments or Seats	85	78	277	602	887	900	1,100	1,300	1,500	1,700	80	14
CPU Installed Base	237	304	558	1,121	1,946	2,800	3,700	4,600	5,600	6,600	69	28
Installed Seats	237	304	558	1,121	1,946	2,800	3,700	4,600	5,600	6,600	69	28
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	69.5	82.0	96.0	62.0	46.8	44.5	42.2	40.1	38.2	36.6	-9	-5
Hardware-Only ASP	19.6	41.9	20.1	23.3	23.5	23.0	22.8	22.5	22.3	22.0	5	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	4	8	16	21	21	24	27	31	35	61	11
CPU Revenue	3	3	7	15	20	20	23	26	30	34	66	11
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	1	1	1	1	1	1	1	1	1	21	-4
Software Revenue	2	2	7	14	20	21	24	28	32	37	78	13
Bundled	2	2	2	4	6	6	6	6	7	7	39	4
Unbundled	0	0	5	10	14	15	18	22	25	30	140	16
Service Revenue	1	2	6	11	14	15	17	20	23	26	103	13
Total Factory Revenue	6	8	21	41	55	57	66	75	86	98	74	12
Increase over Prior Year (%)	-14	28	167	102	34	3	15	14	14	14		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 65
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Singapore
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	38	30	12	12	9	30	20	20	20	20	-31	18
Unit Shipments or Seats	169	106	106	73	52	200	200	200	100	100	-26	14
CPU Installed Base	57	87	98	107	107	100	100	100	100	100	17	-1
Installed Seats	364	468	568	624	639	800	900	900	1,000	1,000	15	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	641.7	995.2	479.4	412.2	372.6	394.3	380.2	371.3	354.3	343.5	-13	-2
Hardware-Only ASP	109.3	117.9	420.0	334.6	276.8	347.6	329.5	312.7	297.0	280.5	26	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	8	6	5	4	2	9	8	7	6	5	-26	17
CPU Revenue	5	4	3	2	2	5	4	4	3	3	-27	13
Terminal Revenue	2	2	2	1	1	4	4	3	3	2	-23	24
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-35	10
Software Revenue	2	1	1	1	0	1	1	1	1	1	-29	11
Bundled	2	1	1	1	0	1	1	1	1	0	-32	5
Unbundled	0	NA	NA	0	0	1	0	0	0	0	37	31
Service Revenue	2	2	1	1	1	2	2	1	1	1	-24	13
Total Factory Revenue	12	9	7	6	4	12	11	9	8	7	-26	16
Increase over Prior Year (%)	4	-26	-24	-16	-37	246	-13	-16	-9	-9		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 66
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Singapore
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	17	16	20	20	20	20	20	30	NA	8
Unit Shipments or Seats	NA	NA	17	16	20	20	20	20	20	30	NA	8
CPU Installed Base	NA	NA	17	33	52	100	100	100	100	100	NA	14
Installed Seats	NA	NA	17	33	52	100	100	100	100	100	NA	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	75.2	109.1	69.9	62.5	60.0	57.2	54.0	53.2	NA	-5
Hardware-Only ASP	NA	NA	37.3	63.7	67.9	75.7	74.3	72.6	71.2	69.6	NA	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	1	1	1	1	1	1	1	2	NA	6
CPU Revenue	NA	NA	1	1	1	1	1	1	1	2	NA	8
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	0	0	0	0	0	0	0	0	NA	-39
Software Revenue	NA	NA	0	0	2	1	1	1	1	1	NA	-2
Bundled	NA	NA	0	0	0	0	0	0	0	0	NA	1
Unbundled	NA	NA	NA	0	1	1	1	1	1	1	NA	-3
Service Revenue	NA	NA	0	0	1	1	1	1	1	1	NA	1
Total Factory Revenue	NA	NA	1	1	4	3	4	4	4	4	NA	1
Increase over Prior Year (%)	NA	NA	NA	30	163	-13	4	6	4	7		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 67
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Singapore
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	608	557	895	577	1,032	2,000	2,200	2,400	2,800	3,100	14	25
Unit Shipments or Seats	608	557	895	577	1,032	2,000	2,200	2,400	2,800	3,100	14	25
CPU Installed Base	711	1,258	2,102	2,534	3,263	4,700	6,200	7,900	9,700	11,400	46	28
Installed Seats	711	1,258	2,102	2,534	3,263	4,700	6,200	7,900	9,700	11,400	46	28
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	31.7	28.0	22.0	16.5	15.3	14.7	13.9	13.3	NA	-10
Hardware-Only ASP	2.3	3.0	2.1	3.4	3.4	3.5	3.5	3.6	3.6	3.5	10	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1	2	2	2	4	7	8	9	10	11	29	24
CPU Revenue	1	2	2	2	4	7	8	9	10	11	28	25
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	1	1	1	0	0	45	17
Software Revenue	0	0	0	2	4	7	8	9	10	12	125	27
Bundled	NA	NA	0	0	0	1	1	1	1	1	NA	39
Unbundled	0	0	0	1	3	6	7	8	9	11	122	26
Service Revenue	0	0	0	0	0	0	1	1	1	1	13	42
Total Factory Revenue	2	2	3	4	8	15	17	19	22	24	46	26
Increase over Prior Year (%)	186	21	25	51	101	97	13	12	14	12		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 68
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: Singapore
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	221	234	423	400	620	1,000	1,100	1,200	1,400	1,600	30	21
Unit Shipments or Seats	314	281	488	442	649	1,100	1,200	1,300	1,500	1,700	20	21
CPU Installed Base	374	594	984	1,312	1,801	2,600	3,400	4,200	5,100	6,000	48	27
Installed Seats	619	886	1,335	1,694	2,186	3,100	3,900	4,800	5,700	6,500	37	24
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	184.8	252.0	140.7	84.4	59.2	52.6	49.7	47.0	45.4	43.8	-25	-6
Hardware-Only ASP	10.5	13.5	7.2	10.2	12.8	13.2	12.7	12.0	11.3	10.8	5	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	8	7	6	6	10	16	16	16	17	19	6	14
CPU Revenue	6	4	4	5	8	12	13	14	15	16	11	14
Terminal Revenue	1	1	1	1	1	2	2	2	2	2	-23	26
Peripheral Revenue (Turnkey)	1	1	1	1	1	1	1	1	1	1	-2	6
Software Revenue	2	2	2	3	8	10	11	12	14	16	40	14
Bundled	2	2	1	2	3	3	3	3	3	3	7	5
Unbundled	0	0	0	2	6	7	8	9	10	12	162	17
Service Revenue	2	2	2	3	4	5	5	5	6	7	19	12
Total Factory Revenue	12	10	10	12	22	31	32	34	37	41	16	14
Increase over Prior Year (%)	-4	-13	-5	23	81	41	6	5	9	11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 69
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: Singapore
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	153	209	275	67	257	300	400	400	500	600	14	18
Unit Shipments or Seats	169	218	285	73	261	300	400	400	500	600	11	18
CPU Installed Base	165	373	639	672	846	1,000	1,200	1,400	1,800	2,100	51	20
Installed Seats	190	407	683	721	897	1,100	1,200	1,500	1,800	2,100	47	19
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	156.0	105.0	104.6	75.0	50.2	31.9	29.5	27.4	24.8	23.3	-25	-14
Hardware-Only ASP	5.4	5.4	3.4	7.0	4.5	4.1	4.1	4.1	4.2	4.2	-4	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	2	1	1	2	2	2	3	3	3	2	12
CPU Revenue	1	1	1	1	2	2	2	2	3	3	7	13
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-32	8
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-2	0
Software Revenue	0	0	0	0	2	2	2	3	3	3	49	15
Bundled	0	0	0	0	1	1	1	1	1	2	32	11
Unbundled	0	0	0	0	1	1	1	1	2	2	100	18
Service Revenue	0	1	1	0	1	1	1	1	1	1	16	10
Total Factory Revenue	2	3	2	1	4	5	5	6	7	8	15	13
Increase over Prior Year (%)	93	18	-14	-39	187	11	15	14	13	12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 70
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: Singapore
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	83	21	98	312	519	900	1,100	1,200	1,400	1,600	58	25
Unit Shipments or Seats	92	28	105	322	527	1,000	1,100	1,200	1,400	1,600	55	25
CPU Installed Base	90	110	203	501	992	1,900	2,900	3,900	4,900	5,800	82	42
Installed Seats	106	134	233	541	1,038	2,000	3,000	4,000	5,100	6,000	77	42
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	140.5	61.6	73.8	70.2	38.4	33.6	30.8	28.8	27.6	26.6	-28	-7
Hardware-Only ASP	6.4	31.8	4.5	20.7	13.2	10.9	9.8	9.0	8.6	8.2	20	-9
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1	1	1	8	8	11	12	12	13	14	76	12
CPU Revenue	1	1	1	8	8	10	10	11	12	13	90	11
Terminal Revenue	0	0	0	0	0	2	1	1	1	1	-12	39
Peripheral Revenue (Turnkey)	0	0	0	1	0	0	0	0	0	0	38	-2
Software Revenue	0	0	0	6	8	9	10	11	12	14	179	12
Bundled	0	0	0	2	2	2	2	2	2	3	107	7
Unbundled	0	0	0	4	6	7	8	9	10	11	277	13
Service Revenue	0	0	0	4	4	4	5	5	6	7	119	9
Total Factory Revenue	1	1	2	18	20	24	26	28	31	34	105	11
Increase over Prior Year (%)	67	18	10	1131	9	20	7	7	11	11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 71
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Singapore
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	274	202	405	427	552	600	800	900	1,000	1,100	19	15
Unit Shipments or Seats	287	214	418	430	554	600	800	900	1,000	1,100	18	15
CPU Installed Base	378	572	950	1,310	1,731	2,200	2,600	3,200	3,800	4,300	46	20
Installed Seats	397	603	994	1,356	1,779	2,200	2,700	3,200	3,800	4,400	46	20
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	89.9	88.6	120.3	62.5	53.7	53.3	50.3	48.5	47.6	47.3	-12	-3
Hardware-Only ASP	6.5	7.6	13.0	15.6	14.7	14.0	14.4	14.9	15.4	16.1	23	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	2	7	8	9	10	12	14	16	18	38	14
CPU Revenue	2	2	6	7	9	9	11	13	15	17	43	15
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-24	-37
Peripheral Revenue (Turnkey)	0	0	0	0	1	1	1	1	0	0	34	-7
Software Revenue	1	1	6	7	8	10	12	14	16	18	59	18
Bundled	1	1	1	1	1	1	1	1	1	1	10	1
Unbundled	0	0	5	6	7	8	10	12	14	17	103	20
Service Revenue	1	1	4	6	7	8	10	12	13	15	95	16
Total Factory Revenue	4	4	17	20	24	28	33	39	45	51	54	16
Increase over Prior Year (%)	-10	-4	317	18	20	15	18	18	15	13		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 72
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Singapore
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	167	81	155	205	270	300	400	400	500	600	13	17
Unit Shipments or Seats	171	85	159	205	271	300	400	400	500	600	12	17
CPU Installed Base	220	297	438	604	806	1,000	1,300	1,600	1,900	2,200	38	22
Installed Seats	224	305	450	617	819	1,000	1,300	1,600	1,900	2,200	38	22
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	74.5	58.0	127.1	62.2	49.9	47.8	46.5	45.0	44.0	43.5	-10	-3
Hardware-Only ASP	5.3	7.8	16.9	18.9	14.4	13.7	14.1	14.6	15.3	16.2	28	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1	1	3	4	5	5	6	7	8	9	41	15
CPU Revenue	1	1	3	4	4	4	5	6	8	9	43	17
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-31	-100
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	51	-7
Software Revenue	1	0	3	4	5	6	6	7	8	9	67	15
Bundled	0	0	1	1	1	1	1	1	1	1	14	-3
Unbundled	0	0	2	4	4	5	6	7	7	9	115	17
Service Revenue	0	0	2	4	4	4	5	6	7	7	103	14
Total Factory Revenue	2	1	8	12	13	15	17	20	23	26	60	15
Increase over Prior Year (%)	-17	-30	495	49	7	15	16	15	13	14		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 73
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Singapore
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	2	2	82	42	55	100	100	100	100	200	120	29
Unit Shipments or Seats	4	3	83	42	55	100	100	100	100	200	92	29
CPU Installed Base	32	32	110	146	190	200	300	400	500	600	57	26
Installed Seats	34	35	113	149	194	300	300	400	500	600	55	25
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	69.3	55.1	123.9	58.1	50.6	49.4	47.1	46.3	44.9	45.2	-8	-2
Hardware-Only ASP	94.9	42.4	18.7	31.0	27.7	25.6	26.2	26.6	27.2	27.7	-26	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	0	0	2	1	2	2	2	3	4	4	77	22
CPU Revenue	0	0	2	1	1	2	2	3	4	4	87	23
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-29	-100
Peripheral Revenue (Turnkey)	NA	0	NA	0	0	0	0	0	0	0	NA	-7
Software Revenue	0	0	2	1	1	2	2	3	4	4	120	30
Bundled	0	0	1	0	0	0	0	0	0	0	48	6
Unbundled	0	0	2	1	1	1	2	3	3	4	215	33
Service Revenue	0	0	2	1	1	2	2	3	4	5	161	26
Total Factory Revenue	0	0	6	4	4	5	7	9	11	13	104	26
Increase over Prior Year (%)	-75	-21	2974	-39	16	28	33	30	22	18		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 74
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Singapore
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	104	118	168	181	226	200	300	300	400	400	21	12
Unit Shipments or Seats	112	125	176	183	229	200	300	300	400	400	19	12
CPU Installed Base	127	243	403	560	734	900	1,000	1,200	1,400	1,600	55	17
Installed Seats	139	263	431	590	766	900	1,100	1,200	1,400	1,600	53	16
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	109.0	109.8	107.4	66.9	64.1	68.1	61.3	58.7	58.1	57.3	-12	-2
Hardware-Only ASP	7.2	7.2	6.8	9.2	12.1	11.3	11.2	11.2	11.1	11.3	14	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1	1	2	2	3	3	3	4	4	4	27	7
CPU Revenue	1	1	1	2	3	3	3	4	4	4	33	8
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-20	-32
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-5	-9
Software Revenue	1	1	1	1	2	3	3	4	4	4	38	15
Bundled	0	1	0	0	0	0	0	0	0	0	-1	2
Unbundled	0	0	1	1	2	2	3	3	4	4	73	17
Service Revenue	0	0	1	1	2	2	2	3	3	3	68	9
Total Factory Revenue	2	3	3	5	7	8	9	10	11	12	37	10
Increase over Prior Year (%)	42	22	25	44	58	9	11	13	10	8		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 75
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Taiwan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,591	1,593	1,986	1,042	4,418	4,200	4,800	5,500	6,200	6,900	29	9
Unit Shipments or Seats	1,829	1,710	2,132	1,107	4,468	4,400	5,000	5,600	6,300	7,000	25	9
CPU Installed Base	2,203	3,747	5,562	6,193	9,813	12,700	15,900	19,400	23,100	26,600	45	22
Installed Seats	2,796	4,453	6,404	7,071	10,684	13,700	16,800	20,300	24,000	27,400	40	21
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	140.4	120.7	125.2	83.4	61.3	51.6	48.6	45.8	43.4	41.8	-19	-7
Hardware-Only ASP	6.9	8.3	5.8	17.9	7.8	11.5	11.1	10.8	10.6	10.7	3	7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	27	26	21	24	41	54	59	64	71	78	11	14
CPU Revenue	21	19	16	21	37	47	52	58	64	72	16	14
Terminal Revenue	4	3	3	1	1	4	3	3	2	2	-26	13
Peripheral Revenue (Turnkey)	2	4	2	2	3	3	3	4	4	4	5	10
Software Revenue	13	8	7	14	33	39	46	52	60	68	27	15
Bundled	9	6	5	4	6	6	7	7	7	7	-8	3
Unbundled	4	3	2	10	27	33	39	45	52	61	60	18
Service Revenue	6	8	8	10	15	20	23	26	29	33	23	18
Total Factory Revenue	46	42	36	48	89	114	127	142	160	180	18	15
Increase over Prior Year (%)	17	-9	-16	35	84	28	12	12	12	13		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (August 1994)

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Table 76
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Taiwan
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	354	242	173	441	830	1,100	1,300	1,600	1,800	2,100	24	20
Unit Shipments or Seats	354	242	173	441	830	1,100	1,300	1,600	1,800	2,100	24	20
CPU Installed Base	686	905	1,019	1,359	2,040	3,000	4,100	5,300	6,600	8,000	31	31
Installed Seats	686	905	1,019	1,359	2,040	3,000	4,100	5,300	6,600	8,000	31	31
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	74.9	75.3	87.9	67.3	59.5	55.0	52.0	49.4	47.4	45.7	-6	-5
Hardware-Only ASP	14.6	27.3	24.1	24.3	24.0	23.6	23.5	23.3	23.2	23.0	13	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	10	11	7	13	21	28	32	37	43	49	22	18
CPU Revenue	8	8	6	11	19	26	30	34	40	46	23	19
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	3	2	1	2	2	2	3	3	3	13	10
Software Revenue	9	6	5	12	20	27	32	37	42	49	22	19
Bundled	5	3	3	3	5	5	5	5	5	5	-1	1
Unbundled	4	2	2	8	15	22	27	31	37	43	41	23
Service Revenue	3	5	4	8	12	15	18	21	25	29	46	19
Total Factory Revenue	22	21	16	32	54	70	82	95	110	126	26	19
Increase over Prior Year (%)	31	-2	-25	101	68	30	17	16	15	15		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 77
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Taiwan
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	56	50	29	24	22	30	30	30	20	20	-20	-2
Unit Shipments or Seats	293	167	175	89	73	200	200	200	100	100	-29	7
CPU Installed Base	92	142	168	187	196	200	200	200	200	200	21	0
Installed Seats	684	848	1,010	1,064	1,066	1,200	1,200	1,100	1,100	1,000	12	-1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	647.1	947.6	477.8	520.3	597.4	556.9	512.3	470.5	430.8	397.4	-2	-8
Hardware-Only ASP	121.1	129.6	258.5	231.1	200.6	280.8	265.7	251.3	238.0	225.9	13	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	15	11	9	7	5	10	9	7	6	6	-22	2
CPU Revenue	10	7	6	5	4	6	5	4	4	4	-20	-2
Terminal Revenue	4	3	3	1	1	4	3	3	2	2	-26	13
Peripheral Revenue (Turnkey)	1	1	1	0	0	0	0	0	0	0	-42	7
Software Revenue	3	2	1	1	1	2	1	1	1	1	-35	10
Bundled	3	2	1	1	0	1	1	1	1	1	-40	4
Unbundled	0	NA	NA	0	0	1	1	1	0	0	63	24
Service Revenue	4	3	2	2	1	2	2	2	2	2	-22	1
Total Factory Revenue	22	17	13	9	7	13	12	10	9	8	-24	3
Increase over Prior Year (%)	-1	-23	-24	-26	-23	86	-12	-14	-12	-7		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 78
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Taiwan
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	36	37	44	100	100	100	100	100	NA	18
Unit Shipments or Seats	NA	NA	36	37	44	100	100	100	100	100	NA	18
CPU Installed Base	NA	NA	36	73	114	200	200	300	400	400	NA	28
Installed Seats	NA	NA	36	73	114	200	200	300	400	400	NA	28
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	79.7	108.8	70.7	76.2	72.7	70.0	65.8	64.7	NA	-2
Hardware-Only ASP	NA	NA	37.2	69.1	72.7	79.8	78.1	76.7	75.1	73.6	NA	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	1	3	3	6	6	6	7	7	NA	20
CPU Revenue	NA	NA	1	2	3	6	6	6	7	7	NA	22
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	0	0	0	0	0	0	0	0	NA	-35
Software Revenue	NA	NA	0	0	1	1	1	1	1	1	NA	1
Bundled	NA	NA	0	0	0	0	0	0	0	0	NA	-12
Unbundled	NA	NA	NA	0	1	1	1	1	1	1	NA	5
Service Revenue	NA	NA	1	1	1	2	2	2	2	2	NA	15
Total Factory Revenue	NA	NA	2	4	5	9	9	10	10	11	NA	15
Increase over Prior Year (%)	NA	NA	NA	46	45	72	2	5	4	7		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (August 1994)

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Table 79
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
Region: Taiwan
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	1,182	1,300	1,748	540	3,521	3,000	3,400	3,800	4,200	4,700	31	6
Unit Shipments or Seats	1,182	1,300	1,748	540	3,521	3,000	3,400	3,800	4,200	4,700	31	6
CPU Installed Base	1,425	2,700	4,339	4,574	7,463	9,400	11,300	13,600	15,900	18,000	51	19
Installed Seats	1,425	2,700	4,339	4,574	7,463	9,400	11,300	13,600	15,900	18,000	51	19
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	31.7	23.1	21.3	21.0	19.9	19.2	18.4	17.8	NA	-4
Hardware-Only ASP	2.4	3.1	2.1	3.6	3.2	3.3	3.3	3.3	3.3	3.3	7	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	4	4	2	12	11	12	14	15	16	43	7
CPU Revenue	3	4	4	2	12	10	11	13	14	16	43	6
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	1	1	1	1	1	29	23
Software Revenue	0	0	1	1	11	10	12	13	15	17	172	9
Bundled	NA	NA	0	0	0	1	1	1	1	1	NA	30
Unbundled	0	0	1	1	11	9	11	12	14	16	171	8
Service Revenue	0	0	0	0	0	0	0	1	1	1	6	28
Total Factory Revenue	3	5	5	4	23	21	24	27	31	34	64	8
Increase over Prior Year (%)	166	46	2	-26	543	-8	14	13	13	10		

NA = Not applicable

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 80
CAD/CAM/CAE/GIS History and Forecast Update

Application: Mechanical
Region: Taiwan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	421	454	829	473	1,829	1,500	1,600	1,800	1,900	2,100	44	3
Unit Shipments or Seats	595	532	936	533	1,872	1,700	1,800	1,900	2,000	2,200	33	3
CPU Installed Base	732	1,160	1,921	2,252	3,822	4,900	6,000	7,000	7,900	8,800	51	18
Installed Seats	1,212	1,716	2,574	2,941	4,507	5,700	6,700	7,700	8,600	9,400	39	16
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	189.3	223.2	149.6	92.7	64.2	55.1	52.1	49.3	47.4	45.8	-24	-7
Hardware-Only ASP	8.9	11.8	6.3	13.9	7.1	15.8	15.2	14.4	13.5	13.0	-5	13
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	14	13	12	11	17	28	28	28	29	30	5	12
CPU Revenue	10	9	9	9	15	23	24	24	26	27	10	12
Terminal Revenue	3	2	2	1	1	3	2	2	2	2	-26	16
Peripheral Revenue (Turnkey)	1	2	1	1	1	2	1	1	1	1	-1	2
Software Revenue	4	3	3	5	14	16	17	18	20	22	36	9
Bundled	4	3	3	3	5	5	5	5	5	5	5	1
Unbundled	0	0	0	2	10	11	12	13	15	17	174	12
Service Revenue	4	4	4	5	6	8	9	9	10	11	12	14
Total Factory Revenue	22	20	19	21	37	52	53	56	59	63	14	11
Increase over Prior Year (%)	-13	-9	-7	11	79	39	3	4	6	7		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 81
CAD/CAM/CAE/GIS History and Forecast Update

Application: AEC
Region: Taiwan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	294	411	537	93	1,452	1,400	1,600	1,900	2,100	2,300	49	10
Unit Shipments or Seats	323	425	550	99	1,458	1,400	1,600	1,900	2,100	2,300	46	10
CPU Installed Base	334	743	1,260	1,282	2,568	3,600	4,800	6,200	7,500	8,800	66	28
Installed Seats	382	804	1,334	1,360	2,649	3,700	4,900	6,200	7,600	8,800	62	27
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	158.2	82.9	84.6	56.3	55.1	40.2	37.7	34.8	32.0	30.8	-23	-11
Hardware-Only ASP	4.6	5.1	3.2	7.2	3.5	4.0	4.0	4.0	4.0	4.0	-7	3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	3	3	1	6	6	7	8	9	10	20	12
CPU Revenue	2	2	2	1	6	6	7	8	9	10	27	12
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-30	-6
Peripheral Revenue (Turnkey)	0	1	0	0	0	0	0	0	0	0	-9	5
Software Revenue	1	1	1	1	5	6	7	8	9	10	68	15
Bundled	1	1	0	0	1	1	1	1	1	1	4	9
Unbundled	0	0	0	0	4	5	6	7	8	9	181	16
Service Revenue	1	1	1	0	1	1	1	2	2	2	3	23
Total Factory Revenue	4	5	4	2	12	13	15	18	20	22	29	14
Increase over Prior Year (%)	49	21	-13	-47	403	13	16	15	13	11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 82
CAD/CAM/CAE/GIS History and Forecast Update

Application: GIS/Mapping
Region: Taiwan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	199	46	157	42	481	500	600	700	800	900	25	13
Unit Shipments or Seats	215	58	167	46	488	500	600	700	800	900	23	13
CPU Installed Base	222	266	410	416	830	1,200	1,700	2,200	2,700	3,300	39	32
Installed Seats	253	309	463	471	890	1,300	1,800	2,300	2,900	3,400	37	31
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	126.6	61.1	73.3	72.5	56.4	45.0	42.2	40.9	38.5	37.9	-18	-8
Hardware-Only ASP	4.5	19.9	4.6	23.5	6.3	11.5	10.0	9.1	8.4	8.1	9	5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	1	2	2	4	6	7	7	7	8	26	17
CPU Revenue	1	1	1	1	3	5	6	6	7	7	33	17
Terminal Revenue	0	0	0	0	0	1	1	1	0	0	-21	29
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	15	10
Software Revenue	0	0	1	1	4	4	5	6	7	7	93	15
Bundled	0	0	0	1	0	0	0	0	1	1	13	9
Unbundled	0	0	0	0	3	4	4	5	6	7	187	15
Service Revenue	0	1	1	1	1	2	2	2	3	3	41	19
Total Factory Revenue	2	3	3	3	9	12	14	15	17	19	43	16
Increase over Prior Year (%)	25	19	28	-5	188	37	11	10	12	13		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 83
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Taiwan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	677	681	464	434	656	800	1,000	1,200	1,400	1,600	-1	20
Unit Shipments or Seats	696	695	479	429	650	800	1,000	1,200	1,400	1,600	-2	20
CPU Installed Base	916	1,578	1,971	2,245	2,593	2,900	3,400	4,000	4,900	5,800	30	17
Installed Seats	949	1,624	2,032	2,298	2,638	3,000	3,400	4,100	4,900	5,800	29	17
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	91.5	73.2	138.8	69.3	55.0	51.3	49.5	47.5	46.5	46.4	-12	-3
Hardware-Only ASP	7.7	7.7	8.2	23.0	20.6	17.1	17.5	17.9	18.3	19.0	28	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	8	8	5	10	14	14	18	21	25	30	14	16
CPU Revenue	7	7	4	10	13	13	16	19	23	27	16	16
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-26	-41
Peripheral Revenue (Turnkey)	1	1	1	0	1	1	2	2	2	2	17	17
Software Revenue	8	4	2	8	10	14	17	20	24	28	6	23
Bundled	4	1	1	0	0	0	1	1	1	1	-44	4
Unbundled	4	2	1	7	10	13	16	20	23	27	26	23
Service Revenue	2	3	2	4	7	8	10	13	15	18	38	20
Total Factory Revenue	18	15	9	22	31	36	45	54	64	75	15	19
Increase over Prior Year (%)	86	-19	-36	138	40	17	24	21	18	18		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 84
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Taiwan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	418	400	146	266	386	500	600	700	800	1,000	-2	21
Unit Shipments or Seats	422	403	149	260	379	500	600	700	800	1,000	-3	21
CPU Installed Base	560	947	1,049	1,213	1,416	1,600	1,900	2,400	2,900	3,500	26	20
Installed Seats	568	958	1,064	1,222	1,418	1,600	1,900	2,400	2,900	3,500	26	20
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	83.9	64.4	132.1	62.7	50.1	45.3	43.6	42.4	41.5	41.1	-12	-4
Hardware-Only ASP	6.1	7.1	11.8	21.7	18.8	15.2	15.8	16.4	17.1	18.1	32	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	4	4	2	6	8	8	10	12	15	18	18	19
CPU Revenue	4	4	2	6	7	6	8	10	13	16	17	19
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-31	-100
Peripheral Revenue (Turnkey)	0	0	0	0	1	1	1	2	2	2	38	18
Software Revenue	4	2	1	4	6	8	10	11	14	16	8	22
Bundled	2	1	0	0	0	0	0	0	0	0	-42	2
Unbundled	2	1	0	4	6	8	9	11	13	16	26	22
Service Revenue	1	1	1	2	4	4	5	6	7	9	41	20
Total Factory Revenue	9	8	4	13	17	20	24	29	35	43	16	20
Increase over Prior Year (%)	99	-18	-50	229	35	14	24	21	21	21		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 85
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Taiwan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	36	18	13	81	143	200	200	300	300	300	41	16
Unit Shipments or Seats	37	18	12	79	140	200	200	300	300	300	39	16
CPU Installed Base	49	67	75	151	282	500	700	900	1,100	1,300	55	36
Installed Seats	52	69	77	150	279	500	700	900	1,100	1,300	52	36
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	101.8	66.0	343.3	57.6	61.9	55.6	58.8	61.2	53.8	56.2	-12	-2
Hardware-Only ASP	23.5	36.5	33.4	35.7	28.9	25.5	26.0	26.5	27.1	27.6	5	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1	1	1	3	4	5	6	7	8	9	42	16
CPU Revenue	1	1	0	3	4	5	6	7	8	9	46	16
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-36	-100
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-29	-100
Software Revenue	1	0	0	2	3	4	6	7	8	9	33	24
Bundled	0	0	0	0	0	0	0	0	0	0	-50	0
Unbundled	0	0	0	2	3	4	6	7	8	9	58	25
Service Revenue	0	0	0	1	3	3	4	5	6	7	77	22
Total Factory Revenue	2	1	1	7	10	13	16	19	22	25	44	21
Increase over Prior Year (%)	280	-39	-18	483	47	31	24	20	15	13		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
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Table 86
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Taiwan
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1989-1993	CAGR (%) 1993-1998
HARDWARE SHIPMENT DATA												
CPU Shipments	224	263	305	87	128	100	200	200	200	300	-13	19
Unit Shipments or Seats	237	274	317	89	131	100	200	200	200	300	-14	18
CPU Installed Base	306	564	847	880	896	800	800	800	900	1,000	31	2
Installed Seats	329	597	892	926	942	900	800	800	900	1,000	30	1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	100.0	89.1	129.2	78.9	74.3	73.5	71.4	66.8	66.3	65.8	-7	-2
Hardware-Only ASP	8.7	7.2	5.5	15.1	16.3	11.4	11.3	11.3	11.3	11.5	17	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	3	2	1	2	2	2	2	3	3	-9	6
CPU Revenue	3	2	2	1	2	2	2	2	3	3	-6	7
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-22	-37
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-47	0
Software Revenue	2	2	1	1	1	1	2	2	2	3	-19	22
Bundled	1	1	0	0	0	0	0	0	0	0	-44	8
Unbundled	1	1	1	1	1	1	2	2	2	3	-2	23
Service Revenue	1	1	1	1	1	1	1	1	2	2	5	14
Total Factory Revenue	6	5	4	3	4	4	5	6	7	8	-10	12
Increase over Prior Year (%)	46	-14	-21	-34	48	-8	23	19	16	15		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Note: All tables show estimated data.

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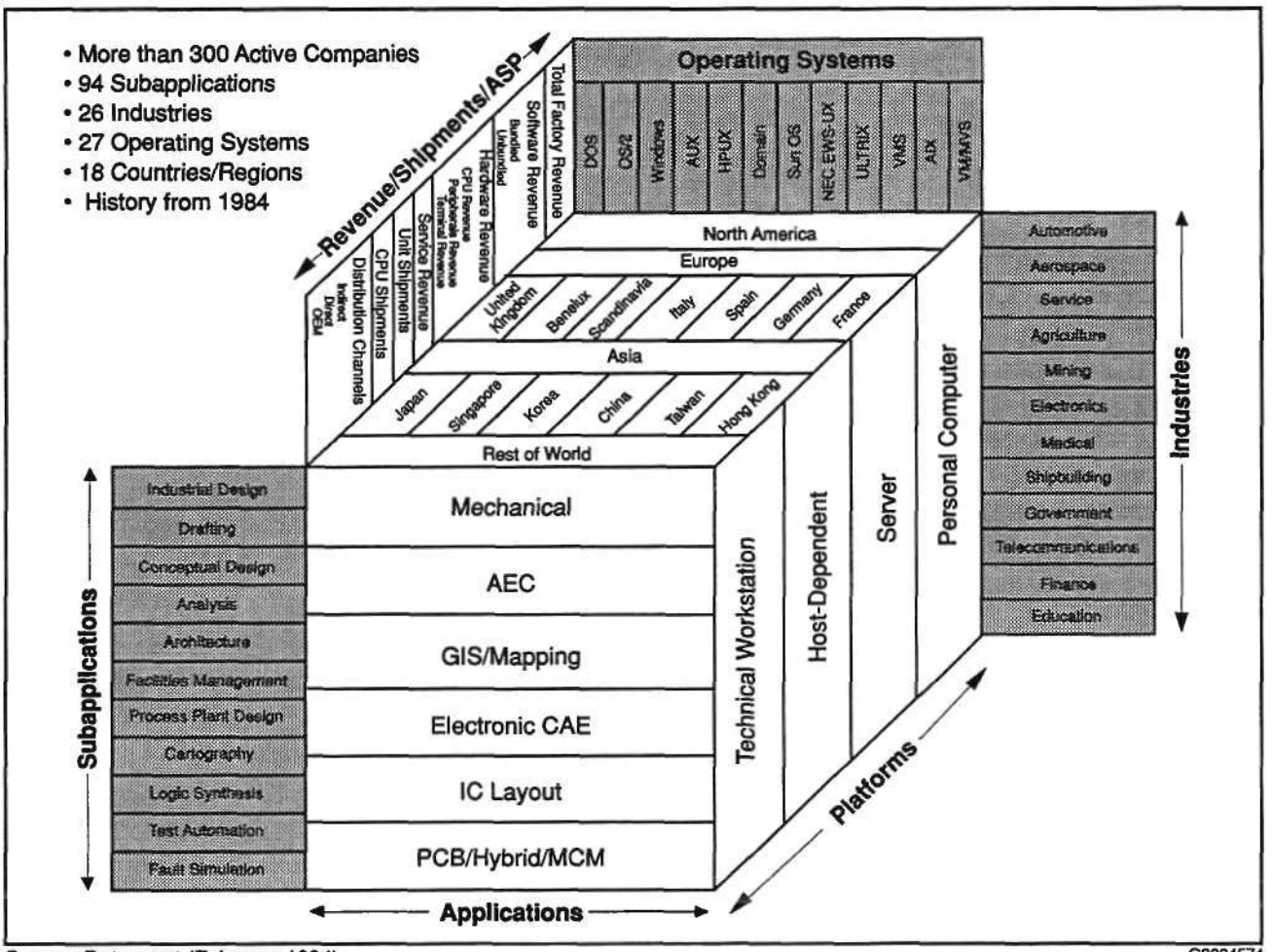
CAD/CAM/CAE and GIS Asia Market Share Update

Introduction

CAD/CAM/CAE/GIS systems have dramatically changed the methods by which designers and production managers originate and implement products. CAD and CAE systems allow designers to create, draft, analyze, test, and manipulate products on a screen in two and three dimensions. As CAD/CAM/CAE/GIS systems continue to decrease in cost, they become more available and cost justifiable to new users.

In order to provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure 1.

Figure 1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (February 1994)

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Table 1
CAD/CAM/CAE/GIS 1992-1993 Market Summary

	Software Revenue 1992 ($M)	Software Revenue 1993 ($M)	Growth Rate (%)	Total Revenue 1992 ($M)	Total Revenue 1993 ($M)	Growth Rate (%)	Hardware Unit Shipments 1992	Hardware Unit Shipments 1993	Growth Rate (%)
Application									
Mechanical	2,170.4	2,294.7	5.7	7,988.2	7,862.7	-1.6	302,347	303,364	0.3
AEC	746.9	794.1	6.3	2,356.5	2,444.0	3.7	178,629	198,075	10.9
GIS/Mapping	580.1	662.2	14.2	2,005.6	2,179.1	8.7	86,513	102,624	18.6
Electronic CAE	741.5	797.1	7.5	2,086.4	2,271.7	8.9	94,176	99,129	5.3
IC Layout	212.7	203.0	-4.6	628.4	676.4	7.6	9,771	13,049	33.5
PCB/Hybrid/MCM	265.9	271.2	2.0	870.9	900.2	3.4	35,110	38,030	8.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
Region									
North America	1,562.5	1,754.6	12.3	5,253.5	5,690.7	8.3	286,939	325,318	13.4
Europe	1,693.8	1,608.9	-5.0	5,755.5	5,432.7	-5.6	231,062	240,603	4.1
Asia	1,352.7	1,534.4	13.4	4,601.2	4,830.6	5.0	169,839	163,620	-3.7
Rest of World	108.5	124.3	14.6	325.9	380.2	16.7	18,706	24,730	32.2
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8
In Local Currencies									
Europe (ECU)	1,301.8	1,378.2	5.9	4,423.7	4,653.7	5.2			
Asia (yen)	170,895	170,093	-0.5	581,318	535,468	-7.9			
Platform									
Technical Workstation	3,060.1	3,312.8	8.3	9,640.0	10,458.3	8.5	173,705	194,848	12.2
Host-Dependent	360.2	306.1	-15.0	2,436.6	1,754.7	-28.0	34,524	28,573	-17.2
Server	140.0	176.2	25.9	906.3	1,056.8	16.6	11,566	13,381	15.7
Personal Computer	1,157.1	1,227.1	6.1	2,953.2	3,064.4	3.8	486,751	517,469	6.3
Total	4,717.4	5,022.2	6.5	15,936.0	16,334.2	2.5	706,546	754,271	6.8

Source: Dataquest (July 1994)

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A companion article analyzing major shifts in the 1993 market was published in our *Dataquest Perspective,* dated June 27, 1994.

Table 1 summarizes the performance in various segments of the CAD/CAM/CAE/GIS markets in 1993 versus 1992. With the devaluation of the dollar against the yen (¥126.34/$ in 1992 versus ¥110.85/$ in 1993) and the appreciation of the dollar against the ECU (ECU 0.7686/$ in 1992 versus ECU 0.8566/$ in 1993), actual growth is not as it appears when denominated in U.S. dollars. With 75 percent of the Asian market in Japan, denominating in yen gives a rough indication of real growth in the Asian market, which was a negative 7.9 percent.

About This Document

This document contains Dataquest's detailed market share information on the CAD/CAM/CAE/GIS industry. We no longer publish worldwide all-application market statistics for the entire CAD/CAM/CAE/GIS industry. This data is available by calling Suzanne Snygg at (408) 437-8241. The category "Other Companies" is the aggregation of small companies. More detailed data on these markets may be requested through our Client Inquiry service.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality-control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

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Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic Computer-Aided Engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of products). Schematic capture and simulation are examples of electronic CAE applications.
- IC Layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/Hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe. Market share data is available for each of these countries.

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong. Market share data is available for each of these countries.

Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed

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by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

Metrics

The following paragraphs define measurements.

- Total factory revenue is defined as the amount of money received by a manufacturer for its goods and services measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue). Total factory revenue is the sum of software revenue, hardware revenue, and service revenue.
- Unit shipment is defined as the number of seats delivered (number of possible simultaneous users of product delivered) excluding OEM shipments.

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- Hardware revenue is revenue derived from sales of CPUs (including operating systems), terminals (for host-dependent systems), and peripherals.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled application software.
- Service revenue is defined as all revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
  - Maintenance fees for hardware and software
  - Management and operations services—help desk, education and training, disaster recovery, vaulting, and configuration management.
  - Service bureau—project work, including construction of database, data conversion, product design, analysis, or manufacturing.
  - Application development—design and development of customized software applications or the modification, enhancement, or customization of existing software applications, adding new functionality.
  - Consulting revenue—assessment of CAD/CAM/CAE/GIS business and information technology needs and the formulation of a plan based on needs identification.
  - Implementation and integration services—planning, implementation, migration, and integration of software products (software network support and integration, account integration management, data center design, and construction).

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year and second quarter of the subsequent year, we survey all participants in each industry. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contacts at large companies. (Dataquest maintains a large contact database on all sources of information.) The following are examples of the job titles of people contacted for information:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning

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- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE/GIS marketing programs
- Market research analyst

The Audit Process

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks
- Articles in both the general and trade press
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice; Dataquest also checks with multiple sources at one company to cross-check data on that company.

Dataquest analysts have many years of experience in how to apply the above tools to get the most accurate information possible on a particular company (such as what to use when and what industry averages are). We believe that the estimates presented here are the most accurate and meaningful generally available today. It is the CAD/CAM/CAE/GIS group's policy to continually update our market information for any year, based on any new data received, in order to arrive at the most accurate market representation possible.

Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

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Publishing Schedule

We publish both market share and forecasting twice each year, allowing for timely distribution of data and thorough analysis and forecasting. Our annual delivery schedule is as follows:

- Market share data is available January 31. All tables will be published and distributed to clients by March 31.
- Forecasting from the market share tables provides a five-year forecast period, available after March 31. The books will be shipped by May 31.
- Final updated market share tables, based on additional data collection and analysis, will be completed by May 31. At this point, the market share database is frozen and will not be changed until the end of the year. For the next six months, supplementary market data will be based on this final market data. Books will be shipped by July 31.
- We provide complete final forecast tables by July 31. These tables take into consideration changes in the market share during the previous six months. Books will be shipped by September 30.

Database Changes

Tables 2 through 5 show changes made to the database since last year's market share update. PC clone manufacturers are no longer tracked individually. We continue to show PC sales by IBM, Hewlett-Packard, and Digital, which also sell other platforms. The 1993 sales of GeoVision Systems to SHL Systemhouse, Computervision-GIS to Unisys, Racal-Redac to Zuken, Chronologic to Viewlogic, ASG to Softdesk, CDC's mechanical software product to ICEM Technologies, PDA to MacNeal-Schwendler, and Logic Modeling Corporation to Synopsys; the merger of Sysdeco and SysScan; and the change of GDS to Convergent Group will be recognized in market reporting for 1994.

Table 2
Companies Renamed

Company Name	Renamed to:
Alper Systems	Sysdeco Ltd.
Areon	Kreon
CADAM	Altium
Catalpa	Catalpa groupe Missler
Geotrace Technologies	Cadlynx
Logic Control	Logic Systems Designers
RIB/RZB	RIB Bausoftware
Sener Sistemas Marinos	Sener Inginiera y Sistemas
STI Strassle	Strassle Informationssysteme
Test Systems Strategies	Summitt

Source: Dataquest (July 1994)

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Table 3
Companies (or CAD Portions Thereof) Sold/Merged

Company Name	Acquired by, Merged with, Technology Sold to:
ANACAD & Electrical Eng. Software	ANACAD-EES
Aries Technology	MacNeal-Schwendler
CAD Language Systems	Compass Design Automation
CAD/CAM Group	Data I/O
Comdisco	Cadence
DAT Standard info ssystemes	ISD Software
EEsof	Hewlett-Packard
Expertest	Sunrise Test
Fides Industrielle Automation	Strassle
HP Cade	Hewlett-Packard
Inca	Zycad
Infocel	Understanding Systems
PiE Design	Quickturn Design Systems
Quad Design Technology	Viewlogic
Wisdom Systems	ICAD

Source: Dataquest (July 1994)

Table 4
Companies Deleted

Company Removed from Database:
European
Asicom
Club Informatico SA
DATAID Technologies
DECISA
Micrograph
Olivetti*
Research Machines*
North American
Bechtel
CADLYNX
Compaq*
Dell Computer*
Engineering Systems Corporation
GeoQuest
Mega CADD
NCR Microelectronics
Object Design
Objectivity
Ontos
Quicklogic
The CAD Group
Ultimap

*We no longer follow individual PC clone makers.
Source: Dataquest (July 1994)

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Table 5
Companies Added

Company Added to Database:
European
APIC Systemes
ISD Software
SPEED
Ultimate Technology
North American
AT&T
Aptix
ARC SYS
EAGLE Point
Earth Resource Mapping
Graftek
Graphic Data Systems (GDS)
Model Technology
Systems Science Inc.
Tactics Int'l Ltd.
VLSI Libraries
Asian
Adam Net
Kozo
Okura
Tachnodia
TECHSPERT
Toshiba Engineering
Yokogawa Digital Computer

Source: Dataquest (July 1994)

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Table 6
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Fujitsu	523.7	298.0	165.8	18,152	10.8%	11.7%	10.8%	11.1%
NEC	402.9	269.1	97.8	22,773	8.3%	10.6%	6.4%	13.9%
IBM	364.2	177.2	125.9	10,808	7.5%	6.9%	8.2%	6.6%
Nihon Unisys	266.1	156.4	56.1	1,220	5.5%	6.1%	3.7%	.7%
Sun Microsystems	223.7	178.0	.0	7,474	4.6%	7.0%	.0%	4.6%
Hewlett-Packard	196.1	134.1	25.0	5,696	4.1%	5.3%	1.6%	3.5%
Hitachi	187.9	88.3	80.8	7,870	3.9%	3.5%	5.3%	4.8%
Toshiba*	179.9	89.9	71.9	4,944	3.7%	3.5%	4.7%	3.0%
Digital	154.5	120.1	2.7	4,691	3.2%	4.7%	.2%	2.9%
Mitsubishi Electric	116.9	91.4	14.6	1,849	2.4%	3.6%	.9%	1.1%
Cadence	111.2	.0	71.9	0	2.3%	.0%	4.7%	.0%
Altium*	102.1	38.7	60.2	7,500	2.1%	1.5%	3.9%	4.6%
Seiko*	99.3	34.7	49.7	587	2.1%	1.4%	3.2%	.4%
Hitachi Zosen Info Systems	98.9	83.9	4.8	946	2.0%	3.3%	.3%	.6%
Zuken	96.0	27.7	45.8	545	2.0%	1.1%	3.0%	.3%
Mutoh Industries*	94.4	59.4	26.2	2,401	2.0%	2.3%	1.7%	1.5%
Computervision	90.2	18.8	45.4	870	1.9%	.7%	3.0%	.5%
C. Itoh Techno-Science*	86.0	26.6	52.5	897	1.8%	1.0%	3.4%	.5%
Technodia	78.9	63.6	.8	958	1.6%	2.5%	.1%	.6%
Sumisho Electronics*	75.6	53.3	19.3	1,475	1.6%	2.1%	1.3%	.9%
Info. Services Int'l. Dentsu*	72.0	5.0	50.4	124	1.5%	.2%	3.3%	.1%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Kozo Keikaku Engineering	71.9	3.6	18.6	134	1.5%	.1%	1.2%	.1%
SDRC	70.8	.0	48.3	0	1.5%	.0%	3.1%	.0%
ARGO GRAPHICS*	66.2	58.6	3.4	1,398	1.4%	2.3%	.2%	.9%
Mentor Graphics	64.7	8.2	28.7	273	1.3%	.3%	1.9%	.2%
Intergraph	64.7	26.9	17.3	946	1.3%	1.1%	1.1%	.6%
Autodesk	64.1	.0	64.1	0	1.3%	.0%	4.2%	.0%
Sharp*	53.7	25.8	27.9	494	1.1%	1.0%	1.8%	.3%
Silicon Graphics	52.3	52.3	.0	1,393	1.1%	2.0%	.0%	.9%
Marubeni Hytech*	47.7	7.1	39.7	252	1.0%	.3%	2.6%	.2%
Sony	47.0	47.0	.0	2,331	1.0%	1.8%	.0%	1.4%
Hakuto	43.1	25.4	17.6	1,006	.9%	1.0%	1.1%	.6%
CADIX	41.5	17.8	20.3	229	.9%	.7%	1.3%	.1%
Mitsui Engineering	38.7	26.7	7.9	313	.8%	1.0%	.5%	.2%
Kubota Computer	38.2	29.1	6.1	438	.8%	1.1%	.4%	.3%
Uchida Yoko	36.0	21.2	13.1	1,002	.7%	.8%	.9%	.6%
Andor	35.9	7.9	26.6	652	.7%	.3%	1.7%	.4%
Synopsys	33.8	.0	22.9	0	.7%	.0%	1.5%	.0%
EDS Unigraphics	31.5	9.2	14.8	397	.7%	.4%	1.0%	.2%
Yokogawa Digital Computer	30.9	12.3	15.4	285	.6%	.5%	1.0%	.2%
GDS	28.3	13.0	12.5	377	.6%	.5%	.8%	.2%
Toyo Information Systems*	27.5	16.4	8.4	309	.6%	.6%	.5%	.2%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Tokyo Electron*	27.0	8.7	12.6	124	.6%	.3%	.8%	.1%
Toshiba Engineering*	27.0	12.1	13.5	482	.6%	.5%	.9%	.3%
Wacom	27.0	5.4	18.8	902	.6%	.2%	1.2%	.6%
Informatix*	25.5	20.4	3.0	188	.5%	.8%	.2%	.1%
Apple Computer	23.9	23.9	.0	5,028	.5%	.9%	.0%	3.1%
Dassault*	23.7	.0	20.6	0	.5%	.0%	1.3%	.0%
Century Research Center	19.8	10.3	7.4	133	.4%	.4%	.5%	.1%
Parametric Technology	17.9	.0	14.7	0	.4%	.0%	1.0%	.0%
MacNeal-Schwendler	16.8	.0	16.4	0	.3%	.0%	1.1%	.0%
Landmark Graphics	16.6	3.8	7.1	47	.3%	.1%	.5%	.0%
Racal-Redac	16.0	2.3	7.1	96	.3%	.1%	.5%	.1%
INS Engineering	15.4	7.6	7.9	56	.3%	.3%	.5%	.0%
Graphtec Engineering	15.3	7.5	7.0	404	.3%	.3%	.5%	.2%
Nihon Itek*	15.3	7.2	6.3	97	.3%	.3%	.4%	.1%
Kanematsu Computer Systems*	15.0	7.3	6.2	218	.3%	.3%	.4%	.1%
Adam Net	14.4	7.1	5.4	19	.3%	.3%	.4%	.0%
CPU	14.4	4.8	9.6	343	.3%	.2%	.6%	.2%
Viewlogic Systems	13.5	.0	10.2	0	.3%	.0%	.7%	.0%
ESRI	13.5	.0	10.9	0	.3%	.0%	.7%	.0%
Omron	13.5	6.8	5.4	300	.3%	.3%	.4%	.2%
COMPASS Design Automation	12.7	.0	10.2	0	.3%	.0%	.7%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Design Automation	11.0	2.2	8.3	375	.2%	.1%	.5%	.2%
OKURA*	10.8	.0	10.8	0	.2%	.0%	.7%	.0%
Pasco*	10.1	3.7	5.5	83	.2%	.1%	.4%	.1%
Sumitomo Denko Workstation	9.0	9.0	.0	978	.2%	.4%	.0%	.6%
Quickturn Design Systems	8.9	2.7	4.5	55	.2%	.1%	.3%	.0%
Harris EDA	8.9	.8	5.4	34	.2%	.0%	.4%	.0%
Siemens Nixdorf Info systems	7.9	2.5	3.1	121	.2%	.1%	.2%	.1%
MARC	7.8	.0	7.4	0	.2%	.0%	.5%	.0%
Ricoh*	6.5	.0	5.5	0	.1%	.0%	.4%	.0%
Zycad	6.2	3.6	.7	90	.1%	.1%	.0%	.1%
Delcam International	6.2	2.1	2.7	80	.1%	.1%	.2%	.0%
Swanson Analysis	5.7	.0	5.0	0	.1%	.0%	.3%	.0%
Sophia Systems*	5.7	1.2	3.9	59	.1%	.0%	.3%	.0%
CrossCheck Technology	5.7	.0	3.0	0	.1%	.0%	.2%	.0%
Cisigraph	5.7	1.5	3.0	85	.1%	.1%	.2%	.1%
Control Data Systems	5.5	2.8	1.2	70	.1%	.1%	.1%	.0%
Gerber Systems	5.4	2.5	2.3	87	.1%	.1%	.1%	.1%
Alias Research	5.3	.0	4.9	0	.1%	.0%	.3%	.0%
PADS Software	5.2	.0	4.6	0	.1%	.0%	.3%	.0%
Matra Datavision	5.0	1.7	2.8	75	.1%	.1%	.2%	.0%
Graftek	5.0	2.1	1.9	129	.1%	.1%	.1%	.1%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ICAD	4.9	.0	4.0	0	.1%	.0%	.3%	.0%
Logic Modeling Corp.	4.8	.0	4.2	0	.1%	.0%	.3%	.0%
Cascade Design Automation	4.7	.0	3.6	0	.1%	.0%	.2%	.0%
Mechanical Dynamics	4.7	.0	3.8	0	.1%	.0%	.2%	.0%
ADRA Systems	4.4	.0	3.5	0	.1%	.0%	.2%	.0%
Aspen Technology	4.3	.0	2.8	0	.1%	.0%	.2%	.0%
GeoVision Systems	3.5	.3	1.9	7	.1%	.0%	.1%	.0%
Cimatron	3.4	1.5	1.5	113	.1%	.1%	.1%	.1%
PDA Engineering	3.4	.0	3.2	0	.1%	.0%	.2%	.0%
Silvar-Lisco	3.3	.0	2.2	0	.1%	.0%	.1%	.0%
Microsim	3.3	.0	3.1	0	.1%	.0%	.2%	.0%
Investronica SA	3.2	2.0	.9	108	.1%	.1%	.1%	.1%
Kockums Computer Systems	3.0	.8	1.9	140	.1%	.0%	.1%	.1%
CAD Centre	3.0	.0	2.2	0	.1%	.0%	.1%	.0%
Altera	2.9	.0	2.5	0	.1%	.0%	.2%	.0%
IEZ	2.9	1.0	1.5	69	.1%	.0%	.1%	.0%
Applicon	2.8	1.0	1.2	29	.1%	.0%	.1%	.0%
Meta-Software	2.8	.0	1.8	0	.1%	.0%	.1%	.0%
Contec Microelectronics	2.4	.0	2.2	0	.1%	.0%	.1%	.0%
CAMAX Systems Inc.	2.3	.2	1.5	21	.0%	.0%	.1%	.0%
Cimlinc	2.2	.1	1.1	5	.0%	.0%	.1%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Summitt	2.2	.0	2.0	0	.0%	.0%	.1%	.0%
TSSI Japan	2.2	.0	1.6	0	.0%	.0%	.1%	.0%
LSI Logic	2.1	.2	1.6	4	.0%	.0%	.1%	.0%
Straessle Informationssysteme	2.1	.2	1.4	9	.0%	.0%	.1%	.0%
Genasys II	1.9	.2	1.4	9	.0%	.0%	.1%	.0%
MCS	1.9	.1	1.6	11	.0%	.0%	.1%	.0%
Synercom	1.9	.0	.8	0	.0%	.0%	.0%	.0%
Data I/O	1.8	.0	1.8	0	.0%	.0%	.1%	.0%
Analogy	1.7	.0	1.3	0	.0%	.0%	.1%	.0%
Ascent Logic Corp	1.6	.0	1.3	0	.0%	.0%	.1%	.0%
EPIC Design Technology	1.6	.0	1.6	0	.0%	.0%	.1%	.0%
EA Systems	1.5	.0	.6	0	.0%	.0%	.0%	.0%
IKOS Systems	1.5	1.1	.4	18	.0%	.0%	.0%	.0%
Auto-Trol	1.4	.5	.6	17	.0%	.0%	.0%	.0%
Anilam Electronics	1.4	.3	1.0	46	.0%	.0%	.1%	.0%
ANACAD EES	1.4	.0	1.3	0	.0%	.0%	.1%	.0%
CADKEY	1.4	.0	1.3	0	.0%	.0%	.1%	.0%
Radan Computational	1.3	.5	.7	27	.0%	.0%	.0%	.0%
Orcad	1.3	.0	1.3	0	.0%	.0%	.1%	.0%
Integrated Silicon Systems	1.3	.0	1.3	0	.0%	.0%	.1%	.0%
TECHSPERT	1.3	.2	1.1	11	.0%	.0%	.1%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Xilinx	1.3	.0	1.1	0	.0%	.0%	.1%	.0%
Earth Resource Mapping	1.2	.0	1.1	0	.0%	.0%	.1%	.0%
Compact Software	1.2	.0	.9	0	.0%	.0%	.1%	.0%
BETRONEX	1.1	.1	1.0	20	.0%	.0%	.1%	.0%
Point Control	1.0	.0	.8	0	.0%	.0%	.1%	.0%
ArcSys	1.0	.0	.9	0	.0%	.0%	.1%	.0%
ERDAS	1.0	.2	.7	18	.0%	.0%	.0%	.0%
Neocad	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
Kanematsu Semiconductor*	.7	.0	.5	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	38,167	.0%	.0%	.0%	23.3%
All Companies	4,830.6	2,549.9	1,534.4	163,620	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2,080.7	1,016.6	673.3	90,942	43.1%	39.9%	43.9%	55.6%
All Asian-Based Companies	2,680.4	1,516.1	825.6	71,635	55.5%	59.5%	53.8%	43.8%
All European-Based Companies	69.5	17.3	35.6	1,043	1.4%	.7%	2.3%	.6%
All Hardware Companies	1,010.9	906.8	4.5	96,382	20.9%	35.6%	.3%	58.9%
All Turnkey & SW Companies	3,819.7	1,643.1	1,530.0	67,238	79.1%	64.4%	99.7%	41.1%

*Contains reseller or OEM revenue; All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 7
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Fujitsu	314.3	170.0	103.1	7,175	10.1%	11.2%	9.8%	14.9%
NEC	212.2	131.8	61.5	5,981	6.8%	8.7%	5.8%	12.4%
Sun Microsystems	191.1	151.0	.0	6,906	6.1%	9.9%	.0%	14.4%
Hewlett-Packard	188.6	128.8	23.5	4,610	6.1%	8.5%	2.2%	9.6%
Hitachi	142.8	67.1	61.4	2,825	4.6%	4.4%	5.8%	5.9%
IBM	130.7	47.3	59.3	1,002	4.2%	3.1%	5.6%	2.1%
Toshiba*	125.2	62.6	50.1	1,389	4.0%	4.1%	4.7%	2.9%
Nihon Unisys	123.2	67.8	33.3	498	4.0%	4.5%	3.1%	1.0%
Cadence	111.2	.0	71.9	0	3.6%	.0%	6.8%	.0%
Seiko*	99.3	34.7	49.7	587	3.2%	2.3%	4.7%	1.2%
Zuken	96.0	27.7	45.8	545	3.1%	1.8%	4.3%	1.1%
Hitachi Zosen Info Systems	93.9	79.3	4.8	946	3.0%	5.2%	.5%	2.0%
Mitsubishi Electric	90.0	76.5	6.3	844	2.9%	5.0%	.6%	1.8%
Computervision	89.5	18.8	44.7	870	2.9%	1.2%	4.2%	1.8%
Technodia	74.0	59.2	.7	831	2.4%	3.9%	.1%	1.7%
SDRC	70.1	.0	47.8	0	2.2%	.0%	4.5%	.0%
C. Itoh Techno-Science*	69.9	21.7	42.7	769	2.2%	1.4%	4.0%	1.6%
Info. Services Int'l. Dentsu*	68.4	4.8	47.8	118	2.2%	.3%	4.5%	.2%
Mentor Graphics	64.7	8.2	28.7	273	2.1%	.5%	2.7%	.6%
Sumisho Electronics*	58.7	41.5	14.2	250	1.9%	2.7%	1.3%	.5%
Intergraph	55.5	23.7	13.4	688	1.8%	1.6%	1.3%	1.4%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sharp*	52.6	25.3	27.3	487	1.7%	1.7%	2.6%	1.0%
Silicon Graphics	52.3	52.3	.0	1,393	1.7%	3.4%	.0%	2.9%
Digital	49.5	36.7	2.0	1,529	1.6%	2.4%	.2%	3.2%
Sony	47.0	47.0	.0	2,331	1.5%	3.1%	.0%	4.8%
Altium*	46.9	20.1	25.5	1,331	1.5%	1.3%	2.4%	2.8%
Mutoh Industries*	42.6	22.0	13.9	599	1.4%	1.4%	1.3%	1.2%
Marubeni Hytech*	41.7	7.1	33.8	252	1.3%	.5%	3.2%	.5%
CADIX	41.5	17.8	20.3	229	1.3%	1.2%	1.9%	.5%
Mitsui Engineering	35.6	24.6	7.3	246	1.1%	1.6%	.7%	.5%
Synopsys	33.8	.0	22.9	0	1.1%	.0%	2.2%	.0%
Uchida Yoko	32.3	19.1	11.6	807	1.0%	1.3%	1.1%	1.7%
Yokogawa Digital Computer	30.9	12.3	15.4	285	1.0%	.8%	1.5%	.6%
Kubota Computer	30.6	23.2	4.9	292	1.0%	1.5%	.5%	.6%
GDS	28.3	13.0	12.5	377	.9%	.9%	1.2%	.8%
ARGO GRAPHICS*	28.1	24.9	1.5	234	.9%	1.6%	.1%	.5%
Tokyo Electron*	27.0	8.7	12.6	124	.9%	.6%	1.2%	.3%
Toshiba Engineering*	27.0	12.1	13.5	482	.9%	.8%	1.3%	1.0%
EDS Unigraphics	26.6	7.7	12.5	354	.9%	.5%	1.2%	.7%
Toyo Information Systems*	23.4	14.2	7.0	285	.7%	.9%	.7%	.6%
Kozo Keikaku Engineering	21.7	2.2	6.5	23	.7%	.1%	.6%	.0%
Informatix*	20.2	16.0	2.5	156	.6%	1.1%	.2%	.3%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Century Research Center	18.6	9.7	7.0	131	.6%	.6%	.7%	.3%
Parametric Technology	17.0	.0	14.0	0	.5%	.0%	1.3%	.0%
Racal-Redac	16.0	2.3	7.1	96	.5%	.2%	.7%	.2%
Graphtec Engineering	15.3	7.5	7.0	404	.5%	.5%	.7%	.8%
Nihon Itek*	15.3	7.2	6.3	97	.5%	.5%	.6%	.2%
INS Engineering	14.7	7.2	7.5	41	.5%	.5%	.7%	.1%
Omron	13.5	6.8	5.4	300	.4%	.4%	.5%	.6%
COMPASS Design Automation	12.7	.0	10.2	0	.4%	.0%	1.0%	.0%
Dassault*	12.7	.0	10.9	0	.4%	.0%	1.0%	.0%
Viewlogic Systems	11.1	.0	7.8	0	.4%	.0%	.7%	.0%
OKURA*	10.8	.0	10.8	0	.3%	.0%	1.0%	.0%
Kanematsu Computer Systems*	10.5	6.1	2.9	100	.3%	.4%	.3%	.2%
Landmark Graphics	10.0	2.3	4.3	28	.3%	.1%	.4%	.1%
Pasco*	9.2	3.5	4.8	46	.3%	.2%	.5%	.1%
Quickturn Design Systems	8.9	2.7	4.5	55	.3%	.2%	.4%	.1%
Adam Net	8.6	1.3	5.4	17	.3%	.1%	.5%	.0%
Sumitomo Denko Workstation	8.4	8.4	.0	926	.3%	.6%	.0%	1.9%
Harris EDA	7.7	.6	4.6	23	.2%	.0%	.4%	.0%
Siemens Nixdorf Info systeme	7.5	2.4	3.0	115	.2%	.2%	.3%	.2%
Ricoh*	6.5	.0	5.5	0	.2%	.0%	.5%	.0%
Delcam International	5.9	2.1	2.6	73	.2%	.1%	.2%	.2%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
MARC	5.8	.0	5.5	0	.2%	.0%	.5%	.0%
CrossCheck Technology	5.7	.0	3.0	0	.2%	.0%	.3%	.0%
Autodesk	5.5	.0	5.5	0	.2%	.0%	.5%	.0%
ESRI	5.4	.0	4.2	0	.2%	.0%	.4%	.0%
Gerber Systems	5.4	2.5	2.3	87	.2%	.2%	.2%	.2%
Alias Research	5.3	.0	4.9	0	.2%	.0%	.5%	.0%
Cisigraph	5.1	1.4	2.7	82	.2%	.1%	.3%	.2%
Matra Datavision	4.9	1.7	2.7	66	.2%	.1%	.3%	.1%
ICAD	4.9	.0	4.0	0	.2%	.0%	.4%	.0%
Logic Modeling Corp.	4.8	.0	4.1	0	.2%	.0%	.4%	.0%
Cascade Design Automation	4.7	.0	3.6	0	.1%	.0%	.3%	.0%
Zycad	4.2	2.4	.5	65	.1%	.2%	.0%	.1%
Graftek	4.0	1.6	1.6	83	.1%	.1%	.1%	.2%
Control Data Systems	3.4	1.6	1.0	48	.1%	.1%	.1%	.1%
Mechanical Dynamics	3.4	.0	2.7	0	.1%	.0%	.3%	.0%
Silvar-Lisco	3.3	.0	2.2	0	.1%	.0%	.2%	.0%
Swanson Analysis	3.2	.0	2.9	0	.1%	.0%	.3%	.0%
Aspen Technology	3.2	.0	2.1	0	.1%	.0%	.2%	.0%
ADRA Systems	3.2	.0	2.5	0	.1%	.0%	.2%	.0%
Kockums Computer Systems	3.0	.8	1.9	140	.1%	.1%	.2%	.3%
PDA Engineering	3.0	.0	2.8	0	.1%	.0%	.3%	.0%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
CAD Centre	3.0	.0	2.2	0	.1%	.0%	.2%	.0%
GeoVision Systems	2.9	.2	1.6	6	.1%	.0%	.2%	.0%
IEZ	2.9	1.0	1.5	69	.1%	.1%	.1%	.1%
Applicon	2.8	1.0	1.2	29	.1%	.1%	.1%	.1%
Hakuto	2.6	1.6	1.0	31	.1%	.1%	.1%	.1%
Wacom	2.6	.5	2.0	44	.1%	.0%	.2%	.1%
Meta-Software	2.5	.0	1.7	0	.1%	.0%	.2%	.0%
Cimatron	2.3	1.0	1.0	52	.1%	.1%	.1%	.1%
CAMAX Systems Inc.	2.3	.2	1.5	21	.1%	.0%	.1%	.0%
Contec Microelectronics	2.2	.0	2.0	0	.1%	.0%	.2%	.0%
MacNeal-Schwendler	2.2	.0	1.9	0	.1%	.0%	.2%	.0%
TSSI Japan	2.2	.0	1.6	0	.1%	.0%	.2%	.0%
Cimlinc	2.1	.1	1.1	5	.1%	.0%	.1%	.0%
Straessle Informationssysteme	2.1	.2	1.4	9	.1%	.0%	.1%	.0%
Summitt	2.1	.0	1.9	0	.1%	.0%	.2%	.0%
LSI Logic	2.0	.1	1.5	4	.1%	.0%	.1%	.0%
Genasys II	1.7	.2	1.2	4	.1%	.0%	.1%	.0%
Analogy	1.6	.0	1.3	0	.1%	.0%	.1%	.0%
Sophia Systems*	1.6	.2	1.2	10	.1%	.0%	.1%	.0%
EPIC Design Technology	1.6	.0	1.6	0	.0%	.0%	.1%	.0%
Auto-Trol	1.4	.5	.6	17	.0%	.0%	.1%	.0%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Synercom	1.4	.0	.6	0	.0%	.0%	.1%	.0%
Radan Computational	1.3	.5	.7	26	.0%	.0%	.1%	.1%
ANACAD EES	1.2	.0	1.2	0	.0%	.0%	.1%	.0%
Earth Resource Mapping	1.2	.0	1.1	0	.0%	.0%	.1%	.0%
Ascent Logic Corp	1.2	.0	.9	0	.0%	.0%	.1%	.0%
Integrated Silicon Systems	1.1	.0	1.1	0	.0%	.0%	.1%	.0%
ArcSys	1.0	.0	.9	0	.0%	.0%	.1%	.0%
MCS	1.0	.0	.8	3	.0%	.0%	.1%	.0%
ERDAS	.8	.2	.5	4	.0%	.0%	.0%	.0%
Neocad	.6	.0	.6	0	.0%	.0%	.1%	.0%
Compact Software	.6	.0	.4	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	3,115.2	1,522.5	1,056.3	48,113	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1,287.0	504.7	475.3	18,538	41.3%	33.1%	45.0%	38.5%
All Asian-Based Companies	1,769.8	1,004.2	551.3	28,835	56.8%	66.0%	52.2%	59.9%
All European-Based Companies	58.3	13.6	29.6	741	1.9%	.9%	2.8%	1.5%
All Hardware Companies	510.3	438.8	4.5	18,265	16.4%	28.8%	.4%	38.0%
All Turnkey & SW Companies	2,604.9	1,083.7	1,051.8	29,848	83.6%	71.2%	99.6%	62.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 8
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Nihon Unisys	142.9	88.6	22.9	722	20.3%	20.3%	15.6%	6.1%
Fujitsu	133.9	61.6	53.6	2,019	19.0%	14.1%	36.7%	17.0%
IBM	122.1	70.1	24.0	1,564	17.3%	16.0%	16.4%	13.2%
NEC	61.4	45.5	10.5	127	8.7%	10.4%	7.2%	1.1%
Digital	56.9	44.2	.3	0	8.1%	10.1%	.2%	.0%
Mitsubishi Electric	15.2	7.2	4.3	42	2.2%	1.6%	2.9%	.4%
Hitachi	14.3	6.7	6.1	3,467	2.0%	1.5%	4.2%	29.2%
Kozo Keikaku Engineering	11.8	.0	2.4	0	1.7%	.0%	1.6%	.0%
C. Itoh Techno-Science*	9.3	2.9	5.7	67	1.3%	.7%	3.9%	.6%
MacNeal-Schwendler	9.2	.0	9.2	0	1.3%	.0%	6.3%	.0%
Toshiba*	8.8	4.4	3.5	118	1.2%	1.0%	2.4%	1.0%
Dassault*	8.0	.0	7.0	0	1.1%	.0%	4.8%	.0%
Informatix*	5.3	4.4	.5	31	.8%	1.0%	.3%	.3%
Hitachi Zosen Info Systems	5.1	4.5	.0	0	.7%	1.0%	.0%	.0%
Toyo Information Systems*	4.2	2.3	1.3	24	.6%	.5%	.9%	.2%
MARC	1.9	.0	1.8	0	.3%	.0%	1.3%	.0%
Control Data Systems	1.9	1.0	.2	20	.3%	.2%	.1%	.2%
Swanson Analysis	1.6	.0	1.3	0	.2%	.0%	.9%	.0%
Century Research Center	1.2	.6	.5	2	.2%	.1%	.3%	.0%
EA Systems	1.1	.0	.5	0	.2%	.0%	.3%	.0%
Aspen Technology	1.1	.0	.7	0	.2%	.0%	.5%	.0%

(Continued)

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Table 8 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Mechanical Dynamics	1.0	.0	.8	0	.1%	.0%	.5%	.0%
Graftek	.9	.5	.3	43	.1%	.1%	.2%	.4%
SDRC	.7	.0	.5	0	.1%	.0%	.3%	.0%
GeoVision Systems	.5	.0	.3	0	.1%	.0%	.2%	.0%
Other Companies	82.2	92.5	.0	3,598	11.7%	21.2%	.0%	30.3%
All Companies	705.0	437.2	146.2	11,856	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	306.4	216.0	41.2	5,340	43.5%	49.4%	28.2%	45.0%
All Asian-Based Companies	397.9	221.0	104.6	6,510	56.4%	50.5%	71.6%	54.9%
All European-Based Companies	.7	.2	.4	6	.1%	.0%	.2%	.1%
All Hardware Companies	162.9	145.0	.0	3,717	23.1%	33.2%	.0%	31.3%
All Turnkey & SW Companies	542.1	292.2	146.2	8,139	76.9%	66.8%	100.0%	68.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 9
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	36.5	28.6	.0	318	24.3%	30.9%	.0%	22.2%
Sun Microsystems	32.6	27.1	.0	568	21.7%	29.3%	.0%	39.7%
IBM	31.7	16.7	7.9	253	21.1%	18.1%	29.5%	17.7%
C. Itoh Techno-Science*	6.8	2.1	4.2	62	4.5%	2.3%	15.5%	4.3%
Landmark Graphics	6.6	1.5	2.8	19	4.4%	1.7%	10.4%	1.3%
Adam Net	5.8	5.8	.0	2	3.8%	6.2%	.0%	.2%
Kubota Computer	5.7	4.4	.9	47	3.8%	4.7%	3.4%	3.3%
ESRI	5.3	.0	4.1	0	3.5%	.0%	15.3%	.0%
MacNeal-Schwendler	5.0	.0	5.0	0	3.3%	.0%	18.7%	.0%
EDS Unigraphics	4.9	1.5	2.3	43	3.3%	1.6%	8.4%	3.0%
Intergraph	3.7	1.6	1.0	37	2.5%	1.7%	3.7%	2.6%
Info. Services Int'l. Dentsu*	3.6	.3	2.5	6	2.4%	.3%	9.3%	.4%
Kozo Keikaku Engineering	3.6	.0	.7	0	2.4%	.0%	2.7%	.0%
Dassault*	3.1	.0	2.6	0	2.0%	.0%	9.8%	.0%
Zycad	2.1	1.2	.3	25	1.4%	1.3%	.9%	1.8%
Hewlett-Packard	1.8	1.5	.0	24	1.2%	1.6%	.0%	1.7%
IKOS Systems	1.5	1.1	.4	18	1.0%	1.2%	1.4%	1.3%
Sharp*	1.1	.5	.6	7	.7%	.6%	2.1%	.5%
Cisigraph	.6	.1	.3	4	.4%	.2%	1.0%	.3%

(Continued)

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Table 9 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sumitomo Denko Workstation	.6	.6	.0	52	.4%	.6%	.0%	3.7%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	150.3	92.5	26.9	1,431	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	132.5	81.0	24.2	1,315	88.1%	87.6%	89.9%	91.9%
All Asian-Based Companies	16.8	11.2	2.3	109	11.2%	12.1%	8.4%	7.6%
All European-Based Companies	1.0	.3	.5	7	.7%	.3%	1.7%	.5%
All Hardware Companies	71.6	57.9	.0	968	47.6%	62.5%	.0%	67.7%
All Turnkey & SW Companies	78.8	34.7	26.9	462	52.4%	37.5%	100.0%	32.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 10
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
NEC	129.2	91.8	25.8	16,665	15.0%	18.4%	8.5%	16.3%
IBM	79.7	43.1	34.7	7,988	9.3%	8.7%	11.4%	7.8%
Fujitsu	75.5	66.4	9.1	8,958	8.8%	13.3%	3.0%	8.8%
Autodesk	58.6	.0	58.6	0	6.8%	.0%	19.2%	.0%
Altium*	55.2	18.6	34.7	6,169	6.4%	3.7%	11.4%	6.0%
Mutoh Industries*	51.8	37.5	12.3	1,802	6.0%	7.5%	4.0%	1.8%
Toshiba*	45.9	22.9	18.3	3,437	5.3%	4.6%	6.0%	3.4%
Hakuto	40.5	23.9	16.6	975	4.7%	4.8%	5.4%	1.0%
ARGO GRAPHICS*	38.1	33.6	1.9	1,164	4.4%	6.8%	.6%	1.1%
Andor	35.9	7.9	26.6	652	4.2%	1.6%	8.7%	.6%
Kozo Keikaku Engineering	34.9	1.4	9.1	111	4.1%	.3%	3.0%	.1%
Hitachi	30.9	14.5	13.3	1,578	3.6%	2.9%	4.4%	1.5%
Wacom	24.4	4.9	16.8	858	2.8%	1.0%	5.5%	.8%
Apple Computer	23.9	23.9	.0	5,028	2.8%	4.8%	.0%	4.9%
Sumisho Electronics*	16.8	11.8	5.0	1,225	2.0%	2.4%	1.7%	1.2%
CPU	14.4	4.8	9.6	343	1.7%	1.0%	3.2%	.3%
Mitsubishi Electric	11.7	7.7	4.0	964	1.4%	1.5%	1.3%	.9%
Digital	11.7	10.6	.4	2,845	1.4%	2.1%	.1%	2.8%
Design Automation	11.0	2.2	8.3	375	1.3%	.4%	2.7%	.4%
Marubeni Hytech*	5.9	.0	5.9	0	.7%	.0%	1.9%	.0%
Hewlett-Packard	5.6	3.7	1.5	1,062	.7%	.7%	.5%	1.0%

(Continued)

Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	5.3	1.6	2.7	221	.6%	.3%	.9%	.2%
Technodia	4.9	4.4	.1	128	.6%	.9%	.0%	.1%
PADS Software	4.7	.0	4.2	0	.5%	.0%	1.4%	.0%
Kanematsu Computer Systems*	4.5	1.2	3.3	118	.5%	.2%	1.1%	.1%
Sophia Systems*	4.1	1.0	2.7	49	.5%	.2%	.9%	.0%
Uchida Yoko	3.6	2.2	1.5	195	.4%	.4%	.5%	.2%
Investronica SA	3.2	2.0	.9	108	.4%	.4%	.3%	.1%
Mitsui Engineering	3.1	2.1	.6	67	.4%	.4%	.2%	.1%
Altera	2.9	.0	2.5	0	.3%	.0%	.8%	.0%
Microsim	2.9	.0	2.7	0	.3%	.0%	.9%	.0%
ESRI	2.7	.0	2.6	0	.3%	.0%	.8%	.0%
Viewlogic Systems	2.4	.0	2.4	0	.3%	.0%	.8%	.0%
Kubota Computer	1.9	1.5	.3	99	.2%	.3%	.1%	.1%
Data I/O	1.6	.0	1.6	0	.2%	.0%	.5%	.0%
Anilam Electronics	1.4	.3	1.0	46	.2%	.1%	.3%	.0%
Orcad	1.3	.0	1.3	0	.2%	.0%	.4%	.0%
CADKEY	1.3	.0	1.2	0	.2%	.0%	.4%	.0%
ADRA Systems	1.2	.0	1.0	0	.1%	.0%	.3%	.0%
TECHSPERT	1.1	.2	1.0	11	.1%	.0%	.3%	.0%
BETRONEX	1.1	.1	1.0	20	.1%	.0%	.3%	.0%
Cimatron	1.1	.5	.5	61	.1%	.1%	.2%	.1%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Swanson Analysis	1.0	.0	.9	0	.1%	.0%	.3%	.0%
Harris EDA	1.0	.1	.7	8	.1%	.0%	.2%	.0%
MCS	.9	.0	.8	8	.1%	.0%	.3%	.0%
Point Control	.9	.0	.7	0	.1%	.0%	.2%	.0%
Parametric Technology	.9	.0	.7	0	.1%	.0%	.2%	.0%
Xilinx	.9	.0	.8	0	.1%	.0%	.3%	.0%
Computervision	.7	.0	.7	0	.1%	.0%	.2%	.0%
INS Engineering	.7	.3	.4	14	.1%	.1%	.1%	.0%
Compact Software	.5	.0	.4	0	.1%	.0%	.1%	.0%
Pasco*	.5	.2	.3	37	.1%	.0%	.1%	.0%
Other Companies	.0	48.9	.0	38,795	.0%	9.8%	.0%	38.0%
All Companies	860.1	497.8	305.1	102,220	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	354.7	214.9	132.6	65,749	41.2%	43.2%	43.4%	64.3%
All Asian-Based Companies	496.0	279.7	167.4	36,181	57.7%	56.2%	54.9%	35.4%
All European-Based Companies	9.5	3.2	5.1	290	1.1%	.6%	1.7%	.3%
All Hardware Companies	266.1	265.1	.0	73,432	30.9%	53.3%	.0%	71.8%
All Turnkey & SW Companies	594.0	232.6	305.1	28,788	69.1%	46.7%	100.0%	28.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 11
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	280.1	128.4	101.6	5,753	11.0%	9.0%	12.9%	6.9%
NEC	245.8	165.4	58.4	11,515	9.6%	11.6%	7.4%	13.9%
Fujitsu	219.9	128.9	67.4	8,751	8.6%	9.1%	8.6%	10.5%
Nihon Unisys	218.2	129.2	44.5	1,014	8.5%	9.1%	5.7%	1.2%
Hitachi	143.6	67.5	61.8	6,076	5.6%	4.7%	7.8%	7.3%
Toshiba*	125.9	63.0	50.4	4,070	4.9%	4.4%	6.4%	4.9%
Hewlett-Packard	102.4	65.3	14.9	2,430	4.0%	4.6%	1.9%	2.9%
Hitachi Zosen Info Systems	89.8	76.1	4.4	865	3.5%	5.4%	.6%	1.0%
Altium*	82.3	33.5	46.3	5,769	3.2%	2.4%	5.9%	7.0%
Computervision	78.1	16.3	39.3	755	3.1%	1.1%	5.0%	.9%
Info. Services Int'l. Dentsu*	72.0	5.0	50.4	124	2.8%	.4%	6.4%	.1%
Mutoh Industries*	70.8	45.6	19.2	1,906	2.8%	3.2%	2.4%	2.3%
SDRC	70.8	.0	48.3	0	2.8%	.0%	6.1%	.0%
ARGO GRAPHICS*	66.2	58.6	3.4	1,398	2.6%	4.1%	.4%	1.7%
Sumisho Electronics*	65.1	45.9	16.5	1,155	2.5%	3.2%	2.1%	1.4%
Digital	60.6	48.2	.0	2,029	2.4%	3.4%	.0%	2.4%
Mitsubishi Electric	50.3	39.3	6.3	795	2.0%	2.8%	.8%	1.0%
C. Itoh Techno-Science*	49.9	15.5	30.4	511	2.0%	1.1%	3.9%	.6%
Silicon Graphics	48.6	48.6	.0	1,286	1.9%	3.4%	.0%	1.5%
Hakuto	43.1	25.4	17.6	1,006	1.7%	1.8%	2.2%	1.2%
Sharp*	43.0	20.7	22.3	398	1.7%	1.5%	2.8%	.5%
Seiko*	40.6	14.2	20.3	241	1.6%	1.0%	2.6%	.3%

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Kubota Computer	38.2	29.1	6.1	438	1.5%	2.0%	.8%	.5%
Technodia	37.9	30.3	.4	425	1.5%	2.1%	.0%	.5%
EDS Unigraphics	31.5	9.2	14.8	397	1.2%	.6%	1.9%	.5%
Tokyo Electron*	27.0	8.7	12.6	124	1.1%	.6%	1.6%	.1%
Toshiba Engineering*	27.0	12.1	13.5	482	1.1%	.9%	1.7%	.6%
Autodesk	25.6	.0	25.6	0	1.0%	.0%	3.3%	.0%
Andor	23.1	5.1	17.1	421	.9%	.4%	2.2%	.5%
Toyo Information Systems*	23.0	13.7	6.9	258	.9%	1.0%	.9%	.3%
Mitsui Engineering	22.1	15.3	4.5	178	.9%	1.1%	.6%	.2%
Dassault*	22.1	.0	19.2	0	.9%	.0%	2.4%	.0%
Kozo Keikaku Engineering	21.6	1.3	5.8	40	.8%	.1%	.7%	.0%
Sun Microsystems	20.4	16.5	.0	548	.8%	1.2%	.0%	.7%
Marubeni Hytech*	18.6	3.2	15.1	112	.7%	.2%	1.9%	.1%
Parametric Technology	17.9	.0	14.7	0	.7%	.0%	1.9%	.0%
MacNeal-Schwendler	16.8	.0	16.4	0	.7%	.0%	2.1%	.0%
Sony	16.6	16.6	.0	823	.7%	1.2%	.0%	1.0%
Apple Computer	16.0	16.0	.0	3,377	.6%	1.1%	.0%	4.1%
Graphtec Engineering	15.3	7.5	7.0	404	.6%	.5%	.9%	.5%
Nihon Itek*	12.2	5.8	5.0	78	.5%	.4%	.6%	.1%
Adam Net	11.5	6.6	3.6	14	.5%	.5%	.5%	.0%
Omron	11.5	5.7	4.6	255	.4%	.4%	.6%	.3%
Intergraph	10.8	3.8	3.6	127	.4%	.3%	.5%	.2%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Design Automation	8.6	1.8	6.5	295	.3%	.1%	.8%	.4%
CADIX	8.3	3.6	4.1	46	.3%	.3%	.5%	.1%
Wacom	8.1	1.6	5.7	261	.3%	.1%	.7%	.3%
Sumitomo Denko Workstation	7.9	7.9	.0	855	.3%	.6%	.0%	1.0%
MARC	7.8	.0	7.4	0	.3%	.0%	.9%	.0%
Ricoh*	6.5	.0	5.5	0	.3%	.0%	.7%	.0%
Delcam International	6.2	2.1	2.7	80	.2%	.2%	.3%	.1%
Swanson Analysis	5.7	.0	5.0	0	.2%	.0%	.6%	.0%
Cisigraph	5.7	1.5	3.0	85	.2%	.1%	.4%	.1%
Control Data Systems	5.4	2.7	1.2	65	.2%	.2%	.1%	.1%
Gerber Systems	5.4	2.5	2.3	87	.2%	.2%	.3%	.1%
Alias Research	5.3	.0	4.9	0	.2%	.0%	.6%	.0%
Matra Datavision	5.0	1.7	2.8	75	.2%	.1%	.4%	.1%
Graftek	5.0	2.1	1.9	129	.2%	.1%	.2%	.2%
Mechanical Dynamics	4.7	.0	3.8	0	.2%	.0%	.5%	.0%
ADRA Systems	4.4	.0	3.5	0	.2%	.0%	.4%	.0%
ICAD	4.2	.0	3.4	0	.2%	.0%	.4%	.0%
Cimatron	3.4	1.5	1.5	113	.1%	.1%	.2%	.1%
PDA Engineering	3.4	.0	3.2	0	.1%	.0%	.4%	.0%
Investronica SA	3.2	2.0	.9	108	.1%	.1%	.1%	.1%
Century Research Center	2.9	1.5	1.1	14	.1%	.1%	.1%	.0%
Applicon	2.8	1.0	1.2	29	.1%	.1%	.1%	.0%

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
CAMAX Systems Inc.	2.3	.2	1.5	21	.1%	.0%	.2%	.0%
Cimlinc	2.2	.1	1.1	5	.1%	.0%	.1%	.0%
Straessle Informationssysteme	2.1	.2	1.4	9	.1%	.0%	.2%	.0%
Uchida Yoko	2.0	1.2	.7	53	.1%	.1%	.1%	.1%
MCS	1.9	.1	1.6	11	.1%	.0%	.2%	.0%
Anilam Electronics	1.4	.3	1.0	46	.1%	.0%	.1%	.1%
CADKEY	1.4	.0	1.3	0	.1%	.0%	.2%	.0%
Radan Computational	1.2	.4	.6	24	.0%	.0%	.1%	.0%
Point Control	1.0	.0	.8	0	.0%	.0%	.1%	.0%
Zuken	1.0	.3	.5	6	.0%	.0%	.1%	.0%
Auto-Trol	.8	.3	.3	10	.0%	.0%	.0%	.0%
CAD Centre	.5	.0	.4	0	.0%	.0%	.1%	.0%
Other Companies	.0	.0	.0	14,202	.0%	.0%	.0%	17.1%
All Companies	2,555.3	1,422.4	786.8	82,972	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	998.8	508.3	326.6	41,832	39.1%	35.7%	41.5%	50.4%
All Asian-Based Companies	1,525.3	904.1	444.3	40,571	59.7%	63.6%	56.5%	48.9%
All European-Based Companies	31.2	10.0	16.0	569	1.2%	.7%	2.0%	.7%
All Hardware Companies	420.4	395.4	.0	43,776	16.5%	27.8%	.0%	52.8%
All Turnkey & SW Companies	2,134.9	1,027.0	786.8	39,196	83.5%	72.2%	100.0%	47.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 12
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Fujitsu	151.8	88.1	47.3	5,982	20.7%	21.8%	21.9%	17.3%
NEC	64.5	43.2	15.6	5,325	8.8%	10.7%	7.2%	15.4%
Kozo Keikaku Engineering	50.4	2.3	12.8	93	6.9%	.6%	6.0%	.3%
IBM	49.7	28.9	13.4	2,632	6.8%	7.1%	6.2%	7.6%
Nihon Unisys	47.9	27.2	11.6	206	6.5%	6.7%	5.4%	.6%
Technodia	41.1	33.3	.4	533	5.6%	8.2%	.2%	1.5%
Autodesk	27.6	.0	27.6	0	3.8%	.0%	12.8%	.0%
Informatix*	25.5	20.4	3.0	188	3.5%	5.1%	1.4%	.5%
Intergraph	25.4	10.7	7.0	445	3.5%	2.6%	3.2%	1.3%
Toshiba*	21.6	10.8	8.6	515	2.9%	2.7%	4.0%	1.5%
Mutoh Industries*	18.9	10.9	5.6	383	2.6%	2.7%	2.6%	1.1%
Hitachi	18.4	8.7	7.9	750	2.5%	2.1%	3.7%	2.2%
C. Itoh Techno-Science*	18.1	5.6	11.0	193	2.5%	1.4%	5.1%	.6%
Mitsubishi Electric	17.5	13.7	2.2	277	2.4%	3.4%	1.0%	.8%
Hewlett-Packard	15.6	13.3	.0	728	2.1%	3.3%	.0%	2.1%
Kanematsu Computer Systems*	15.0	7.3	6.2	218	2.0%	1.8%	2.9%	.6%
Sony	14.9	14.9	.0	737	2.0%	3.7%	.0%	2.1%
CPU	14.4	4.8	9.6	343	2.0%	1.2%	4.5%	1.0%
GDS	14.2	6.5	6.2	188	1.9%	1.6%	2.9%	.5%
Computervision	12.1	2.5	6.2	115	1.6%	.6%	2.9%	.3%
Andor	10.0	2.2	7.4	182	1.4%	.5%	3.4%	.5%

(Continued)

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Table 12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Century Research Center	9.9	5.2	3.7	69	1.3%	1.3%	1.7%	.2%
Hitachi Zosen Info Systems	9.1	7.7	.4	81	1.2%	1.9%	.2%	.2%
Altium*	7.7	2.0	5.4	667	1.1%	.5%	2.5%	1.9%
INS Engineering	7.5	3.7	3.8	34	1.0%	.9%	1.8%	.1%
Sumisho Electronics*	6.0	4.2	1.6	225	.8%	1.0%	.7%	.6%
Apple Computer	5.7	5.7	.0	1,191	.8%	1.4%	.0%	3.4%
Uchida Yoko	5.2	3.1	1.9	145	.7%	.8%	.9%	.4%
Digital	5.1	4.3	.0	599	.7%	1.1%	.0%	1.7%
Toyo Information Systems*	4.6	2.7	1.4	51	.6%	.7%	.7%	.1%
Sun Microsystems	4.5	3.6	.0	170	.6%	.9%	.0%	.5%
Aspen Technology	4.3	.0	2.8	0	.6%	.0%	1.3%	.0%
Silicon Graphics	3.5	3.5	.0	102	.5%	.9%	.0%	.3%
Nihon Itek*	3.1	1.4	1.3	19	.4%	.4%	.6%	.1%
Kockums Computer Systems	3.0	.8	1.9	140	.4%	.2%	.9%	.4%
Adam Net	2.9	.4	1.8	6	.4%	.1%	.8%	.0%
IEZ	2.9	1.0	1.5	69	.4%	.2%	.7%	.2%
CAD Centre	2.5	.0	1.8	0	.3%	.0%	.8%	.0%
Design Automation	2.3	.5	1.8	80	.3%	.1%	.8%	.2%
Mitsui Engineering	1.9	1.3	.4	15	.3%	.3%	.2%	.0%
Dassault*	1.6	.0	1.4	0	.2%	.0%	.7%	.0%
EA Systems	1.5	.0	.6	0	.2%	.0%	.3%	.0%

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Table 12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sumitomo Denko Workstation	.8	.8	.0	83	.1%	.2%	.0%	.2%
ICAD	.7	.0	.6	0	.1%	.0%	.3%	.0%
Auto-Trol	.6	.2	.2	8	.1%	.1%	.1%	.0%
Other Companies	.0	.0	.0	10,794	.0%	.0%	.0%	31.2%
All Companies	734.0	404.4	215.5	34,588	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	218.5	123.4	67.8	18,678	29.8%	30.5%	31.5%	54.0%
All Asian-Based Companies	505.7	279.1	141.7	15,684	68.9%	69.0%	65.8%	45.3%
All European-Based Companies	9.9	1.9	6.0	226	1.3%	.5%	2.8%	.7%
All Hardware Companies	140.2	135.8	.0	22,032	19.1%	33.6%	.0%	63.7%
All Turnkey & SW Companies	593.9	268.6	215.5	12,556	80.9%	66.4%	100.0%	36.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 13
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Fujitsu	57.7	29.7	20.2	1,172	16.5%	15.7%	18.0%	11.7%
Mitsubishi Electric	49.1	38.4	6.1	777	14.1%	20.2%	5.4%	7.8%
Uchida Yoko	22.5	13.3	8.2	624	6.4%	7.0%	7.3%	6.2%
Intergraph	20.0	10.7	4.0	323	5.7%	5.6%	3.6%	3.2%
Hitachi	18.9	8.9	8.1	726	5.4%	4.7%	7.2%	7.3%
Toshiba*	18.0	9.0	7.2	200	5.2%	4.7%	6.4%	2.0%
Landmark Graphics	16.6	3.8	7.1	47	4.7%	2.0%	6.3%	.5%
Mitsui Engineering	14.7	10.2	3.0	120	4.2%	5.4%	2.7%	1.2%
GDS	14.2	6.5	6.2	189	4.1%	3.4%	5.5%	1.9%
ESRI	13.5	.0	10.9	0	3.9%	.0%	9.7%	.0%
Digital	10.6	8.8	.0	406	3.0%	4.6%	.0%	4.1%
IBM	10.1	7.4	1.3	788	2.9%	3.9%	1.1%	7.9%
Pasco*	10.1	3.7	5.5	83	2.9%	1.9%	4.9%	.8%
NEC	8.1	5.1	2.3	308	2.3%	2.7%	2.0%	3.1%
INS Engineering	7.9	3.9	4.0	22	2.3%	2.0%	3.6%	.2%
Siemens Nixdorf Info systeme	7.9	2.5	3.1	121	2.3%	1.3%	2.8%	1.2%
Hewlett-Packard	7.5	6.4	.0	257	2.2%	3.4%	.0%	2.6%
Autodesk	7.0	.0	7.0	0	2.0%	.0%	6.3%	.0%
Mutoh Industries*	4.7	2.9	1.3	112	1.4%	1.5%	1.2%	1.1%
Century Research Center	4.7	2.5	1.8	33	1.3%	1.3%	1.6%	.3%
CADIX	4.2	1.8	2.0	23	1.2%	.9%	1.8%	.2%

(Continued)

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Table 13 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	3.8	3.1	.0	92	1.1%	1.6%	.0%	.9%
GeoVision Systems	3.5	.3	1.9	7	1.0%	.1%	1.7%	.1%
C. Itoh Techno-Science*	3.0	.9	1.8	32	.9%	.5%	1.6%	.3%
Genasys II	1.9	.2	1.4	9	.6%	.1%	1.2%	.1%
Synercom	1.9	.0	.8	0	.5%	.0%	.7%	.0%
Andor	1.7	.4	1.3	31	.5%	.2%	1.1%	.3%
Earth Resource Mapping	1.2	.0	1.1	0	.3%	.0%	1.0%	.0%
ERDAS	1.0	.2	.7	17	.3%	.1%	.6%	.2%
Other Companies	3.3	9.2	.0	3,466	1.0%	4.8%	.0%	34.7%
All Companies	349.3	189.5	112.6	9,989	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	131.7	62.9	44.7	5,773	37.7%	33.2%	39.7%	57.8%
All Asian-Based Companies	208.3	123.6	64.4	4,083	59.6%	65.2%	57.2%	40.9%
All European-Based Companies	9.2	3.0	3.6	132	2.6%	1.6%	3.2%	1.3%
All Hardware Companies	48.5	44.5	.0	5,339	13.9%	23.5%	.0%	53.4%
All Turnkey & SW Companies	300.7	145.0	112.6	4,650	86.1%	76.5%	100.0%	46.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 14
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	195.1	154.9	.0	6,663	16.4%	29.0%	.0%	18.5%
Cadence	111.2	.0	71.9	0	9.3%	.0%	17.1%	.0%
Zuken	95.0	27.4	45.4	540	8.0%	5.1%	10.8%	1.5%
Fujitsu	94.3	51.3	30.9	2,247	7.9%	9.6%	7.4%	6.2%
NEC	84.6	55.4	21.6	5,625	7.1%	10.4%	5.2%	15.6%
Digital	78.2	58.8	2.6	1,657	6.6%	11.0%	.6%	4.6%
Hewlett-Packard	70.5	49.1	10.1	2,281	5.9%	9.2%	2.4%	6.3%
Mentor Graphics	64.7	8.2	28.7	273	5.4%	1.5%	6.8%	.8%
Seiko*	58.7	20.5	29.4	346	4.9%	3.8%	7.0%	1.0%
Synopsys	33.8	.0	22.9	0	2.8%	.0%	5.5%	.0%
Yokogawa Digital Computer	30.9	12.3	15.4	285	2.6%	2.3%	3.7%	.8%
Marubeni Hytech*	29.1	4.0	24.7	140	2.4%	.7%	5.9%	.4%
CADIX	29.0	12.5	14.2	160	2.4%	2.3%	3.4%	.4%
IBM	24.3	12.6	9.7	1,636	2.0%	2.4%	2.3%	4.5%
Wacom	18.9	3.8	13.1	641	1.6%	.7%	3.1%	1.8%
Racal-Redac	16.0	2.3	7.1	96	1.3%	.4%	1.7%	.3%
Sony	15.5	15.6	.0	770	1.3%	2.9%	.0%	2.1%
C. Itoh Techno-Science*	15.1	4.6	9.2	161	1.3%	.9%	2.2%	.4%
Toshiba*	14.4	7.2	5.8	160	1.2%	1.3%	1.4%	.4%
Viewlogic Systems	13.5	.0	10.2	0	1.1%	.0%	2.4%	.0%
COMPASS Design Automation	12.7	.0	10.2	0	1.1%	.0%	2.4%	.0%

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Table 14 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Altium*	12.1	3.2	8.5	1,064	1.0%	.6%	2.0%	3.0%
OKURA*	10.8	.0	10.8	0	.9%	.0%	2.6%	.0%
Sharp*	10.7	5.2	5.6	97	.9%	1.0%	1.3%	.3%
Quicktum Design Systems	8.9	2.7	4.5	55	.8%	.5%	1.1%	.2%
Harris EDA	8.9	.8	5.4	34	.7%	.1%	1.3%	.1%
Intergraph	8.5	1.8	2.7	52	.7%	.3%	.6%	.1%
Hitachi	7.1	3.3	3.1	319	.6%	.6%	.7%	.9%
Uchida Yoko	6.3	3.7	2.3	180	.5%	.7%	.5%	.5%
Zycad	6.2	3.6	.7	90	.5%	.7%	.2%	.2%
Sophia Systems*	5.7	1.2	3.9	59	.5%	.2%	.9%	.2%
CrossCheck Technology	5.7	.0	3.0	0	.5%	.0%	.7%	.0%
PADS Software	5.2	.0	4.6	0	.4%	.0%	1.1%	.0%
Logic Modeling Corp.	4.8	.0	4.2	0	.4%	.0%	1.0%	.0%
Cascade Design Automation	4.7	.0	3.6	0	.4%	.0%	.9%	.0%
Sumisho Electronics*	4.5	3.2	1.2	95	.4%	.6%	.3%	.3%
Autodesk	3.9	.0	3.9	0	.3%	.0%	.9%	.0%
Silvar-Lisco	3.3	.0	2.2	0	.3%	.0%	.5%	.0%
Microsim	3.3	.0	3.1	0	.3%	.0%	.7%	.0%
Altera	2.9	.0	2.5	0	.2%	.0%	.6%	.0%
Meta-Software	2.8	.0	1.8	0	.2%	.0%	.4%	.0%
Contec Microelectronics	2.4	.0	2.2	0	.2%	.0%	.5%	.0%

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Table 14 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Century Research Center	2.3	1.2	.9	16	.2%	.2%	.2%	.0%
Apple Computer	2.2	2.2	.0	461	.2%	.4%	.0%	1.3%
Summitt	2.2	.0	2.0	0	.2%	.0%	.5%	.0%
TSSI Japan	2.2	.0	1.6	0	.2%	.0%	.4%	.0%
LSI Logic	2.1	.2	1.6	4	.2%	.0%	.4%	.0%
Omron	2.0	1.0	.8	45	.2%	.2%	.2%	.1%
Data I/O	1.8	.0	1.8	0	.1%	.0%	.4%	.0%
Analogy	1.7	.0	1.3	0	.1%	.0%	.3%	.0%
Ascent Logic Corp	1.6	.0	1.3	0	.1%	.0%	.3%	.0%
EPIC Design Technology	1.6	.0	1.6	0	.1%	.0%	.4%	.0%
IKOS Systems	1.5	1.1	.4	18	.1%	.2%	.1%	.1%
ANACAD EES	1.4	.0	1.3	0	.1%	.0%	.3%	.0%
Orcad	1.3	.0	1.3	0	.1%	.0%	.3%	.0%
Integrated Silicon Systems	1.3	.0	1.3	0	.1%	.0%	.3%	.0%
TECHSPERT	1.3	.2	1.1	11	.1%	.0%	.3%	.0%
Xilinx	1.3	.0	1.1	0	.1%	.0%	.3%	.0%
Compact Software	1.2	.0	.9	0	.1%	.0%	.2%	.0%
BETRONEX	1.1	.1	1.0	20	.1%	.0%	.2%	.1%
Andor	1.0	.2	.8	19	.1%	.0%	.2%	.1%
ArcSys	1.0	.0	.9	0	.1%	.0%	.2%	.0%
Neocad	1.0	.0	1.0	0	.1%	.0%	.2%	.0%

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Table 14 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Kanematsu Semiconductor*	.7	.0	.5	0	.1%	.0%	.1%	.0%
Other Companies	.0	.0	.0	9,705	.0%	.0%	.0%	26.9%
All Companies	1,192.0	533.6	419.5	36,071	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	731.7	321.9	234.2	24,659	61.4%	60.3%	55.8%	68.4%
All Asian-Based Companies	441.1	209.2	175.3	11,296	37.0%	39.2%	41.8%	31.3%
All European-Based Companies	19.2	2.4	10.1	117	1.6%	.4%	2.4%	.3%
All Hardware Companies	401.8	331.0	4.5	25,236	33.7%	62.0%	1.1%	70.0%
All Turnkey & SW Companies	790.1	202.6	415.1	10,835	66.3%	38.0%	98.9%	30.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 15
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	99.1	78.7	.0	3,539	16.9%	30.4%	.0%	17.2%
Hewlett-Packard	54.0	35.0	10.1	1,672	9.2%	13.5%	4.9%	8.1%
Cadence	53.1	.0	34.3	0	9.1%	.0%	16.7%	.0%
NEC	52.4	34.2	13.5	3,324	8.9%	13.2%	6.6%	16.2%
Digital	43.1	32.6	1.3	1,032	7.3%	12.6%	.6%	5.0%
Mentor Graphics	37.0	4.9	16.3	165	6.3%	1.9%	7.9%	.8%
Fujitsu	36.7	20.2	11.8	848	6.3%	7.8%	5.7%	4.1%
Synopsys	33.8	.0	22.9	0	5.8%	.0%	11.2%	.0%
Seiko*	32.0	11.2	16.0	188	5.5%	4.3%	7.8%	.9%
Marubeni Hytech*	27.6	3.7	23.5	131	4.7%	1.4%	11.5%	.6%
Zuken	25.3	7.3	12.1	144	4.3%	2.8%	5.9%	.7%
Wacom	18.9	3.8	13.1	641	3.2%	1.5%	6.4%	3.1%
Viewlogic Systems	13.5	.0	10.2	0	2.3%	.0%	5.0%	.0%
Sony	11.2	11.2	.0	557	1.9%	4.3%	.0%	2.7%
C. Itoh Techno-Science*	9.3	2.9	5.7	99	1.6%	1.1%	2.8%	.5%
Quickturn Design Systems	8.9	2.7	4.5	55	1.5%	1.0%	2.2%	.3%
COMPASS Design Automation	7.6	.0	6.1	0	1.3%	.0%	3.0%	.0%
Zycad	6.2	3.6	.7	90	1.1%	1.4%	.4%	.4%
CrossCheck Technology	5.7	.0	3.0	0	1.0%	.0%	1.5%	.0%
IBM	5.6	5.6	.0	1,036	1.0%	2.2%	.0%	5.0%
Logic Modeling Corp.	4.8	.0	4.2	0	.8%	.0%	2.0%	.0%

(Continued)

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Table 15 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sophia Systems*	4.6	1.0	3.1	49	.8%	.4%	1.5%	.2%
Intergraph	4.5	1.0	1.4	29	.8%	.4%	.7%	.1%
Racal-Redac	3.8	.5	1.7	23	.7%	.2%	.8%	.1%
Harris EDA	3.7	.4	2.3	17	.6%	.1%	1.1%	.1%
Microsim	3.3	.0	3.1	0	.6%	.0%	1.5%	.0%
Autodesk	3.2	.0	3.2	0	.5%	.0%	1.6%	.0%
Altera	2.9	.0	2.5	0	.5%	.0%	1.2%	.0%
Meta-Software	2.8	.0	1.8	0	.5%	.0%	.9%	.0%
Contec Microelectronics	2.4	.0	2.2	0	.4%	.0%	1.1%	.0%
Summitt	2.2	.0	2.0	0	.4%	.0%	1.0%	.0%
Apple Computer	1.9	1.9	.0	402	.3%	.7%	.0%	2.0%
LSI Logic	1.9	.1	1.5	4	.3%	.1%	.7%	.0%
Data I/O	1.8	.0	1.8	0	.3%	.0%	.9%	.0%
Analogy	1.7	.0	1.3	0	.3%	.0%	.7%	.0%
Ascent Logic Corp	1.6	.0	1.3	0	.3%	.0%	.6%	.0%
EPIC Design Technology	1.6	.0	1.6	0	.3%	.0%	.8%	.0%
IKOS Systems	1.5	1.1	.4	18	.2%	.4%	.2%	.1%
PADS Software	1.4	.0	1.3	0	.2%	.0%	.6%	.0%
ANACAD EES	1.4	.0	1.3	0	.2%	.0%	.6%	.0%
Century Research Center	1.3	.7	.5	9	.2%	.3%	.2%	.0%
Xilinx	1.3	.0	1.1	0	.2%	.0%	.5%	.0%

(Continued)

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Table 15 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cascade Design Automation	1.1	.0	.9	0	.2%	.0%	.4%	.0%
Neocad	1.0	.0	1.0	0	.2%	.0%	.5%	.0%
Orcad	.9	.0	.9	0	.2%	.0%	.4%	.0%
Kanematsu Semiconductor*	.7	.0	.5	0	.1%	.0%	.2%	.0%
Other Companies	.0	.0	.0	6,467	.0%	.0%	.0%	31.5%
All Companies	586.1	259.0	205.1	20,540	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	435.1	181.1	150.9	14,995	74.2%	69.9%	73.6%	73.0%
All Asian-Based Companies	145.7	77.3	51.0	5,523	24.9%	29.9%	24.9%	26.9%
All European-Based Companies	5.3	.5	3.1	23	.9%	.2%	1.5%	.1%
All Hardware Companies	225.5	184.4	4.5	15,069	38.5%	71.2%	2.2%	73.4%
All Turnkey & SW Companies	360.6	74.6	200.6	5,472	61.5%	28.8%	97.8%	26.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 16
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	58.2	46.2	.0	1,760	27.5%	52.9%	.0%	53.9%
Cadence	50.7	.0	32.8	0	24.0%	.0%	45.0%	.0%
Seiko*	26.7	9.4	13.4	159	12.6%	10.7%	18.4%	4.8%
Digital	19.3	15.1	.0	287	9.1%	17.2%	.0%	8.8%
Fujitsu	15.7	9.2	4.7	512	7.4%	10.5%	6.5%	15.7%
Mentor Graphics	14.0	1.6	6.3	54	6.6%	1.9%	8.6%	1.7%
OKURA*	10.8	.0	10.8	0	5.1%	.0%	14.8%	.0%
COMPASS Design Automation	5.1	.0	4.1	0	2.4%	.0%	5.6%	.0%
NEC	4.0	2.5	1.2	114	1.9%	2.9%	1.6%	3.5%
Cascade Design Automation	3.6	.0	2.7	0	1.7%	.0%	3.8%	.0%
Silvar-Lisco	3.3	.0	2.2	0	1.6%	.0%	3.1%	.0%
TSSI Japan	2.2	.0	1.6	0	1.0%	.0%	2.2%	.0%
Hewlett-Packard	1.9	1.6	.0	61	.9%	1.8%	.0%	1.9%
Intergraph	1.8	.4	.6	8	.9%	.4%	.8%	.2%
Marubeni Hytech*	1.4	.3	1.2	9	.7%	.3%	1.6%	.3%
Integrated Silicon Systems	1.3	.0	1.3	0	.6%	.0%	1.7%	.0%
ArcSys	1.0	.0	.9	0	.5%	.0%	1.2%	.0%

(Continued)

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Table 16 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Compact Software	.6	.0	.5	0	.3%	.0%	.6%	.0%
Other Companies	.0	.7	.0	282	.0%	.8%	.0%	8.6%
All Companies	211.4	87.4	72.7	3,269	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	162.4	65.9	51.9	2,464	76.8%	75.5%	71.3%	75.4%
All Asian-Based Companies	49.0	21.4	20.9	805	23.2%	24.5%	28.7%	24.6%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	84.8	68.2	.0	2,690	40.1%	78.1%	.0%	82.3%
All Turnkey & SW Companies	126.7	19.1	72.7	578	59.9%	21.9%	100.0%	17.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 17
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Zuken	69.7	20.1	33.3	396	17.7%	10.7%	23.5%	3.2%
Fujitsu	41.9	21.9	14.4	887	10.6%	11.7%	10.2%	7.2%
Sun Microsystems	37.8	30.0	.0	1,364	9.6%	16.0%	.0%	11.1%
Yokogawa Digital Computer	30.9	12.3	15.4	285	7.8%	6.6%	10.9%	2.3%
CADIX	29.0	12.5	14.2	160	7.4%	6.7%	10.0%	1.3%
NEC	28.2	18.8	6.9	2,188	7.1%	10.0%	4.9%	17.8%
IBM	18.7	7.0	9.7	600	4.7%	3.7%	6.8%	4.9%
Digital	15.9	11.2	1.3	338	4.0%	6.0%	.9%	2.8%
Hewlett-Packard	14.7	12.5	.0	548	3.7%	6.7%	.0%	4.5%
Toshiba*	14.4	7.2	5.8	160	3.6%	3.8%	4.1%	1.3%
Mentor Graphics	13.7	1.6	6.2	54	3.5%	.9%	4.3%	.4%
Racal-Redac	12.2	1.8	5.4	73	3.1%	.9%	3.8%	.6%
Altium*	12.1	3.2	8.5	1,064	3.1%	1.7%	6.0%	8.7%
Sharp*	10.7	5.2	5.6	97	2.7%	2.8%	3.9%	.8%
Cadence	7.4	.0	4.8	0	1.9%	.0%	3.4%	.0%
Hitachi	7.1	3.3	3.1	319	1.8%	1.8%	2.2%	2.6%
Uchida Yoko	6.3	3.7	2.3	180	1.6%	2.0%	1.6%	1.5%
C. Itoh Techno-Science*	5.8	1.8	3.5	62	1.5%	.9%	2.5%	.5%
Harris EDA	5.2	.4	3.1	17	1.3%	.2%	2.2%	.1%
Sumisho Electronics*	4.5	3.2	1.2	95	1.1%	1.7%	.8%	.8%
Sony	3.9	3.9	.0	193	1.0%	2.1%	.0%	1.6%

(Continued)

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Table 17 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
PADS Software	3.8	.0	3.3	0	1.0%	.0%	2.4%	.0%
Intergraph	2.2	.4	.7	14	.6%	.2%	.5%	.1%
Omron	2.0	1.0	.8	45	.5%	.5%	.6%	.4%
TECHSPERT	1.3	.2	1.1	11	.3%	.1%	.8%	.1%
Sophia Systems*	1.1	.2	.8	10	.3%	.1%	.6%	.1%
BETRONEX	1.1	.1	1.0	20	.3%	.0%	.7%	.2%
Andor	1.0	.2	.8	19	.3%	.1%	.5%	.2%
Century Research Center	1.0	.5	.4	7	.3%	.3%	.3%	.1%
Autodesk	.6	.0	.6	0	.2%	.0%	.5%	.0%
Compact Software	.6	.0	.5	0	.1%	.0%	.3%	.0%
Other Companies	.0	2.3	.0	2,957	.0%	1.2%	.0%	24.1%
All Companies	394.4	187.2	141.8	12,262	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	134.2	74.9	31.4	7,200	34.0%	40.0%	22.2%	58.7%
All Asian-Based Companies	246.4	110.5	103.4	4,969	62.5%	59.0%	73.0%	40.5%
All European-Based Companies	13.9	1.9	6.9	93	3.5%	1.0%	4.9%	.8%
All Hardware Companies	91.6	78.4	.0	7,477	23.2%	41.9%	.0%	61.0%
All Turnkey & SW Companies	302.9	108.8	141.8	4,785	76.8%	58.1%	100.0%	39.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 18
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	6.6	5.3	.0	244	9.5%	21.0%	.0%	15.6%
IBM	6.6	3.3	2.1	189	9.5%	13.0%	7.4%	12.0%
Computervision	6.5	1.4	3.3	63	9.4%	5.4%	11.2%	4.0%
EDS Unigraphics	5.4	1.6	2.5	67	7.7%	6.2%	8.6%	4.3%
Cadence	5.0	.0	3.2	0	7.2%	.0%	11.1%	.0%
Silicon Graphics	4.4	4.4	.0	117	6.3%	17.3%	.0%	7.4%
Synopsys	3.0	.0	2.0	0	4.3%	.0%	7.0%	.0%
Viewlogic Systems	2.6	.0	2.0	0	3.8%	.0%	6.8%	.0%
Sun Microsystems	2.5	2.0	.0	86	3.6%	7.9%	.0%	5.5%
IEZ	2.3	.8	1.2	56	3.3%	3.1%	4.1%	3.5%
Mentor Graphics	2.3	.3	1.0	10	3.3%	1.2%	3.5%	.6%
Intergraph	2.3	.9	.6	34	3.3%	3.7%	2.1%	2.2%
ESRI	2.2	.0	1.8	0	3.1%	.0%	6.0%	.0%
SDRC	2.1	.0	1.4	0	3.1%	.0%	5.0%	.0%
Hewlett-Packard	2.0	1.7	.0	76	2.9%	6.7%	.0%	4.8%
Altium*	1.5	.6	.9	113	2.2%	2.3%	3.1%	7.2%
Zuken	1.3	.4	.6	7	1.9%	1.5%	2.1%	.5%
MacNeal-Schwendler	1.1	.0	1.1	0	1.6%	.0%	3.7%	.0%
Investronica SA	.6	.4	.2	22	.9%	1.5%	.6%	1.4%
CAD Centre	.5	.0	.4	0	.8%	.0%	1.4%	.0%

(Continued)

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Table 18 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Matra Datavision	.5	.2	.3	8	.8%	.7%	1.0%	.5%
Other Companies	6.3	1.8	3.4	464	9.1%	7.3%	11.5%	29.6%
All Companies	69.4	25.2	29.1	1,568	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	63.1	23.2	26.0	1,463	91.0%	92.1%	89.4%	93.3%
All Asian-Based Companies	1.3	.4	.6	7	1.9%	1.5%	2.1%	.5%
All European-Based Companies	5.0	1.6	2.5	97	7.2%	6.4%	8.5%	6.2%
All Hardware Companies	18.5	16.3	.0	1,224	26.7%	64.7%	.0%	78.0%
All Turnkey & SW Companies	50.9	8.9	29.1	344	73.3%	35.3%	100.0%	22.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 19
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Computervision	6.4	1.4	3.2	63	12.6%	8.7%	13.9%	10.7%
Cadence	5.0	.0	3.2	0	9.8%	.0%	13.9%	.0%
EDS Unigraphics	4.5	1.3	2.1	60	8.9%	8.4%	9.2%	10.3%
Silicon Graphics	4.4	4.4	.0	117	8.5%	28.0%	.0%	19.9%
Synopsys	3.0	.0	2.0	0	5.9%	.0%	8.7%	.0%
IEZ	2.3	.8	1.2	56	4.5%	4.9%	5.1%	9.5%
IBM	2.3	.9	1.0	18	4.5%	5.5%	4.3%	3.1%
Mentor Graphics	2.3	.3	1.0	10	4.5%	1.9%	4.4%	1.6%
Sun Microsystems	2.2	1.7	.0	80	4.3%	11.1%	.0%	13.7%
Viewlogic Systems	2.2	.0	1.5	0	4.2%	.0%	6.5%	.0%
SDRC	2.1	.0	1.4	0	4.1%	.0%	6.2%	.0%
Intergraph	1.9	.8	.5	25	3.8%	5.3%	2.0%	4.2%
Hewlett-Packard	1.9	1.6	.0	61	3.7%	10.5%	.0%	10.5%
Digital	1.9	1.5	.0	60	3.6%	9.3%	.0%	10.3%
Zuken	1.3	.4	.6	7	2.5%	2.4%	2.7%	1.3%
ESRI	.9	.0	.7	0	1.7%	.0%	2.9%	.0%
Altium*	.7	.3	.4	20	1.4%	1.9%	1.6%	3.4%
CAD Centre	.5	.0	.4	0	1.0%	.0%	1.8%	.0%

(Continued)

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Table 19 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Matra Datavision	.5	.2	.3	7	1.0%	1.2%	1.2%	1.2%
Other Companies	3.2	.0	2.8	0	6.3%	.0%	12.0%	.0%
All Companies	51.1	15.6	23.2	585	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	45.5	14.0	20.3	504	89.1%	89.8%	87.5%	86.2%
All Asian-Based Companies	1.3	.4	.6	7	2.5%	2.4%	2.7%	1.3%
All European-Based Companies	4.3	1.2	2.3	74	8.4%	7.8%	9.8%	12.6%
All Hardware Companies	10.3	9.2	.0	319	20.3%	59.1%	.0%	54.6%
All Turnkey & SW Companies	40.7	6.4	23.2	266	79.7%	40.9%	100.0%	45.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 20
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	2.5	1.4	.5	31	35.5%	32.3%	35.3%	44.6%
Digital	2.4	1.9	.0	0	34.2%	42.9%	.0%	.0%
MacNeal-Schwendler	.6	.0	.6	0	8.7%	.0%	43.2%	.0%
Other Companies	1.3	1.1	.2	39	19.3%	24.8%	12.9%	55.2%
All Companies	6.9	4.3	1.4	71	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	6.9	4.3	1.4	70	99.9%	100.0%	100.0%	99.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.1%	.0%	.0%	.2%
All Hardware Companies	3.5	2.9	.0	39	50.6%	67.7%	.0%	54.9%
All Turnkey & SW Companies	3.4	1.4	1.4	32	49.4%	32.3%	100.0%	45.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 21
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	1.8	1.4	.0	15	31.8%	58.5%	.0%	42.5%
ESRI	.9	.0	.7	0	15.4%	.0%	36.5%	.0%
EDS Unigraphics	.8	.3	.4	7	15.1%	10.7%	21.0%	20.3%
IBM	.6	.3	.1	5	10.3%	13.2%	7.7%	12.8%
Other Companies	.7	.1	.3	2	13.1%	3.4%	14.9%	4.2%
All Companies	5.5	2.3	1.8	36	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	5.5	2.3	1.8	36	99.8%	100.0%	100.0%	99.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.2%	.0%	.0%	.2%
All Hardware Companies	2.1	1.6	.0	21	37.6%	70.1%	.0%	59.2%
All Turnkey & SW Companies	3.4	.7	1.8	15	62.4%	29.9%	100.0%	40.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 22
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	1.3	.7	.5	135	21.4%	24.1%	19.8%	15.4%
Altium*	.8	.3	.5	93	14.0%	9.4%	19.8%	10.6%
Digital	.7	.6	.0	168	11.1%	21.1%	.0%	19.2%
Investronica SA	.6	.4	.2	22	10.6%	13.0%	6.5%	2.5%
Other Companies	1.0	.9	.1	436	17.5%	29.4%	4.2%	49.7%
All Companies	5.9	3.0	2.6	876	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	5.3	2.6	2.4	853	88.7%	87.0%	92.8%	97.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.7	.4	.2	23	11.3%	13.0%	7.2%	2.7%
All Hardware Companies	2.6	2.6	.0	844	44.4%	85.3%	.0%	96.4%
All Turnkey & SW Companies	3.3	.4	2.6	32	55.6%	14.7%	100.0%	3.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 23
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
EDS Unigraphics	5.4	1.6	2.5	67	17.5%	11.9%	21.2%	11.4%
IBM	4.8	2.2	1.7	90	15.7%	17.1%	14.1%	15.1%
Computervision	4.7	1.0	2.4	45	15.3%	7.4%	19.9%	7.6%
Silicon Graphics	3.9	3.9	.0	103	12.7%	29.7%	.0%	17.4%
Digital	2.7	2.1	.0	89	8.7%	16.2%	.0%	15.1%
SDRC	2.1	.0	1.4	0	6.9%	.0%	12.2%	.0%
Altium*	1.2	.5	.7	87	4.0%	3.8%	5.8%	14.6%
MacNeal-Schwendler	1.1	.0	1.1	0	3.6%	.0%	9.0%	.0%
Investronica SA	.6	.4	.2	22	2.1%	3.0%	1.4%	3.6%
Matra Datavision	.5	.2	.3	8	1.7%	1.4%	2.5%	1.3%
Other Companies	1.4	.6	.5	55	4.5%	4.7%	4.3%	9.2%
All Companies	30.7	13.1	11.9	592	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	28.7	12.4	11.0	555	93.7%	94.3%	92.6%	93.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.9	.8	.9	37	6.3%	5.7%	7.4%	6.3%
All Hardware Companies	8.3	7.6	.0	391	27.1%	58.2%	.0%	66.0%
All Turnkey & SW Companies	22.4	5.5	11.9	201	72.9%	41.8%	100.0%	34.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 24
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IEZ	2.3	.8	1.2	56	28.8%	23.3%	38.1%	24.3%
Computervision	1.8	.4	.9	17	22.5%	11.5%	29.2%	7.6%
Intergraph	1.0	.4	.3	18	12.6%	13.0%	8.7%	7.8%
IBM	.9	.5	.2	39	11.1%	15.2%	7.7%	17.1%
Digital	.5	.4	.0	61	6.5%	13.3%	.0%	26.7%
Other Companies	.2	.1	.1	3	2.9%	2.7%	2.9%	1.2%
All Companies	8.0	3.3	3.1	229	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	5.4	2.5	1.7	173	67.1%	76.7%	54.2%	75.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	2.6	.8	1.4	56	32.9%	23.3%	45.8%	24.3%
All Hardware Companies	1.5	1.4	.0	127	19.0%	41.8%	.0%	55.7%
All Turnkey & SW Companies	6.5	1.9	3.1	101	81.0%	58.2%	100.0%	44.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 25
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ESRI	2.2	.0	1.8	0	32.4%	.0%	59.5%	.0%
Digital	1.0	.8	.0	37	14.4%	36.7%	.0%	19.1%
Intergraph	.6	.3	.1	10	9.0%	14.5%	3.7%	4.9%
Other Companies	2.1	.6	.9	119	30.9%	26.2%	31.0%	60.8%
All Companies	6.7	2.2	2.9	196	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	6.5	2.2	2.9	193	97.0%	97.3%	97.6%	98.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.2	.1	.1	3	3.0%	2.7%	2.4%	1.5%
All Hardware Companies	1.7	1.5	.0	175	25.4%	67.9%	.0%	89.2%
All Turnkey & SW Companies	5.0	.7	2.9	21	74.6%	32.1%	100.0%	10.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 26
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cadence	5.0	.0	3.2	0	20.8%	.0%	28.9%	.0%
Synopsys	3.0	.0	2.0	0	12.5%	.0%	18.2%	.0%
Viewlogic Systems	2.6	.0	2.0	0	10.9%	.0%	17.7%	.0%
Digital	2.5	1.9	.0	56	10.3%	29.3%	.0%	10.2%
Sun Microsystems	2.3	1.8	.0	80	9.6%	28.0%	.0%	14.6%
Mentor Graphics	2.3	.3	1.0	10	9.5%	4.6%	9.1%	1.8%
Hewlett-Packard	1.4	1.2	.0	51	5.8%	18.2%	.0%	9.2%
Zuken	1.3	.4	.6	7	5.4%	5.6%	5.6%	1.3%
Other Companies	2.6	.6	1.8	287	10.9%	8.4%	16.5%	52.1%
All Companies	24.1	6.6	11.2	551	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	22.6	6.2	10.5	542	93.7%	93.9%	93.6%	98.4%
All Asian-Based Companies	1.3	.4	.6	7	5.4%	5.6%	5.6%	1.3%
All European-Based Companies	.2	.0	.1	1	.9%	.5%	.8%	.2%
All Hardware Companies	7.0	5.8	.0	530	29.2%	88.0%	.0%	96.3%
All Turnkey & SW Companies	17.1	.8	11.2	21	70.8%	12.0%	100.0%	3.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 27
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Synopsys	3.0	.0	2.0	0	19.3%	.0%	24.3%	.0%
Viewlogic Systems	2.6	.0	2.0	0	16.8%	.0%	23.6%	.0%
Cadence	2.4	.0	1.5	0	15.3%	.0%	18.4%	.0%
Mentor Graphics	1.3	.2	.6	6	8.4%	5.6%	6.9%	1.5%
Sun Microsystems	1.0	.8	.0	35	6.4%	24.1%	.0%	9.1%
Zuken	.9	.3	.5	5	6.0%	8.4%	5.4%	1.4%
Digital	.9	.7	.0	22	5.6%	21.1%	.0%	5.6%
Hewlett-Packard	.8	.7	.0	27	4.9%	20.4%	.0%	7.0%
Other Companies	2.4	.5	1.7	267	15.4%	15.2%	20.6%	68.6%
All Companies	15.6	3.2	8.4	389	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	14.6	3.0	7.9	383	93.6%	91.3%	94.4%	98.5%
All Asian-Based Companies	.9	.3	.5	5	6.0%	8.4%	5.4%	1.4%
All European-Based Companies	.1	.0	.0	0	.3%	.3%	.2%	.1%
All Hardware Companies	3.3	2.7	.0	377	20.9%	84.8%	.0%	96.9%
All Turnkey & SW Companies	12.3	.5	8.4	12	79.1%	15.2%	100.0%	3.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 28
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cadence	2.3	.0	1.5	0	56.9%	.0%	79.5%	.0%
Sun Microsystems	.6	.5	.0	18	14.5%	52.3%	.0%	65.0%
Other Companies	.2	.0	.2	0	4.7%	1.1%	8.1%	1.3%
All Companies	4.0	.9	1.9	27	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	4.0	.9	1.9	27	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.0	.8	.0	25	25.4%	92.0%	.0%	92.3%
All Turnkey & SW Companies	3.0	.1	1.9	2	74.6%	8.0%	100.0%	7.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 29
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: China
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	1.2	1.0	.0	29	26.9%	38.5%	.0%	21.3%
Sun Microsystems	.8	.6	.0	27	16.7%	24.3%	.0%	20.2%
Hewlett-Packard	.6	.5	.0	22	13.4%	20.6%	.0%	16.6%
Other Companies	.0	.1	.0	20	.9%	2.0%	.0%	15.0%
All Companies	4.5	2.5	1.0	135	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	4.0	2.4	.7	132	88.4%	95.1%	75.0%	97.8%
All Asian-Based Companies	.4	.1	.2	2	8.0%	4.0%	17.7%	1.5%
All European-Based Companies	.2	.0	.1	1	3.6%	.8%	7.3%	.7%
All Hardware Companies	2.7	2.2	.0	129	61.0%	90.7%	.0%	95.3%
All Turnkey & SW Companies	1.8	.2	1.0	6	39.0%	9.3%	100.0%	4.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 30
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Computervision	6.9	1.4	3.5	66	12.8%	5.6%	19.2%	4.1%
Digital	6.0	4.8	.0	199	11.2%	18.8%	.0%	12.3%
Silicon Graphics	5.8	5.8	.0	155	10.8%	22.9%	.0%	9.6%
IBM	5.0	2.3	1.8	125	9.2%	9.1%	10.0%	7.7%
Sun Microsystems	3.6	2.9	.0	121	6.7%	11.2%	.0%	7.5%
Intergraph	3.5	1.4	1.0	49	6.4%	5.5%	5.4%	3.0%
SDRC	2.8	.0	1.9	0	5.3%	.0%	10.7%	.0%
EDS Unigraphics	2.5	.7	1.2	32	4.7%	2.9%	6.6%	2.0%
Cadence	2.2	.0	1.5	0	4.1%	.0%	8.0%	.0%
Altium*	1.5	.6	.9	113	2.8%	2.3%	5.0%	7.0%
Autodesk	1.5	.0	1.5	0	2.8%	.0%	8.4%	.0%
Hewlett-Packard	1.5	1.3	.0	58	2.8%	5.1%	.0%	3.6%
MacNeal-Schwendler	1.2	.0	1.2	0	2.2%	.0%	6.4%	.0%
ESRI	.8	.0	.6	0	1.5%	.0%	3.5%	.0%
Mentor Graphics	.7	.1	.3	3	1.2%	.3%	1.6%	.2%
Investronica SA	.6	.4	.2	22	1.2%	1.5%	.9%	1.3%
Gerber Systems	.5	.3	.2	9	1.0%	1.0%	1.3%	.5%

(Continued)

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Table 30 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Matra Datavision	.5	.2	.3	8	1.0%	.7%	1.7%	.5%
Other Companies	4.9	2.8	1.4	640	9.1%	11.0%	7.7%	39.6%
All Companies	53.8	25.4	18.0	1,617	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	51.6	24.6	17.1	1,578	95.9%	96.9%	94.8%	97.6%
All Asian-Based Companies	.1	.0	.0	0	.1%	.1%	.2%	.0%
All European-Based Companies	2.1	.8	.9	39	3.9%	3.1%	5.0%	2.4%
All Hardware Companies	20.8	18.5	.0	1,364	38.6%	72.7%	.0%	84.4%
All Turnkey & SW Companies	33.0	7.0	18.0	253	61.4%	27.3%	100.0%	15.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 31
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Computervision	6.8	1.4	3.4	66	18.5%	9.0%	26.6%	11.9%
Silicon Graphics	5.8	5.8	.0	155	15.8%	36.6%	.0%	27.9%
Sun Microsystems	3.1	2.5	.0	112	8.6%	15.6%	.0%	20.2%
Intergraph	3.0	1.2	.8	36	8.1%	7.8%	5.9%	6.5%
SDRC	2.8	.0	1.9	0	7.6%	.0%	14.9%	.0%
Cadence	2.2	.0	1.5	0	6.0%	.0%	11.3%	.0%
EDS Unigraphics	2.1	.6	1.0	28	5.8%	3.9%	7.9%	5.1%
Digital	1.8	1.4	.0	59	4.9%	8.9%	.0%	10.6%
IBM	1.7	.6	.8	13	4.7%	3.8%	6.4%	2.3%
Hewlett-Packard	1.4	1.2	.0	46	3.9%	7.8%	.0%	8.3%
Altium*	.7	.3	.4	20	1.9%	1.9%	3.0%	3.6%
Mentor Graphics	.7	.1	.3	3	1.8%	.4%	2.2%	.5%
Gerber Systems	.5	.3	.2	9	1.5%	1.6%	1.8%	1.6%
Matra Datavision	.5	.2	.3	7	1.4%	1.1%	2.3%	1.3%
Other Companies	1.3	.0	1.1	0	3.5%	.0%	8.9%	.0%
All Companies	36.7	15.9	12.8	557	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	35.3	15.5	12.1	540	96.0%	97.4%	94.5%	97.1%
All Asian-Based Companies	.1	.0	.0	0	.2%	.1%	.2%	.1%
All European-Based Companies	1.4	.4	.7	16	3.8%	2.5%	5.3%	2.9%
All Hardware Companies	12.2	11.0	.0	374	33.3%	69.1%	.0%	67.2%
All Turnkey & SW Companies	24.5	4.9	12.8	183	66.7%	30.9%	100.0%	32.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 32
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	2.2	1.7	.0	0	35.9%	43.6%	.0%	.0%
IBM	1.8	1.0	.4	23	28.5%	25.3%	28.9%	33.1%
MacNeal-Schwendler	.7	.0	.7	0	10.5%	.0%	53.7%	.0%
Other Companies	1.5	1.2	.2	46	24.2%	31.1%	14.0%	66.6%
All Companies	6.2	4.0	1.2	69	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	6.2	4.0	1.2	68	99.8%	100.0%	100.0%	99.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.2%	.0%	.0%	.2%
All Hardware Companies	3.5	3.0	.0	46	57.0%	74.7%	.0%	66.4%
All Turnkey & SW Companies	2.7	1.0	1.2	23	43.0%	25.3%	100.0%	33.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 33
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	1.5	1.2	.0	13	34.7%	54.7%	.0%	37.6%
Sun Microsystems	.5	.4	.0	8	10.6%	17.9%	.0%	23.5%
Other Companies	.5	.1	.2	3	11.8%	3.3%	16.5%	7.5%
All Companies	4.3	2.1	1.2	35	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	4.3	2.1	1.2	34	99.8%	100.0%	100.0%	99.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.2%	.0%	.0%	.2%
All Hardware Companies	2.0	1.6	.0	22	45.8%	73.6%	.0%	62.4%
All Turnkey & SW Companies	2.3	.6	1.2	13	54.2%	26.4%	100.0%	37.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 34
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Autodesk	1.4	.0	1.4	0	21.2%	.0%	48.4%	.0%
IBM	1.0	.5	.5	86	15.5%	13.7%	18.1%	9.0%
Altium*	.8	.3	.5	93	12.6%	8.2%	18.1%	9.7%
Investronica SA	.6	.4	.2	22	9.6%	11.4%	5.9%	2.2%
Digital	.5	.5	.0	127	7.6%	13.7%	.0%	13.2%
Other Companies	1.6	1.7	.0	607	24.8%	49.6%	.0%	63.4%
All Companies	6.6	3.4	2.9	957	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	5.9	3.0	2.7	935	89.5%	88.6%	92.3%	97.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.7	.4	.2	23	10.5%	11.4%	7.7%	2.4%
All Hardware Companies	3.0	3.0	.0	923	46.3%	86.3%	.0%	96.4%
All Turnkey & SW Companies	3.5	.5	2.9	34	53.7%	13.7%	100.0%	3.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 35
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Computervision	6.3	1.3	3.2	60	19.7%	9.0%	26.5%	7.8%
Silicon Graphics	5.4	5.4	.0	141	16.8%	37.1%	.0%	18.3%
IBM	3.6	1.6	1.4	76	11.2%	10.9%	11.4%	9.8%
SDRC	2.8	.0	1.9	0	8.9%	.0%	16.2%	.0%
Digital	2.6	2.0	.0	85	8.0%	14.0%	.0%	11.0%
EDS Unigraphics	2.5	.7	1.2	32	7.9%	5.1%	10.0%	4.1%
Altium*	1.2	.5	.7	87	3.9%	3.5%	5.8%	11.2%
MacNeal-Schwendler	1.2	.0	1.2	0	3.7%	.0%	9.7%	.0%
Intergraph	1.0	.3	.3	11	3.1%	2.3%	2.7%	1.5%
Investronica SA	.6	.4	.2	22	2.0%	2.7%	1.4%	2.8%
Autodesk	.6	.0	.6	0	1.9%	.0%	5.1%	.0%
Gerber Systems	.5	.3	.2	9	1.7%	1.7%	1.9%	1.1%
Matra Datavision	.5	.2	.3	8	1.7%	1.2%	2.5%	1.0%
Other Companies	2.1	1.3	.5	222	6.5%	9.1%	4.1%	28.7%
All Companies	31.8	14.4	11.9	774	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	30.4	13.8	11.3	740	95.5%	95.4%	95.0%	95.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.4	.7	.6	33	4.5%	4.6%	5.0%	4.3%
All Hardware Companies	10.4	9.8	.0	595	32.8%	67.6%	.0%	77.0%
All Turnkey & SW Companies	21.4	4.7	11.9	178	67.2%	32.4%	100.0%	23.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 36
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	1.3	.5	.4	22	24.3%	19.5%	22.1%	6.6%
IBM	.8	.4	.2	25	15.7%	15.5%	14.7%	7.6%
Autodesk	.7	.0	.7	0	12.6%	.0%	40.5%	.0%
Computervision	.6	.1	.3	6	11.7%	4.7%	19.6%	1.7%
Other Companies	.7	.7	.0	207	13.6%	25.3%	.0%	61.7%
All Companies	5.2	2.8	1.6	335	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	5.2	2.8	1.6	335	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.9	1.8	.0	299	36.0%	63.5%	.0%	89.2%
All Turnkey & SW Companies	3.3	1.0	1.6	36	64.0%	36.5%	100.0%	10.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 37
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ESRI	.8	.0	.6	0	19.7%	.0%	41.0%	.0%
Intergraph	.8	.4	.2	13	19.5%	26.5%	10.9%	8.6%
Other Companies	1.2	.5	.5	100	30.2%	27.7%	30.1%	66.8%
All Companies	4.1	1.7	1.6	149	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.9	1.6	1.5	146	95.1%	96.4%	95.5%	98.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.2	.1	.1	3	4.9%	3.6%	4.5%	2.0%
All Hardware Companies	1.0	.9	.0	128	24.8%	56.0%	.0%	85.5%
All Turnkey & SW Companies	3.1	.7	1.6	22	75.2%	44.0%	100.0%	14.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

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Table 38
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	3.3	2.6	.0	112	25.9%	39.5%	.0%	31.1%
Digital	2.7	2.1	.0	56	21.3%	32.2%	.0%	15.6%
Cadence	2.2	.0	1.5	0	17.5%	.0%	49.2%	.0%
Hewlett-Packard	1.0	.9	.0	37	8.1%	13.5%	.0%	10.3%
Mentor Graphics	.7	.1	.3	3	5.1%	1.1%	9.5%	.8%
Other Companies	.9	.3	.5	111	7.1%	4.7%	15.3%	30.8%
All Companies	12.7	6.6	3.0	359	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	12.2	6.5	2.7	356	95.7%	98.8%	90.8%	99.2%
All Asian-Based Companies	.1	.0	.0	0	.6%	.3%	1.0%	.1%
All European-Based Companies	.5	.1	.2	3	3.7%	.9%	8.1%	.7%
All Hardware Companies	7.5	6.1	.0	342	58.7%	91.9%	.0%	95.3%
All Turnkey & SW Companies	5.2	.5	3.0	17	41.3%	8.1%	100.0%	4.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

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Table 39
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	1.1	.9	.0	28	20.3%	33.3%	.0%	19.4%
Cadence	1.1	.0	.7	0	19.2%	.0%	47.3%	.0%
Sun Microsystems	1.0	.8	.0	35	17.9%	29.9%	.0%	24.7%
Hewlett-Packard	.6	.5	.0	19	10.1%	18.4%	.0%	13.5%
Other Companies	.6	.1	.4	44	10.1%	3.4%	24.7%	30.5%
All Companies	5.5	2.6	1.5	143	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	5.4	2.6	1.4	143	98.2%	99.6%	96.6%	99.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.1	.0	.1	1	1.8%	.4%	3.4%	.4%
All Hardware Companies	2.8	2.3	.0	132	50.7%	86.6%	.0%	92.3%
All Turnkey & SW Companies	2.7	.4	1.5	11	49.3%	13.4%	100.0%	7.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 40
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	1.2	.9	.0	35	32.0%	49.5%	.0%	64.8%
Digital	1.1	.9	.0	16	30.1%	46.2%	.0%	30.1%
Cadence	1.0	.0	.7	0	27.9%	.0%	80.5%	.0%
Other Companies	.1	.0	.1	0	2.5%	.5%	8.5%	.9%
All Companies	3.6	1.9	.8	54	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.6	1.9	.8	54	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	2.3	1.8	.0	53	63.5%	98.4%	.0%	98.3%
All Turnkey & SW Companies	1.3	.0	.8	1	36.5%	1.6%	100.0%	1.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 41
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems*	1.1	.9	.0	41	32.0%	42.7%	.0%	25.4%
Digital	.5	.4	.0	12	13.8%	18.5%	.0%	7.3%
Other Companies	.3	.2	.0	66	7.0%	10.0%	3.0%	41.2%
All Companies	3.6	2.1	.7	161	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.1	2.0	.5	159	87.6%	96.7%	67.2%	98.6%
All Asian-Based Companies	.1	.0	.0	0	2.0%	.9%	4.5%	.3%
All European-Based Companies	.4	.1	.2	2	10.4%	2.4%	28.4%	1.2%
All Hardware Companies	2.4	2.0	.0	156	66.3%	92.9%	.0%	97.0%
All Turnkey & SW Companies	1.2	.2	.7	5	33.7%	7.1%	100.0%	3.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 42
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Fujitsu	523.7	298.0	165.8	18,152	11.8%	12.5%	12.1%	12.2%
NEC	402.9	269.1	97.8	22,773	9.1%	11.3%	7.1%	15.3%
IBM	331.5	160.6	115.4	9,756	7.5%	6.7%	8.4%	6.6%
Nihon Unisys	266.1	156.4	56.1	1,220	6.0%	6.6%	4.1%	.8%
Sun Microsystems	199.6	158.9	.0	6,656	4.5%	6.7%	.0%	4.5%
Hitachi	187.9	88.3	80.8	7,870	4.2%	3.7%	5.9%	5.3%
Hewlett-Packard	184.0	123.8	25.0	5,236	4.2%	5.2%	1.8%	3.5%
Toshiba*	179.9	89.9	71.9	4,944	4.1%	3.8%	5.2%	3.3%
Digital	120.5	93.0	2.7	3,576	2.7%	3.9%	.2%	2.4%
Mitsubishi Electric	116.9	91.4	14.6	1,849	2.6%	3.8%	1.1%	1.2%
Seiko*	98.9	34.6	49.5	587	2.2%	1.5%	3.6%	.4%
Hitachi Zosen Info Systems	98.0	83.1	4.8	937	2.2%	3.5%	.3%	.6%
Altium*	94.4	35.8	55.7	6,934	2.1%	1.5%	4.1%	4.7%
Mutoh Industries*	94.4	59.4	26.2	2,401	2.1%	2.5%	1.9%	1.6%
Zuken	87.6	25.2	41.8	497	2.0%	1.1%	3.0%	.3%
C. Itoh Techno-Science*	86.0	26.6	52.5	897	1.9%	1.1%	3.8%	.6%
Technodia	78.9	63.6	.8	958	1.8%	2.7%	.1%	.6%
Cadence	77.3	.0	49.9	0	1.7%	.0%	3.6%	.0%
Sumisho Electronics*	75.6	53.3	19.3	1,475	1.7%	2.2%	1.4%	1.0%
Info. Services Int'l. Dentsu*	72.0	5.0	50.4	124	1.6%	.2%	3.7%	.1%
Kozo Keikaku Engineering	71.9	3.6	18.6	134	1.6%	.1%	1.4%	.1%

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Table 42 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ARGO GRAPHICS*	66.2	58.6	3.4	1,398	1.5%	2.5%	.2%	.9%
Computervision	57.7	12.0	29.1	557	1.3%	.5%	2.1%	.4%
SDRC	55.2	.0	37.7	0	1.2%	.0%	2.7%	.0%
Sharp*	53.7	25.8	27.9	494	1.2%	1.1%	2.0%	.3%
Intergraph	49.7	20.7	13.2	726	1.1%	.9%	1.0%	.5%
Mentor Graphics	48.6	6.1	21.5	205	1.1%	.3%	1.6%	.1%
Marubeni Hytech*	47.7	7.1	39.7	252	1.1%	.3%	2.9%	.2%
Sony	47.0	47.0	.0	2,331	1.1%	2.0%	.0%	1.6%
Hakuto	43.1	25.4	17.6	1,006	1.0%	1.1%	1.3%	.7%
Autodesk	42.4	.0	42.4	0	1.0%	.0%	3.1%	.0%
CADIX	41.5	17.8	20.3	229	.9%	.7%	1.5%	.2%
Mitsui Engineering	38.7	26.7	7.9	313	.9%	1.1%	.6%	.2%
Kubota Computer	38.2	29.1	6.1	438	.9%	1.2%	.4%	.3%
Uchida Yoko	36.0	21.2	13.1	1,002	.8%	.9%	1.0%	.7%
Andor	35.9	7.9	26.6	652	.8%	.3%	1.9%	.4%
Silicon Graphics	31.7	31.7	.0	845	.7%	1.3%	.0%	.6%
Yokogawa Digital Computer	30.9	12.3	15.4	285	.7%	.5%	1.1%	.2%
Synopsys	30.8	.0	20.8	0	.7%	.0%	1.5%	.0%
GDS	28.3	13.0	12.5	377	.6%	.5%	.9%	.3%
Toyo Information Systems*	27.5	16.4	8.4	309	.6%	.7%	.6%	.2%
Tokyo Electron*	27.0	8.7	12.6	124	.6%	.4%	.9%	.1%

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Table 42 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Wacom	27.0	5.4	18.8	902	.6%	.2%	1.4%	.6%
Toshiba Engineering*	26.7	12.0	13.4	477	.6%	.5%	1.0%	.3%
Informatix*	25.3	20.3	3.0	187	.6%	.9%	.2%	.1%
EDS Unigraphics	20.5	6.0	9.6	258	.5%	.2%	.7%	.2%
Century Research Center	19.8	10.3	7.4	133	.4%	.4%	.5%	.1%
INS Engineering	15.4	7.6	7.9	56	.3%	.3%	.6%	.0%
Graphtec Engineering	15.3	7.5	7.0	404	.3%	.3%	.5%	.3%
Nihon Itek*	15.3	7.2	6.3	97	.3%	.3%	.5%	.1%
Kanematsu Computer Systems*	15.0	7.3	6.2	218	.3%	.3%	.5%	.1%
MacNeal-Schwendler	14.5	.0	14.2	0	.3%	.0%	1.0%	.0%
Adam Net	14.4	7.1	5.4	19	.3%	.3%	.4%	.0%
CPU	14.4	4.8	9.6	343	.3%	.2%	.7%	.2%
Racal-Redac	14.1	2.0	6.2	85	.3%	.1%	.5%	.1%
Omron	13.5	6.8	5.4	300	.3%	.3%	.4%	.2%
OKURA*	10.8	.0	10.8	0	.2%	.0%	.8%	.0%
Pasco*	10.1	3.7	5.5	83	.2%	.2%	.4%	.1%
Design Automation	9.7	2.0	7.3	331	.2%	.1%	.5%	.2%
Viewlogic Systems	9.2	.0	6.9	0	.2%	.0%	.5%	.0%
Sumitomo Denko Workstation	9.0	9.0	.0	978	.2%	.4%	.0%	.7%
COMPASS Design Automation	7.0	.0	5.7	0	.2%	.0%	.4%	.0%
Ricoh*	6.5	.0	5.5	0	.1%	.0%	.4%	.0%

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Table 42 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sophia Systems*	5.7	1.2	3.9	59	.1%	.0%	.3%	.0%
CrossCheck Technology	5.7	.0	3.0	0	.1%	.0%	.2%	.0%
Quickturn Design Systems	5.4	1.6	2.7	33	.1%	.1%	.2%	.0%
Cisigraph	5.1	1.4	2.7	77	.1%	.1%	.2%	.1%
Swanson Analysis	4.6	.0	4.0	0	.1%	.0%	.3%	.0%
Zycad	4.2	2.4	.5	60	.1%	.1%	.0%	.0%
Gerber Systems	4.0	1.9	1.7	65	.1%	.1%	.1%	.0%
ICAD	3.9	.0	3.2	0	.1%	.0%	.2%	.0%
ESRI	3.8	.0	3.1	0	.1%	.0%	.2%	.0%
ADRA Systems	3.6	.0	2.8	0	.1%	.0%	.2%	.0%
Silvar-Lisco	2.7	.0	1.8	0	.1%	.0%	.1%	.0%
Contec Microelectronics	2.4	.0	2.2	0	.1%	.0%	.2%	.0%
Matra Datavision	2.4	.8	1.3	36	.1%	.0%	.1%	.0%
TSSI Japan	2.2	.0	1.6	0	.0%	.0%	.1%	.0%
Applicon	2.1	.7	.9	21	.0%	.0%	.1%	.0%
CAD Centre	2.0	.0	1.5	0	.0%	.0%	.1%	.0%
Delcam International	1.6	.6	.7	21	.0%	.0%	.1%	.0%
CAMAX Systems Inc.	1.5	.1	.9	13	.0%	.0%	.1%	.0%
TECHSPERT	1.3	.2	1.1	11	.0%	.0%	.1%	.0%
Kanematsu Semiconductor*	.7	.0	.5	0	.0%	.0%	.0%	.0%

(Continued)

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Table 42 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ArcSys	.6	.0	.5	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	35,067	.0%	.0%	.0%	23.6%
All Companies	4,425.5	2,383.7	1,371.3	148,857	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1,729.5	866.3	537.6	77,103	39.1%	36.3%	39.2%	51.8%
All Asian-Based Companies	2,669.6	1,512.5	820.5	71,530	60.3%	63.5%	59.8%	48.1%
All European-Based Companies	26.4	4.9	13.3	223	.6%	.2%	1.0%	.1%
All Hardware Companies	879.0	787.2	2.7	83,249	19.9%	33.0%	.2%	55.9%
All Turnkey & SW Companies	3,546.5	1,596.6	1,368.6	65,608	80.1%	67.0%	99.8%	44.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 43
1993 CAD/CAM/CAE/GIS Market Share Update

Application: **All Applications**
Platform: Technical Workstation
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Fujitsu	314.3	170.0	103.1	7,175	11.1%	11.9%	11.0%	16.0%
NEC	212.2	131.8	61.5	5,981	7.5%	9.2%	6.6%	13.3%
Hewlett-Packard	177.1	119.0	23.5	4,242	6.2%	8.3%	2.5%	9.5%
Sun Microsystems	169.9	134.3	.0	6,140	6.0%	9.4%	.0%	13.7%
Hitachi	142.8	67.1	61.4	2,825	5.0%	4.7%	6.5%	6.3%
Toshiba*	125.2	62.6	50.1	1,389	4.4%	4.4%	5.3%	3.1%
Nihon Unisys	123.2	67.8	33.3	498	4.3%	4.7%	3.5%	1.1%
IBM	119.7	43.2	54.4	915	4.2%	3.0%	5.8%	2.0%
Seiko*	98.9	34.6	49.5	587	3.5%	2.4%	5.3%	1.3%
Hitachi Zosen Info Systems	93.0	78.6	4.8	937	3.3%	5.5%	.5%	2.1%
Mitsubishi Electric	90.0	76.5	6.3	844	3.2%	5.3%	.7%	1.9%
Zuken	87.6	25.2	41.8	497	3.1%	1.8%	4.5%	1.1%
Cadence	77.3	.0	49.9	0	2.7%	.0%	5.3%	.0%
Technodia	74.0	59.2	.7	831	2.6%	4.1%	.1%	1.9%
C. Itoh Techno-Science*	69.9	21.7	42.7	769	2.5%	1.5%	4.5%	1.7%
Info. Services Int'l. Dentsu*	68.4	4.8	47.8	118	2.4%	.3%	5.1%	.3%
Sumisho Electronics*	58.7	41.5	14.2	250	2.1%	2.9%	1.5%	.6%
Computervision	57.3	12.0	28.6	557	2.0%	.8%	3.1%	1.2%
SDRC	54.7	.0	37.3	0	1.9%	.0%	4.0%	.0%
Sharp*	52.6	25.3	27.3	487	1.9%	1.8%	2.9%	1.1%
Mentor Graphics	48.6	6.1	21.5	205	1.7%	.4%	2.3%	.5%
Sony	47.0	47.0	.0	2,331	1.7%	3.3%	.0%	5.2%

(Continued)

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Table 43 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Altium*	43.4	18.6	23.6	1,231	1.5%	1.3%	2.5%	2.7%
Mutoh Industries*	42.6	22.0	13.9	599	1.5%	1.5%	1.5%	1.3%
Intergraph	42.6	18.2	10.3	527	1.5%	1.3%	1.1%	1.2%
Marubeni Hytech*	41.7	7.1	33.8	252	1.5%	.5%	3.6%	.6%
CADIX	41.5	17.8	20.3	229	1.5%	1.2%	2.2%	.5%
Digital	38.9	28.5	2.0	1,186	1.4%	2.0%	.2%	2.6%
Mitsui Engineering	35.6	24.6	7.3	246	1.3%	1.7%	.8%	.5%
Uchida Yoko	32.3	19.1	11.6	807	1.1%	1.3%	1.2%	1.8%
Silicon Graphics	31.7	31.7	.0	845	1.1%	2.2%	.0%	1.9%
Yokogawa Digital Computer	30.9	12.3	15.4	285	1.1%	.9%	1.6%	.6%
Synopsys	30.8	.0	20.8	0	1.1%	.0%	2.2%	.0%
Kubota Computer	30.6	23.2	4.9	292	1.1%	1.6%	.5%	.7%
GDS	28.3	13.0	12.5	377	1.0%	.9%	1.3%	.8%
ARGO GRAPHICS*	28.1	24.9	1.5	234	1.0%	1.7%	.2%	.5%
Tokyo Electron*	27.0	8.7	12.6	124	.9%	.6%	1.3%	.3%
Toshiba Engineering*	26.7	12.0	13.4	477	.9%	.8%	1.4%	1.1%
Toyo Information Systems*	23.4	14.2	7.0	285	.8%	1.0%	.7%	.6%
Kozo Keikaku Engineering	21.7	2.2	6.5	23	.8%	.2%	.7%	.1%
Informatix*	20.1	16.0	2.5	156	.7%	1.1%	.3%	.3%
Century Research Center	18.6	9.7	7.0	131	.7%	.7%	.7%	.3%
EDS Unigraphics	17.3	5.0	8.2	230	.6%	.3%	.9%	.5%
Graphtec Engineering	15.3	7.5	7.0	404	.5%	.5%	.7%	.9%

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Table 43 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Nihon Itek*	15.3	7.2	6.3	97	.5%	.5%	.7%	.2%
INS Engineering	14.7	7.2	7.5	41	.5%	.5%	.8%	.1%
Racal-Redac	14.1	2.0	6.2	85	.5%	.1%	.7%	.2%
Omron	13.5	6.8	5.4	300	.5%	.5%	.6%	.7%
OKURA*	10.8	.0	10.8	0	.4%	.0%	1.2%	.0%
Kanematsu Computer Systems*	10.5	6.1	2.9	100	.4%	.4%	.3%	.2%
Pasco*	9.2	3.5	4.8	46	.3%	.2%	.5%	.1%
Adam Net	8.6	1.3	5.4	17	.3%	.1%	.6%	.0%
Sumitomo Denko Workstation	8.4	8.4	.0	926	.3%	.6%	.0%	2.1%
Viewlogic Systems	7.6	.0	5.3	0	.3%	.0%	.6%	.0%
COMPASS Design Automation	7.0	.0	5.7	0	.2%	.0%	.6%	.0%
Ricoh*	6.5	.0	5.5	0	.2%	.0%	.6%	.0%
CrossCheck Technology	5.7	.0	3.0	0	.2%	.0%	.3%	.0%
Quicktum Design Systems	5.4	1.6	2.7	33	.2%	.1%	.3%	.1%
Cisigraph	4.6	1.3	2.4	73	.2%	.1%	.3%	.2%
Gerber Systems	4.0	1.9	1.7	65	.1%	.1%	.2%	.1%
ICAD	3.9	.0	3.2	0	.1%	.0%	.3%	.0%
Autodesk	3.6	.0	3.6	0	.1%	.0%	.4%	.0%
Zycad	2.8	1.6	.3	43	.1%	.1%	.0%	.1%
Silvar-Lisco	2.7	.0	1.8	0	.1%	.0%	.2%	.0%
Hakuto	2.6	1.6	1.0	31	.1%	.1%	.1%	.1%
ADRA Systems	2.6	.0	2.0	0	.1%	.0%	.2%	.0%

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Table 43 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Wacom	2.6	.5	2.0	44	.1%	.0%	.2%	.1%
Swanson Analysis	2.6	.0	2.3	0	.1%	.0%	.2%	.0%
Matra Datavision	2.3	.8	1.3	31	.1%	.1%	.1%	.1%
Contec Microelectronics	2.2	.0	1.9	0	.1%	.0%	.2%	.0%
TSSI Japan	2.2	.0	1.6	0	.1%	.0%	.2%	.0%
Applicon	2.1	.7	.9	21	.1%	.0%	.1%	.0%
CAD Centre	2.0	.0	1.5	0	.1%	.0%	.2%	.0%
MacNeal-Schwendler	1.9	.0	1.6	0	.1%	.0%	.2%	.0%
Sophia Systems*	1.6	.2	1.2	10	.1%	.0%	.1%	.0%
Delcam International	1.6	.5	.7	19	.1%	.0%	.1%	.0%
ESRI	1.5	.0	1.2	0	.1%	.0%	.1%	.0%
CAMAX Systems Inc.	1.5	.1	.9	13	.1%	.0%	.1%	.0%
ArcSys	.6	.0	.5	0	.0%	.0%	.1%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	2,840.9	1,433.3	938.1	44,874	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1,055.3	427.7	378.5	15,888	37.1%	29.8%	40.4%	35.4%
All Asian-Based Companies	1,760.3	1,000.9	547.1	28,774	62.0%	69.8%	58.3%	64.1%
All European-Based Companies	25.3	4.7	12.4	211	.9%	.3%	1.3%	.5%
All Hardware Companies	442.8	382.3	2.7	16,213	15.6%	26.7%	.3%	36.1%
All Turnkey & SW Companies	2,398.2	1,051.0	935.4	28,661	84.4%	73.3%	99.7%	63.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 44
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Nihon Unisys	142.9	88.6	22.9	722	21.3%	21.4%	16.2%	6.3%
Fujitsu	133.9	61.6	53.6	2,019	20.0%	14.9%	37.9%	17.6%
IBM	110.3	63.3	21.7	1,413	16.4%	15.3%	15.3%	12.3%
NEC	61.4	45.5	10.5	127	9.2%	11.0%	7.4%	1.1%
Digital	44.1	34.1	.3	0	6.6%	8.3%	.2%	.0%
Mitsubishi Electric	15.2	7.2	4.3	42	2.3%	1.7%	3.0%	.4%
Hitachi	14.3	6.7	6.1	3,467	2.1%	1.6%	4.3%	30.2%
Kozo Keikaku Engineering	11.8	.0	2.4	0	1.8%	.0%	1.7%	.0%
C. Itoh Techno-Science*	9.3	2.9	5.7	67	1.4%	.7%	4.0%	.6%
Toshiba*	8.8	4.4	3.5	118	1.3%	1.1%	2.5%	1.0%
MacNeal-Schwendler	8.0	.0	8.0	0	1.2%	.0%	5.6%	.0%
Informatix*	5.3	4.3	.5	31	.8%	1.0%	.3%	.3%
Hitachi Zosen Info Systems	5.0	4.5	.0	0	.7%	1.1%	.0%	.0%
Toyo Information Systems*	4.2	2.3	1.3	24	.6%	.5%	.9%	.2%
Swanson Analysis	1.2	.0	1.0	0	.2%	.0%	.7%	.0%
Century Research Center	1.2	.6	.5	2	.2%	.1%	.3%	.0%

(Continued)

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Table 44 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
SDRC	.6	.0	.4	0	.1%	.0%	.3%	.0%
Other Companies	92.7	87.7	.0	3,430	13.8%	21.2%	.0%	29.9%
All Companies	670.5	413.7	141.5	11,462	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	272.7	192.8	36.9	4,952	40.7%	46.6%	26.0%	43.2%
All Asian-Based Companies	397.8	220.9	104.6	6,510	59.3%	53.4%	73.9%	56.8%
All European-Based Companies	.1	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	143.3	128.5	.0	3,484	21.4%	31.1%	.0%	30.4%
All Turnkey & SW Companies	527.2	285.1	141.5	7,979	78.6%	68.9%	100.0%	69.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 45
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	29.7	24.6	.0	516	23.8%	31.0%	.0%	41.6%
IBM	28.9	15.3	7.2	231	23.1%	19.2%	36.2%	18.6%
Digital	28.6	22.4	.0	249	22.9%	28.2%	.0%	20.1%
C. Itoh Techno-Science*	6.8	2.1	4.2	62	5.4%	2.6%	20.8%	5.0%
Adam Net	5.8	5.8	.0	2	4.6%	7.2%	.0%	.2%
Kubota Computer	5.7	4.4	.9	47	4.6%	5.5%	4.6%	3.8%
MacNeal-Schwendler	4.4	.0	4.4	0	3.5%	.0%	21.8%	.0%
Info. Services Int'l. Dentsu*	3.6	.3	2.5	6	2.9%	.3%	12.6%	.5%
Kozo Keikaku Engineering	3.6	.0	.7	0	2.9%	.0%	3.6%	.0%
EDS Unigraphics	3.2	1.0	1.5	28	2.5%	1.2%	7.3%	2.3%
Intergraph	2.8	1.2	.8	28	2.3%	1.5%	3.8%	2.3%
Hewlett-Packard	1.6	1.4	.0	21	1.3%	1.7%	.0%	1.7%
ESRI	1.5	.0	1.2	0	1.2%	.0%	5.8%	.0%
Zycad	1.4	.8	.2	17	1.1%	1.0%	.8%	1.4%
Sharp*	1.1	.5	.6	7	.9%	.7%	2.8%	.6%
Sumitomo Denko Workstation	.6	.6	.0	52	.4%	.7%	.0%	4.2%

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Table 45 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cisigraph	.5	.1	.3	3	.4%	.2%	1.4%	.3%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	124.9	79.5	20.0	1,240	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	107.7	68.1	17.4	1,128	86.2%	85.7%	87.3%	91.0%
All Asian-Based Companies	16.8	11.2	2.3	109	13.4%	14.1%	11.3%	8.8%
All European-Based Companies	.5	.1	.3	3	.4%	.2%	1.4%	.3%
All Hardware Companies	60.6	49.0	.0	844	48.5%	61.7%	.0%	68.1%
All Turnkey & SW Companies	64.4	30.4	20.0	395	51.5%	38.3%	100.0%	31.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 46
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
NEC	129.2	91.8	25.8	16,665	16.4%	20.1%	9.5%	18.3%
Fujitsu	75.5	66.4	9.1	8,958	9.6%	14.5%	3.4%	9.8%
IBM	72.7	38.9	32.1	7,198	9.2%	8.5%	11.8%	7.9%
Mutoh Industries*	51.8	37.5	12.3	1,802	6.6%	8.2%	4.5%	2.0%
Altium*	51.0	17.2	32.1	5,702	6.5%	3.8%	11.8%	6.2%
Toshiba*	45.9	22.9	18.3	3,437	5.8%	5.0%	6.7%	3.8%
Hakuto	40.5	23.9	16.6	975	5.1%	5.2%	6.1%	1.1%
Autodesk	38.8	.0	38.8	0	4.9%	.0%	14.3%	.0%
ARGO GRAPHICS*	38.1	33.6	1.9	1,164	4.8%	7.3%	.7%	1.3%
Andor	35.9	7.9	26.6	652	4.5%	1.7%	9.8%	.7%
Kozo Keikaku Engineering	34.9	1.4	9.1	111	4.4%	.3%	3.3%	.1%
Hitachi	30.9	14.5	13.3	1,578	3.9%	3.2%	4.9%	1.7%
Wacom	24.4	4.9	16.8	858	3.1%	1.1%	6.2%	.9%
Sumisho Electronics*	16.8	11.8	5.0	1,225	2.1%	2.6%	1.9%	1.3%
CPU	14.4	4.8	9.6	343	1.8%	1.0%	3.5%	.4%
Mitsubishi Electric	11.7	7.7	4.0	964	1.5%	1.7%	1.5%	1.1%
Design Automation	9.7	2.0	7.3	331	1.2%	.4%	2.7%	.4%
Digital	8.9	8.0	.4	2,142	1.1%	1.8%	.1%	2.3%
Marubeni Hytech*	5.9	.0	5.9	0	.8%	.0%	2.2%	.0%
Hewlett-Packard	5.2	3.4	1.5	973	.7%	.7%	.5%	1.1%
Technodia	4.9	4.4	.1	128	.6%	1.0%	.0%	.1%
Kanematsu Computer Systems*	4.5	1.2	3.3	118	.6%	.3%	1.2%	.1%

(Continued)

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Table 46 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sophia Systems*	4.1	1.0	2.7	49	.5%	.2%	1.0%	.1%
Intergraph	4.1	1.2	2.0	171	.5%	.3%	.8%	.2%
Uchida Yoko	3.6	2.2	1.5	195	.5%	.5%	.5%	.2%
Mitsui Engineering	3.1	2.1	.6	67	.4%	.5%	.2%	.1%
Kubota Computer	1.9	1.5	.3	99	.2%	.3%	.1%	.1%
Viewlogic Systems	1.6	.0	1.6	0	.2%	.0%	.6%	.0%
TECHSPERT	1.1	.2	1.0	11	.1%	.0%	.3%	.0%
ADRA Systems	1.0	.0	.8	0	.1%	.0%	.3%	.0%
Swanson Analysis	.8	.0	.7	0	.1%	.0%	.3%	.0%
ESRI	.8	.0	.7	0	.1%	.0%	.3%	.0%
INS Engineering	.7	.3	.4	14	.1%	.1%	.1%	.0%
Pasco*	.5	.2	.3	37	.1%	.0%	.1%	.0%
Other Companies	13.4	44.6	.0	35,306	1.7%	9.8%	.0%	38.7%
All Companies	789.1	457.3	271.8	91,281	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	293.8	177.8	104.8	55,135	37.2%	38.9%	38.6%	60.4%
All Asian-Based Companies	494.7	279.5	166.5	36,137	62.7%	61.1%	61.3%	39.6%
All European-Based Companies	.6	.1	.5	9	.1%	.0%	.2%	.0%
All Hardware Companies	232.4	227.3	.0	62,708	29.4%	49.7%	.0%	68.7%
All Turnkey & SW Companies	556.7	230.0	271.8	28,573	70.6%	50.3%	100.0%	31.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 47
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	257.2	117.7	93.5	5,297	10.8%	8.7%	12.9%	6.9%
NEC	245.8	165.4	58.4	11,515	10.3%	12.3%	8.1%	14.9%
Fujitsu	219.9	128.9	67.4	8,751	9.2%	9.6%	9.3%	11.3%
Nihon Unisys	218.2	129.2	44.5	1,014	9.1%	9.6%	6.2%	1.3%
Hitachi	143.6	67.5	61.8	6,076	6.0%	5.0%	8.5%	7.9%
Toshiba*	125.9	63.0	50.4	4,070	5.3%	4.7%	7.0%	5.3%
Hewlett-Packard	100.8	63.9	14.9	2,363	4.2%	4.7%	2.1%	3.1%
Hitachi Zosen Info Systems	89.0	75.4	4.3	856	3.7%	5.6%	.6%	1.1%
Altium*	76.1	31.0	42.9	5,336	3.2%	2.3%	5.9%	6.9%
Info. Services Int'l. Dentsu*	72.0	5.0	50.4	124	3.0%	.4%	7.0%	.2%
Mutoh Industries*	70.8	45.6	19.2	1,906	3.0%	3.4%	2.7%	2.5%
ARGO GRAPHICS*	66.2	58.6	3.4	1,398	2.8%	4.3%	.5%	1.8%
Sumisho Electronics*	65.1	45.9	16.5	1,155	2.7%	3.4%	2.3%	1.5%
SDRC	55.2	.0	37.7	0	2.3%	.0%	5.2%	.0%
Computervision	54.6	11.4	27.5	528	2.3%	.8%	3.8%	.7%
Mitsubishi Electric	50.3	39.3	6.3	795	2.1%	2.9%	.9%	1.0%
C. Itoh Techno-Science*	49.9	15.5	30.4	511	2.1%	1.1%	4.2%	.7%
Digital	49.3	39.2	.0	1,649	2.1%	2.9%	.0%	2.1%
Hakuto	43.1	25.4	17.6	1,006	1.8%	1.9%	2.4%	1.3%
Sharp*	43.0	20.7	22.3	398	1.8%	1.5%	3.1%	.5%
Seiko*	40.6	14.2	20.3	241	1.7%	1.1%	2.8%	.3%
Kubota Computer	38.2	29.1	6.1	438	1.6%	2.2%	.8%	.6%
Technodia	37.9	30.3	.4	425	1.6%	2.3%	.1%	.6%

(Continued)

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Table 47 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Silicon Graphics	29.6	29.6	.0	784	1.2%	2.2%	.0%	1.0%
Tokyo Electron*	27.0	8.7	12.6	124	1.1%	.6%	1.7%	.2%
Toshiba Engineering*	26.7	12.0	13.4	477	1.1%	.9%	1.8%	.6%
Andor	23.1	5.1	17.1	421	1.0%	.4%	2.4%	.5%
Toyo Information Systems*	23.0	13.7	6.9	258	1.0%	1.0%	1.0%	.3%
Mitsui Engineering	22.1	15.3	4.5	178	.9%	1.1%	.6%	.2%
Kozo Keikaku Engineering	21.6	1.3	5.8	40	.9%	.1%	.8%	.1%
EDS Unigraphics	20.5	6.0	9.6	258	.9%	.4%	1.3%	.3%
Sun Microsystems	19.4	15.7	.0	521	.8%	1.2%	.0%	.7%
Marubeni Hytech*	18.6	3.2	15.1	112	.8%	.2%	2.1%	.1%
Autodesk	16.9	.0	16.9	0	.7%	.0%	2.3%	.0%
Sony	16.6	16.6	.0	823	.7%	1.2%	.0%	1.1%
Graphtec Engineering	15.3	7.5	7.0	404	.6%	.6%	1.0%	.5%
MacNeal-Schwendler	14.5	.0	14.2	0	.6%	.0%	2.0%	.0%
Nihon Itek*	12.2	5.8	5.0	78	.5%	.4%	.7%	.1%
Adam Net	11.5	6.6	3.6	14	.5%	.5%	.5%	.0%
Omron	11.5	5.7	4.6	255	.5%	.4%	.6%	.3%
CADIX	8.3	3.6	4.1	46	.3%	.3%	.6%	.1%
Wacom	8.1	1.6	5.7	261	.3%	.1%	.8%	.3%
Sumitomo Denko Workstation	7.9	7.9	.0	855	.3%	.6%	.0%	1.1%
Design Automation	7.7	1.6	5.8	262	.3%	.1%	.8%	.3%
Intergraph	7.3	2.6	2.4	86	.3%	.2%	.3%	.1%
Ricoh*	6.5	.0	5.5	0	.3%	.0%	.8%	.0%

(Continued)

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Table 47 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cisigraph	5.1	1.4	2.7	77	.2%	.1%	.4%	.1%
Swanson Analysis	4.6	.0	4.0	0	.2%	.0%	.6%	.0%
Gerber Systems	4.0	1.9	1.7	65	.2%	.1%	.2%	.1%
ADRA Systems	3.6	.0	2.8	0	.1%	.0%	.4%	.0%
ICAD	3.4	.0	2.7	0	.1%	.0%	.4%	.0%
Century Research Center	2.9	1.5	1.1	14	.1%	.1%	.1%	.0%
Matra Datavision	2.4	.8	1.3	36	.1%	.1%	.2%	.0%
Applicon	2.1	.7	.9	21	.1%	.1%	.1%	.0%
Uchida Yoko	2.0	1.2	.7	53	.1%	.1%	.1%	.1%
Delcam International	1.6	.6	.7	21	.1%	.0%	.1%	.0%
CAMAX Systems Inc.	1.5	.1	.9	13	.1%	.0%	.1%	.0%
Zuken	1.0	.3	.5	6	.0%	.0%	.1%	.0%
Other Companies	.0	.0	.0	14,720	.0%	.0%	.0%	19.1%
All Companies	2,391.9	1,346.9	722.6	77,136	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	858.6	441.0	274.0	36,475	35.9%	32.7%	37.9%	47.3%
All Asian-Based Companies	1,523.3	903.1	443.4	40,526	63.7%	67.0%	61.4%	52.5%
All European-Based Companies	10.0	2.8	5.3	135	.4%	.2%	.7%	.2%
All Hardware Companies	370.0	345.2	.0	38,846	15.5%	25.6%	.0%	50.4%
All Turnkey & SW Companies	2,021.8	1,001.7	722.6	38,290	84.5%	74.4%	100.0%	49.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 48
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Fujitsu	151.8	88.1	47.3	5,982	22.2%	23.2%	24.2%	19.5%
NEC	64.5	43.2	15.6	5,325	9.4%	11.3%	8.0%	17.4%
Kozo Keikaku Engineering	50.4	2.3	12.8	93	7.4%	.6%	6.6%	.3%
Nihon Unisys	47.9	27.2	11.6	206	7.0%	7.1%	6.0%	.7%
IBM	44.7	25.9	12.1	2,381	6.5%	6.8%	6.2%	7.8%
Technodia	41.1	33.3	.4	533	6.0%	8.7%	.2%	1.7%
Informatix*	25.3	20.3	3.0	187	3.7%	5.3%	1.5%	.6%
Toshiba*	21.6	10.8	8.6	515	3.2%	2.8%	4.4%	1.7%
Intergraph	19.5	8.2	5.3	343	2.9%	2.2%	2.7%	1.1%
Mutoh Industries*	18.9	10.9	5.6	383	2.8%	2.9%	2.9%	1.2%
Hitachi	18.4	8.7	7.9	750	2.7%	2.3%	4.0%	2.4%
Autodesk	18.2	.0	18.2	0	2.7%	.0%	9.3%	.0%
C. Itoh Techno-Science*	18.1	5.6	11.0	193	2.6%	1.5%	5.6%	.6%
Mitsubishi Electric	17.5	13.7	2.2	277	2.6%	3.6%	1.1%	.9%
Kanematsu Computer Systems*	15.0	7.3	6.2	218	2.2%	1.9%	3.2%	.7%
Sony	14.9	14.9	.0	737	2.2%	3.9%	.0%	2.4%
CPU	14.4	4.8	9.6	343	2.1%	1.2%	4.9%	1.1%
GDS	14.2	6.5	6.2	188	2.1%	1.7%	3.2%	.6%
Hewlett-Packard	14.1	12.1	.0	658	2.1%	3.2%	.0%	2.1%

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Table 48 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Andor	10.0	2.2	7.4	182	1.5%	.6%	3.8%	.6%
Century Research Center	9.9	5.2	3.7	69	1.4%	1.4%	1.9%	.2%
Hitachi Zosen Info Systems	9.0	7.7	.4	81	1.3%	2.0%	.2%	.3%
INS Engineering	7.5	3.7	3.8	34	1.1%	1.0%	2.0%	.1%
Altium*	7.1	1.9	5.0	617	1.0%	.5%	2.6%	2.0%
Sumisho Electronics*	6.0	4.2	1.6	225	.9%	1.1%	.8%	.7%
Uchida Yoko	5.2	3.1	1.9	145	.8%	.8%	1.0%	.5%
Toyo Information Systems*	4.6	2.7	1.4	51	.7%	.7%	.7%	.2%
Sun Microsystems	4.2	3.3	.0	158	.6%	.9%	.0%	.5%
Computervision	3.1	.6	1.6	29	.5%	.2%	.8%	.1%
Digital	3.1	2.6	.0	365	.5%	.7%	.0%	1.2%
Nihon Itek*	3.1	1.4	1.3	19	.4%	.4%	.6%	.1%
Adam Net	2.9	.4	1.8	6	.4%	.1%	.9%	.0%
Design Automation	2.0	.4	1.5	69	.3%	.1%	.8%	.2%
Silicon Graphics	2.0	2.0	.0	57	.3%	.5%	.0%	.2%
Mitsui Engineering	1.9	1.3	.4	15	.3%	.3%	.2%	.0%
CAD Centre	1.7	.0	1.2	0	.2%	.0%	.6%	.0%
Sumitomo Denko Workstation	.8	.8	.0	83	.1%	.2%	.0%	.3%

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Table 48 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ICAD	.6	.0	.5	0	.1%	.0%	.2%	.0%
Other Companies	.0	.0	.0	9,147	.0%	.0%	.0%	29.8%
All Companies	684.1	380.4	195.3	30,667	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	176.9	101.4	52.4	14,990	25.9%	26.7%	26.8%	48.9%
All Asian-Based Companies	505.3	279.0	141.5	15,673	73.9%	73.3%	72.4%	51.1%
All European-Based Companies	1.9	.1	1.4	4	.3%	.0%	.7%	.0%
All Hardware Companies	123.8	119.1	.0	18,429	18.1%	31.3%	.0%	60.1%
All Turnkey & SW Companies	560.3	261.4	195.3	12,238	81.9%	68.7%	100.0%	39.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 49
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Fujitsu	57.7	29.7	20.2	1,172	18.8%	16.9%	21.8%	14.2%
Mitsubishi Electric	49.1	38.4	6.1	777	16.0%	21.8%	6.6%	9.4%
Uchida Yoko	22.5	13.3	8.2	624	7.3%	7.6%	8.8%	7.5%
Hitachi	18.9	8.9	8.1	726	6.1%	5.0%	8.7%	8.8%
Toshiba*	18.0	9.0	7.2	200	5.9%	5.1%	7.7%	2.4%
Intergraph	15.8	8.5	3.2	255	5.2%	4.8%	3.4%	3.1%
Mitsui Engineering	14.7	10.2	3.0	120	4.8%	5.8%	3.2%	1.4%
GDS	14.2	6.5	6.2	189	4.6%	3.7%	6.7%	2.3%
Pasco*	10.1	3.7	5.5	83	3.3%	2.1%	5.9%	1.0%
Digital	8.2	6.7	.0	312	2.7%	3.8%	.0%	3.8%
NEC	8.1	5.1	2.3	308	2.6%	2.9%	2.4%	3.7%
IBM	7.9	5.9	.9	660	2.6%	3.4%	1.0%	8.0%
INS Engineering	7.9	3.9	4.0	22	2.6%	2.2%	4.3%	.3%
Hewlett-Packard	6.7	5.7	.0	230	2.2%	3.3%	.0%	2.8%
Mutoh Industries*	4.7	2.9	1.3	112	1.5%	1.6%	1.4%	1.4%
Century Research Center	4.7	2.5	1.8	33	1.5%	1.4%	1.9%	.4%
Autodesk	4.7	.0	4.7	0	1.5%	.0%	5.0%	.0%
CADIX	4.2	1.8	2.0	23	1.4%	1.0%	2.2%	.3%
ESRI	3.8	.0	3.1	0	1.2%	.0%	3.3%	.0%
Sun Microsystems	3.5	2.9	.0	85	1.1%	1.6%	.0%	1.0%
C. Itoh Techno-Science*	3.0	.9	1.8	32	1.0%	.5%	2.0%	.4%

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Table 49 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Andor	1.7	.4	1.3	31	.6%	.2%	1.3%	.4%
Other Companies	17.0	9.2	2.0	2,281	5.5%	5.2%	2.2%	27.6%
All Companies	306.8	175.7	93.0	8,275	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	98.4	52.1	28.6	4,192	32.1%	29.6%	30.7%	50.7%
All Asian-Based Companies	208.3	123.6	64.4	4,083	67.9%	70.4%	69.3%	49.3%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	40.3	36.9	.0	3,847	13.1%	21.0%	.0%	46.5%
All Turnkey & SW Companies	266.4	138.8	93.0	4,428	86.9%	79.0%	100.0%	53.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 50
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	172.6	137.1	.0	5,892	16.6%	28.5%	.0%	18.0%
Fujitsu	94.3	51.3	30.9	2,247	9.0%	10.7%	8.6%	6.9%
Zuken	86.6	25.0	41.3	492	8.3%	5.2%	11.5%	1.5%
NEC	84.6	55.4	21.6	5,625	8.1%	11.5%	6.0%	17.2%
Cadence	77.3	.0	49.9	0	7.4%	.0%	13.8%	.0%
Hewlett-Packard	62.3	42.1	10.1	1,984	6.0%	8.8%	2.8%	6.1%
Digital	59.9	44.5	2.6	1,250	5.7%	9.2%	.7%	3.8%
Seiko*	58.4	20.4	29.2	346	5.6%	4.3%	8.1%	1.1%
Mentor Graphics	48.6	6.1	21.5	205	4.7%	1.3%	6.0%	.6%
Yokogawa Digital Computer	30.9	12.3	15.4	285	3.0%	2.6%	4.3%	.9%
Synopsys	30.8	.0	20.8	0	3.0%	.0%	5.8%	.0%
Marubeni Hytech*	29.1	4.0	24.7	140	2.8%	.8%	6.8%	.4%
CADIX	29.0	12.5	14.2	160	2.8%	2.6%	3.9%	.5%
IBM	21.8	11.0	8.9	1,418	2.1%	2.3%	2.5%	4.3%
Wacom	18.9	3.8	13.1	641	1.8%	.8%	3.6%	2.0%
Sony	15.5	15.6	.0	770	1.5%	3.2%	.0%	2.4%
C. Itoh Techno-Science*	15.1	4.6	9.2	161	1.4%	1.0%	2.6%	.5%
Toshiba*	14.4	7.2	5.8	160	1.4%	1.5%	1.6%	.5%
Racal-Redac	14.1	2.0	6.2	85	1.4%	.4%	1.7%	.3%
Altium*	11.2	3.0	7.8	980	1.1%	.6%	2.2%	3.0%
OKURA*	10.8	.0	10.8	0	1.0%	.0%	3.0%	.0%

(Continued)

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Table 50 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sharp*	10.7	5.2	5.6	97	1.0%	1.1%	1.5%	.3%
Viewlogic Systems	9.2	.0	6.9	0	.9%	.0%	1.9%	.0%
Hitachi	7.1	3.3	3.1	319	.7%	.7%	.8%	1.0%
COMPASS Design Automation	7.0	.0	5.7	0	.7%	.0%	1.6%	.0%
Intergraph	7.0	1.5	2.2	43	.7%	.3%	.6%	.1%
Uchida Yoko	6.3	3.7	2.3	180	.6%	.8%	.6%	.5%
Sophia Systems*	5.7	1.2	3.9	59	.5%	.2%	1.1%	.2%
CrossCheck Technology	5.7	.0	3.0	0	.5%	.0%	.8%	.0%
Quickturn Design Systems	5.4	1.6	2.7	33	.5%	.3%	.7%	.1%
Sumisho Electronics*	4.5	3.2	1.2	95	.4%	.7%	.3%	.3%
Zycad	4.2	2.4	.5	60	.4%	.5%	.1%	.2%
Silvar-Lisco	2.7	.0	1.8	0	.3%	.0%	.5%	.0%
Autodesk	2.6	.0	2.6	0	.2%	.0%	.7%	.0%
Contec Microelectronics	2.4	.0	2.2	0	.2%	.0%	.6%	.0%
Century Research Center	2.3	1.2	.9	16	.2%	.2%	.2%	.0%
TSSI Japan	2.2	.0	1.6	0	.2%	.0%	.4%	.0%
Omron	2.0	1.0	.8	45	.2%	.2%	.2%	.1%
TECHSPERT	1.3	.2	1.1	11	.1%	.0%	.3%	.0%
Andor	1.0	.2	.8	19	.1%	.0%	.2%	.1%
Kanematsu Semiconductor*	.7	.0	.5	0	.1%	.0%	.1%	.0%

(Continued)

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Table 50 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ArcSys	.6	.0	.5	0	.1%	.0%	.1%	.0%
Other Companies	.0	.0	.0	8,918	.0%	.0%	.0%	27.2%
All Companies	1,042.8	480.7	360.5	32,779	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	595.6	271.8	182.7	21,446	57.1%	56.6%	50.7%	65.4%
All Asian-Based Companies	432.7	206.8	171.3	11,248	41.5%	43.0%	47.5%	34.3%
All European-Based Companies	14.5	2.0	6.6	85	1.4%	.4%	1.8%	.3%
All Hardware Companies	344.9	286.0	2.7	22,127	33.1%	59.5%	.7%	67.5%
All Turnkey & SW Companies	697.9	194.7	357.9	10,652	66.9%	40.5%	99.3%	32.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 51
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	90.1	71.6	.0	3,220	17.9%	30.8%	.0%	17.3%
NEC	52.4	34.2	13.5	3,324	10.4%	14.7%	8.0%	17.8%
Hewlett-Packard	49.7	31.4	10.1	1,520	9.8%	13.5%	6.0%	8.2%
Cadence	36.9	.0	23.8	0	7.3%	.0%	14.0%	.0%
Fujitsu	36.7	20.2	11.8	848	7.3%	8.7%	6.9%	4.6%
Digital	34.2	25.6	1.3	811	6.8%	11.0%	.8%	4.4%
Seiko*	31.7	11.1	15.8	188	6.3%	4.8%	9.3%	1.0%
Synopsys	30.8	.0	20.8	0	6.1%	.0%	12.3%	.0%
Mentor Graphics	27.8	3.7	12.2	124	5.5%	1.6%	7.2%	.7%
Marubeni Hytech*	27.6	3.7	23.5	131	5.5%	1.6%	13.8%	.7%
Zuken	20.6	6.0	9.9	117	4.1%	2.6%	5.8%	.6%
Wacom	18.9	3.8	13.1	641	3.7%	1.6%	7.7%	3.4%
Sony	11.2	11.2	.0	557	2.2%	4.8%	.0%	3.0%
C. Itoh Techno-Science*	9.3	2.9	5.7	99	1.8%	1.2%	3.3%	.5%
Viewlogic Systems	9.2	.0	6.9	0	1.8%	.0%	4.1%	.0%
CrossCheck Technology	5.7	.0	3.0	0	1.1%	.0%	1.8%	.0%
Quickturn Design Systems	5.4	1.6	2.7	33	1.1%	.7%	1.6%	.2%
IBM	4.8	4.8	.0	896	1.0%	2.1%	.0%	4.8%
Sophia Systems*	4.6	1.0	3.1	49	.9%	.4%	1.8%	.3%
COMPASS Design Automation	4.2	.0	3.4	0	.8%	.0%	2.0%	.0%
Zycad	4.2	2.4	.5	60	.8%	1.0%	.3%	.3%

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Table 51 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	3.8	.8	1.2	25	.8%	.3%	.7%	.1%
Racal-Redac	3.4	.5	1.5	20	.7%	.2%	.9%	.1%
Contec Microelectronics	2.4	.0	2.2	0	.5%	.0%	1.3%	.0%
Autodesk	2.1	.0	2.1	0	.4%	.0%	1.2%	.0%
Century Research Center	1.3	.7	.5	9	.3%	.3%	.3%	.0%
Kanematsu Semiconductor*	.7	.0	.5	0	.1%	.0%	.3%	.0%
Other Companies	.0	.0	.0	5,946	.0%	.0%	.0%	31.9%
All Companies	504.6	232.2	169.8	18,621	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	360.1	155.8	119.5	13,104	71.4%	67.1%	70.4%	70.4%
All Asian-Based Companies	141.1	76.0	48.8	5,496	28.0%	32.7%	28.7%	29.5%
All European-Based Companies	3.4	.5	1.5	20	.7%	.2%	.9%	.1%
All Hardware Companies	197.3	162.8	2.7	13,262	39.1%	70.1%	1.6%	71.2%
All Turnkey & SW Companies	307.3	69.5	167.1	5,359	60.9%	29.9%	98.4%	28.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 52
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	51.9	41.2	.0	1,567	29.5%	52.7%	.0%	52.5%
Cadence	35.3	.0	22.8	0	20.1%	.0%	40.1%	.0%
Seiko*	26.7	9.4	13.4	159	15.2%	12.0%	23.5%	5.3%
Fujitsu	15.7	9.2	4.7	512	8.9%	11.7%	8.3%	17.2%
Digital	14.9	11.7	.0	222	8.5%	14.9%	.0%	7.4%
OKURA*	10.8	.0	10.8	0	6.1%	.0%	19.0%	.0%
Mentor Graphics	10.5	1.2	4.7	41	6.0%	1.6%	8.3%	1.4%
NEC	4.0	2.5	1.2	114	2.3%	3.2%	2.1%	3.8%
COMPASS Design Automation	2.8	.0	2.3	0	1.6%	.0%	4.0%	.0%
Silvar-Lisco	2.7	.0	1.8	0	1.5%	.0%	3.2%	.0%
TSSI Japan	2.2	.0	1.6	0	1.2%	.0%	2.9%	.0%
Hewlett-Packard	1.6	1.4	.0	52	.9%	1.8%	.0%	1.8%
Intergraph	1.5	.3	.5	7	.8%	.4%	.8%	.2%
Marubeni Hytech*	1.4	.3	1.2	9	.8%	.3%	2.0%	.3%
ArcSys	.6	.0	.5	0	.3%	.0%	1.0%	.0%
Other Companies	.0	.6	.0	279	.0%	.8%	.0%	9.4%
All Companies	175.8	78.1	56.8	2,982	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	126.8	56.6	35.9	2,178	72.1%	72.6%	63.3%	73.0%
All Asian-Based Companies	49.0	21.4	20.9	805	27.9%	27.4%	36.7%	27.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	73.7	59.4	.0	2,419	41.9%	76.1%	.0%	81.1%
All Turnkey & SW Companies	102.1	18.7	56.8	563	58.1%	23.9%	100.0%	18.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 53
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Zuken	65.9	19.0	31.5	374	18.2%	11.2%	23.5%	3.3%
Fujitsu	41.9	21.9	14.4	887	11.6%	12.9%	10.8%	7.9%
Yokogawa Digital Computer	30.9	12.3	15.4	285	8.5%	7.2%	11.5%	2.6%
Sun Microsystems	30.6	24.3	.0	1,105	8.4%	14.3%	.0%	9.9%
CADIX	29.0	12.5	14.2	160	8.0%	7.3%	10.6%	1.4%
NEC	28.2	18.8	6.9	2,188	7.8%	11.0%	5.2%	19.6%
IBM	16.9	6.2	8.9	522	4.7%	3.6%	6.6%	4.7%
Toshiba*	14.4	7.2	5.8	160	4.0%	4.2%	4.3%	1.4%
Altium*	11.2	3.0	7.8	980	3.1%	1.7%	5.8%	8.8%
Hewlett-Packard	11.0	9.4	.0	412	3.0%	5.5%	.0%	3.7%
Digital	10.8	7.2	1.3	217	3.0%	4.2%	1.0%	1.9%
Racal-Redac	10.7	1.6	4.7	64	3.0%	.9%	3.5%	.6%
Sharp*	10.7	5.2	5.6	97	3.0%	3.0%	4.2%	.9%
Mentor Graphics	10.3	1.2	4.6	40	2.8%	.7%	3.4%	.4%
Hitachi	7.1	3.3	3.1	319	2.0%	2.0%	2.3%	2.9%
Uchida Yoko	6.3	3.7	2.3	180	1.7%	2.2%	1.7%	1.6%
C. Itoh Techno-Science*	5.8	1.8	3.5	62	1.6%	1.0%	2.6%	.6%
Cadence	5.2	.0	3.3	0	1.4%	.0%	2.5%	.0%
Sumisho Electronics*	4.5	3.2	1.2	95	1.2%	1.9%	.9%	.9%
Sony	3.9	3.9	.0	193	1.1%	2.3%	.0%	1.7%
Omron	2.0	1.0	.8	45	.6%	.6%	.6%	.4%

(Continued)

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Table 53 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Intergraph	1.7	.4	.5	11	.5%	.2%	.4%	.1%
TECHSPERT	1.3	.2	1.1	11	.3%	.1%	.8%	.1%
Sophia Systems*	1.1	.2	.8	10	.3%	.1%	.6%	.1%
Andor	1.0	.2	.8	19	.3%	.1%	.6%	.2%
Century Research Center	1.0	.5	.4	7	.3%	.3%	.3%	.1%
Other Companies	.0	1.9	.0	2,693	.0%	1.1%	.0%	24.1%
All Companies	362.4	170.4	134.0	11,176	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	108.7	59.4	27.2	6,164	30.0%	34.9%	20.3%	55.2%
All Asian-Based Companies	242.6	109.4	101.6	4,947	66.9%	64.2%	75.8%	44.3%
All European-Based Companies	11.2	1.6	5.1	64	3.1%	.9%	3.8%	.6%
All Hardware Companies	73.9	63.8	.0	6,446	20.4%	37.4%	.0%	57.7%
All Turnkey & SW Companies	288.5	106.6	134.0	4,730	79.6%	62.6%	100.0%	42.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 54
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cadence	18.9	.0	12.2	0	14.0%	.0%	21.6%	.0%
Computervision	10.8	2.3	5.4	105	8.0%	4.4%	9.6%	1.9%
Sun Microsystems	10.6	8.4	.0	358	7.8%	16.1%	.0%	6.6%
IBM	10.3	5.6	2.9	366	7.6%	10.8%	5.1%	6.7%
Digital	10.2	8.1	.0	337	7.6%	15.6%	.0%	6.2%
Autodesk	9.5	.0	9.5	0	7.1%	.0%	16.9%	.0%
Zuken	6.2	1.8	3.0	35	4.6%	3.4%	5.3%	.6%
COMPASS Design Automation	4.7	.0	3.8	0	3.5%	.0%	6.7%	.0%
Intergraph	4.6	1.9	1.2	68	3.4%	3.7%	2.2%	1.2%
Silicon Graphics	4.5	4.5	.0	118	3.3%	8.6%	.0%	2.2%
Hewlett-Packard	4.1	3.5	.0	156	3.0%	6.6%	.0%	2.9%
SDRC	3.5	.0	2.4	0	2.6%	.0%	4.3%	.0%
Delcam International	2.1	.7	.9	27	1.5%	1.4%	1.6%	.5%
Quickturn Design Systems	1.8	.5	.9	11	1.3%	1.0%	1.6%	.2%
Altium*	1.5	.6	.9	113	1.1%	1.1%	1.6%	2.1%
ESRI	1.5	.0	1.2	0	1.1%	.0%	2.1%	.0%
Design Automation	1.3	.3	1.0	44	.9%	.5%	1.7%	.8%
Mentor Graphics	1.1	.1	.5	5	.8%	.3%	.9%	.1%
EDS Unigraphics	1.0	.3	.4	12	.7%	.5%	.8%	.2%
Viewlogic Systems	.9	.0	.6	0	.6%	.0%	1.1%	.0%
ADRA Systems	.8	.0	.7	0	.6%	.0%	1.2%	.0%

(Continued)

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Table 54 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Investronica SA	.6	.4	.2	22	.5%	.8%	.3%	.4%
Matra Datavision	.5	.2	.3	8	.4%	.3%	.5%	.1%
Silvar-Lisco	.5	.0	.4	0	.4%	.0%	.6%	.0%
CAD Centre	.5	.0	.4	0	.4%	.0%	.6%	.0%
Other Companies	19.6	12.2	5.8	3,637	14.5%	23.5%	10.3%	66.8%
All Companies	134.9	52.0	56.5	5,441	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	122.6	48.4	50.4	5,294	90.9%	93.1%	89.1%	97.3%
All Asian-Based Companies	7.7	2.2	4.1	83	5.7%	4.1%	7.2%	1.5%
All European-Based Companies	4.6	1.4	2.1	64	3.4%	2.8%	3.8%	1.2%
All Hardware Companies	45.7	39.2	.9	5,000	33.8%	75.4%	1.6%	91.9%
All Turnkey & SW Companies	89.3	12.8	55.7	441	66.2%	24.6%	98.4%	8.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 55
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cadence	18.9	.0	12.2	0	20.8%	.0%	29.4%	.0%
Computervision	10.8	2.3	5.4	105	11.8%	8.4%	12.9%	10.7%
Sun Microsystems	9.3	7.3	.0	335	10.2%	27.1%	.0%	34.1%
Zuken	6.2	1.8	3.0	35	6.8%	6.6%	7.1%	3.6%
COMPASS Design Automation	4.7	.0	3.8	0	5.2%	.0%	9.1%	.0%
Silicon Graphics	4.5	4.5	.0	118	4.9%	16.5%	.0%	12.0%
Intergraph	3.9	1.7	1.0	49	4.3%	6.2%	2.3%	5.0%
Hewlett-Packard	3.9	3.3	.0	123	4.2%	12.1%	.0%	12.5%
SDRC	3.5	.0	2.4	0	3.8%	.0%	5.7%	.0%
IBM	3.4	1.4	1.4	29	3.7%	5.1%	3.3%	3.0%
Digital	3.2	2.5	.0	105	3.5%	9.3%	.0%	10.7%
Delcam International	2.0	.7	.9	24	2.2%	2.5%	2.1%	2.5%
Quickturn Design Systems	1.8	.5	.9	11	2.0%	2.0%	2.1%	1.1%
Mentor Graphics	1.1	.1	.5	5	1.3%	.5%	1.2%	.5%
Autodesk	.8	.0	.8	0	.9%	.0%	1.9%	.0%
EDS Unigraphics	.8	.2	.4	11	.9%	.8%	.9%	1.1%
Altium*	.7	.3	.4	20	.8%	1.1%	.9%	2.0%
Viewlogic Systems	.7	.0	.5	0	.8%	.0%	1.2%	.0%
ADRA Systems	.6	.0	.5	0	.7%	.0%	1.1%	.0%
ESRI	.6	.0	.5	0	.7%	.0%	1.1%	.0%
Matra Datavision	.5	.2	.3	7	.6%	.7%	.7%	.7%

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Table 55 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Silvar-Lisco	.5	.0	.4	0	.6%	.0%	.8%	.0%
CAD Centre	.5	.0	.4	0	.5%	.0%	.9%	.0%
Other Companies	5.0	.0	4.5	0	5.6%	.0%	10.9%	.0%
All Companies	91.0	27.1	41.6	983	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	80.7	24.1	36.7	905	88.7%	89.2%	88.1%	92.1%
All Asian-Based Companies	6.5	1.9	3.1	40	7.1%	7.0%	7.4%	4.0%
All European-Based Companies	3.8	1.0	1.9	38	4.2%	3.8%	4.5%	3.9%
All Hardware Companies	22.7	18.1	.9	694	24.9%	67.0%	2.1%	70.6%
All Turnkey & SW Companies	68.3	8.9	40.7	289	75.1%	33.0%	97.9%	29.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 56
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	3.9	3.1	.0	0	37.9%	41.3%	.0%	.0%
IBM	3.9	2.3	.8	50	37.8%	30.2%	81.1%	38.9%
Other Companies	2.3	2.1	.0	78	22.4%	28.5%	5.3%	61.0%
All Companies	10.3	7.4	1.0	129	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	10.3	7.4	.9	128	99.8%	100.0%	98.9%	99.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.2%	.0%	1.1%	.1%
All Hardware Companies	6.2	5.2	.0	78	59.6%	69.8%	.0%	60.8%
All Turnkey & SW Companies	4.2	2.3	1.0	50	40.4%	30.2%	100.0%	39.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 57
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	2.2	1.8	.0	19	35.3%	47.2%	.0%	33.1%
Sun Microsystems	1.3	1.1	.0	22	20.0%	28.6%	.0%	37.7%
IBM	.9	.5	.2	7	14.6%	13.5%	20.7%	12.7%
ESRI	.6	.0	.5	0	9.1%	.0%	40.5%	.0%
Other Companies	.7	.1	.3	3	11.0%	2.7%	24.3%	5.2%
All Companies	6.4	3.7	1.1	59	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	6.3	3.7	1.1	59	99.8%	100.0%	100.0%	99.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.2%	.0%	.0%	.1%
All Hardware Companies	3.6	2.9	.0	43	56.2%	77.4%	.0%	72.8%
All Turnkey & SW Companies	2.8	.8	1.1	16	43.8%	22.6%	100.0%	27.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 58
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Autodesk	8.7	.0	8.7	0	32.0%	.0%	67.9%	.0%
IBM	2.1	1.5	.5	280	7.5%	10.9%	4.0%	6.5%
Design Automation	1.3	.3	1.0	44	4.7%	1.8%	7.5%	1.0%
Digital	.8	.8	.0	212	3.1%	5.7%	.0%	5.0%
Altium*	.8	.3	.5	93	3.0%	2.0%	4.0%	2.2%
Investronica SA	.6	.4	.2	22	2.3%	2.8%	1.3%	.5%
Other Companies	11.5	10.3	1.0	3,569	42.1%	74.8%	7.6%	83.6%
All Companies	27.3	13.8	12.9	4,271	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	25.3	13.1	11.7	4,202	92.6%	95.1%	90.7%	98.4%
All Asian-Based Companies	1.3	.3	1.0	44	4.7%	1.8%	7.5%	1.0%
All European-Based Companies	.8	.4	.2	25	2.7%	3.0%	1.9%	.6%
All Hardware Companies	13.3	13.0	.0	4,186	48.7%	94.3%	.0%	98.0%
All Turnkey & SW Companies	14.0	.8	12.9	85	51.3%	5.7%	100.0%	2.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 59
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	7.1	3.5	2.2	137	15.5%	16.6%	12.6%	6.2%
Computervision	5.5	1.1	2.8	53	12.0%	5.5%	15.5%	2.4%
Silicon Graphics	4.4	4.4	.0	116	9.6%	20.9%	.0%	5.2%
Autodesk	3.8	.0	3.8	0	8.4%	.0%	21.5%	.0%
SDRC	3.5	.0	2.4	0	7.8%	.0%	13.6%	.0%
Digital	3.0	2.4	.0	99	6.5%	11.3%	.0%	4.5%
Delcam International	2.1	.7	.9	27	4.6%	3.4%	5.1%	1.2%
Altium*	1.2	.5	.7	87	2.7%	2.4%	3.9%	3.9%
Intergraph	1.0	.3	.3	11	2.1%	1.6%	1.8%	.5%
Design Automation	1.0	.2	.7	33	2.1%	.9%	4.0%	1.5%
EDS Unigraphics	1.0	.3	.4	12	2.1%	1.3%	2.5%	.5%
ADRA Systems	.8	.0	.7	0	1.8%	.0%	3.7%	.0%
Investronica SA	.6	.4	.2	22	1.4%	1.9%	1.0%	1.0%
Hewlett-Packard	.6	.5	.0	25	1.3%	2.4%	.0%	1.1%
Matra Datavision	.5	.2	.3	8	1.2%	.9%	1.7%	.4%
Other Companies	7.6	5.9	1.3	1,560	16.7%	28.2%	7.1%	70.6%
All Companies	45.5	20.9	17.7	2,210	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	40.9	19.3	15.4	2,115	89.8%	92.2%	86.9%	95.7%
All Asian-Based Companies	1.2	.3	.8	37	2.6%	1.4%	4.7%	1.7%
All European-Based Companies	3.5	1.3	1.5	58	7.6%	6.3%	8.4%	2.6%
All Hardware Companies	15.3	14.3	.0	1,969	33.6%	68.6%	.0%	89.1%
All Turnkey & SW Companies	30.2	6.6	17.7	241	66.4%	31.4%	100.0%	10.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 60
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Computervision	5.4	1.1	2.7	52	26.6%	13.2%	30.8%	3.2%
Autodesk	4.1	.0	4.1	0	20.3%	.0%	47.0%	.0%
Intergraph	1.8	.7	.5	31	8.8%	8.7%	5.6%	1.9%
IBM	1.7	1.1	.4	104	8.6%	12.9%	4.2%	6.3%
Digital	.7	.6	.0	81	3.4%	6.8%	.0%	4.9%
Hewlett-Packard	.6	.5	.0	28	3.0%	6.1%	.0%	1.7%
CAD Centre	.5	.0	.4	0	2.5%	.0%	4.1%	.0%
Other Companies	4.7	4.2	.3	1,323	23.2%	49.2%	3.8%	80.3%
All Companies	20.2	8.5	8.7	1,647	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	19.3	8.5	8.1	1,636	95.9%	99.3%	93.0%	99.3%
All Asian-Based Companies	.3	.1	.3	11	1.6%	.7%	2.9%	.7%
All European-Based Companies	.5	.0	.4	0	2.5%	.0%	4.1%	.0%
All Hardware Companies	6.3	6.0	.0	1,537	31.2%	70.1%	.0%	93.3%
All Turnkey & SW Companies	13.9	2.6	8.7	110	68.8%	29.9%	100.0%	6.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 61
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ESRI	1.5	.0	1.2	0	17.9%	.0%	34.2%	.0%
Intergraph	1.4	.7	.3	23	16.8%	21.8%	8.0%	4.6%
Autodesk	1.1	.0	1.1	0	12.6%	.0%	30.2%	.0%
IBM	.6	.4	.1	26	7.5%	11.8%	2.9%	5.3%
Digital	.6	.5	.0	22	6.9%	13.9%	.0%	4.4%
Other Companies	2.6	1.4	.8	410	31.4%	41.6%	22.7%	82.7%
All Companies	8.3	3.4	3.5	495	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	8.1	3.3	3.4	492	97.6%	98.2%	98.0%	99.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.2	.1	.1	3	2.4%	1.8%	2.0%	.6%
All Hardware Companies	2.4	2.2	.0	461	28.4%	64.3%	.0%	93.1%
All Turnkey & SW Companies	6.0	1.2	3.5	34	71.6%	35.7%	100.0%	6.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 62
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cadence	18.9	.0	12.2	0	31.0%	.0%	45.9%	.0%
Sun Microsystems	9.9	7.9	.0	339	16.2%	41.0%	.0%	31.1%
Zuken	6.2	1.8	3.0	35	10.2%	9.3%	11.2%	3.2%
Digital	6.0	4.7	.0	135	9.8%	24.6%	.0%	12.4%
COMPASS Design Automation	4.7	.0	3.8	0	7.7%	.0%	14.2%	.0%
Hewlett-Packard	2.6	2.2	.0	93	4.3%	11.5%	.0%	8.6%
Quickturn Design Systems	1.8	.5	.9	11	2.9%	2.8%	3.3%	1.0%
Mentor Graphics	1.1	.1	.5	5	1.9%	.7%	1.9%	.4%
IBM	.9	.7	.2	99	1.5%	3.4%	.6%	9.1%
Viewlogic Systems	.9	.0	.6	0	1.4%	.0%	2.4%	.0%
Autodesk	.6	.0	.6	0	1.0%	.0%	2.2%	.0%
Silvar-Lisco	.5	.0	.4	0	.9%	.0%	1.3%	.0%
Other Companies	4.7	.7	3.4	344	7.7%	3.7%	13.0%	31.6%
All Companies	60.9	19.2	26.6	1,089	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	54.3	17.3	23.4	1,051	89.1%	90.3%	88.0%	96.5%
All Asian-Based Companies	6.2	1.8	3.0	35	10.2%	9.3%	11.2%	3.2%
All European-Based Companies	.4	.1	.2	3	.7%	.3%	.8%	.2%
All Hardware Companies	21.7	16.7	.9	1,034	35.6%	87.1%	3.3%	94.9%
All Turnkey & SW Companies	39.2	2.5	25.7	55	64.4%	12.9%	96.7%	5.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 63
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cadence	9.0	.0	5.8	0	27.8%	.0%	38.7%	.0%
Sun Microsystems	4.0	3.2	.0	142	12.2%	32.8%	.0%	21.4%
Zuken	3.7	1.1	1.8	21	11.4%	11.1%	11.8%	3.2%
Digital	3.1	2.5	.0	77	9.6%	25.5%	.0%	11.7%
COMPASS Design Automation	2.8	.0	2.3	0	8.7%	.0%	15.1%	.0%
Quickturn Design Systems	1.8	.5	.9	11	5.5%	5.6%	5.9%	1.7%
Hewlett-Packard	1.4	1.2	.0	48	4.2%	12.1%	.0%	7.3%
Viewlogic Systems	.9	.0	.6	0	2.6%	.0%	4.3%	.0%
Mentor Graphics	.7	.1	.3	3	2.0%	.8%	1.9%	.4%
Other Companies	3.3	.4	2.5	287	10.1%	4.3%	16.9%	43.4%
All Companies	32.4	9.6	15.1	660	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	28.6	8.5	13.2	639	88.3%	88.8%	87.9%	96.7%
All Asian-Based Companies	3.7	1.1	1.8	21	11.4%	11.1%	11.8%	3.2%
All European-Based Companies	.1	.0	.1	1	.3%	.1%	.3%	.1%
All Hardware Companies	11.1	8.1	.9	627	34.2%	84.9%	5.9%	95.0%
All Turnkey & SW Companies	21.3	1.5	14.2	33	65.8%	15.1%	94.1%	5.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 64
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cadence	8.6	.0	5.6	0	50.9%	.0%	64.5%	.0%
Sun Microsystems	2.9	2.3	.0	88	17.2%	66.0%	.0%	77.5%
COMPASS Design Automation	1.9	.0	1.5	0	11.1%	.0%	17.5%	.0%
Digital	1.3	1.0	.0	19	7.6%	28.9%	.0%	16.9%
Silvar-Lisco	.5	.0	.4	0	3.1%	.0%	4.1%	.0%
Other Companies	.9	.0	.7	1	5.1%	1.1%	8.2%	1.3%
All Companies	16.9	3.5	8.6	114	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	16.9	3.5	8.6	114	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	4.4	3.5	.0	112	25.7%	98.6%	.0%	98.8%
All Turnkey & SW Companies	12.6	.1	8.6	1	74.3%	1.4%	100.0%	1.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 65
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	3.0	2.4	.0	109	26.1%	39.5%	.0%	34.6%
Zuken	2.5	.7	1.2	14	21.7%	12.0%	41.1%	4.5%
Digital	1.6	1.3	.0	38	13.7%	20.6%	.0%	12.0%
Cadence	1.3	.0	.8	0	10.9%	.0%	28.1%	.0%
Hewlett-Packard	1.1	1.0	.0	42	9.8%	15.8%	.0%	13.4%
IBM	.5	.3	.2	35	4.7%	5.1%	5.8%	11.1%
Other Companies	.5	.3	.2	56	4.7%	4.3%	6.8%	17.7%
All Companies	11.6	6.1	2.9	315	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	8.8	5.3	1.6	299	75.4%	87.2%	53.4%	94.9%
All Asian-Based Companies	2.5	.7	1.2	14	21.7%	12.0%	41.1%	4.5%
All European-Based Companies	.3	.1	.2	2	2.9%	.8%	5.5%	.6%
All Hardware Companies	6.3	5.1	.0	294	54.0%	83.9%	.0%	93.4%
All Turnkey & SW Companies	5.3	1.0	2.9	21	46.0%	16.1%	100.0%	6.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 66
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Mentor Graphics	11.1	1.4	4.9	47	18.3%	7.1%	19.0%	2.7%
Siemens Nixdorf Info systeme	7.1	2.3	2.8	109	11.7%	11.7%	10.9%	6.3%
IBM	4.5	2.2	1.6	154	7.4%	11.0%	6.2%	8.9%
SDRC	3.5	.0	2.4	0	5.9%	.0%	9.3%	.0%
ESRI	3.4	.0	2.7	0	5.6%	.0%	10.5%	.0%
Computervision	3.2	.7	1.6	31	5.3%	3.4%	6.2%	1.8%
Sun Microsystems	2.5	2.0	.0	86	4.1%	10.1%	.0%	5.0%
Digital	2.2	1.8	.0	79	3.7%	9.3%	.0%	4.6%
Silicon Graphics	2.2	2.2	.0	58	3.6%	11.0%	.0%	3.4%
Hewlett-Packard	1.6	1.4	.0	62	2.7%	7.1%	.0%	3.6%
Altium*	1.5	.6	.9	113	2.5%	3.0%	3.5%	6.6%
Intergraph	1.3	.5	.4	20	2.2%	2.8%	1.4%	1.1%
EDS Unigraphics	1.3	.4	.6	16	2.1%	1.9%	2.3%	.9%
Autodesk	1.2	.0	1.2	0	2.0%	.0%	4.6%	.0%
Viewlogic Systems	.9	.0	.6	0	1.4%	.0%	2.5%	.0%
Zuken	.7	.2	.4	4	1.2%	1.1%	1.4%	.2%
Investronica SA	.6	.4	.2	22	1.0%	2.0%	.7%	1.3%
IEZ	.6	.2	.3	14	.9%	1.0%	1.2%	.8%

(Continued)

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Table 66 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Matra Datavision	.5	.2	.3	8	.9%	.9%	1.2%	.5%
Other Companies	8.3	2.8	3.9	881	13.8%	14.2%	15.2%	51.2%
All Companies	60.4	19.6	25.9	1,720	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	49.9	16.2	21.5	1,555	82.7%	82.4%	83.0%	90.4%
All Asian-Based Companies	.7	.2	.4	4	1.2%	1.1%	1.4%	.2%
All European-Based Companies	9.8	3.3	4.1	161	16.2%	16.6%	15.6%	9.3%
All Hardware Companies	12.6	11.3	.0	1,395	20.8%	57.6%	.0%	81.1%
All Turnkey & SW Companies	47.8	8.3	25.9	325	79.2%	42.4%	100.0%	18.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 67
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Mentor Graphics	11.1	1.4	4.9	47	24.5%	11.4%	24.3%	9.9%
Siemens Nixdorf Info systeme	6.7	2.1	2.7	103	14.9%	17.3%	13.4%	21.8%
SDRC	3.5	.0	2.4	0	7.7%	.0%	11.8%	.0%
Computervision	3.2	.7	1.6	31	7.0%	5.4%	7.8%	6.5%
Sun Microsystems	2.2	1.7	.0	80	4.9%	14.1%	.0%	16.9%
Silicon Graphics	2.2	2.2	.0	58	4.8%	17.5%	.0%	12.2%
Hewlett-Packard	1.6	1.3	.0	49	3.4%	10.7%	.0%	10.4%
IBM	1.5	.5	.7	11	3.3%	4.0%	3.6%	2.2%
ESRI	1.4	.0	1.0	0	3.0%	.0%	5.1%	.0%
Intergraph	1.1	.5	.3	14	2.5%	4.0%	1.4%	3.0%
EDS Unigraphics	1.1	.3	.5	14	2.4%	2.5%	2.5%	3.0%
Zuken	.7	.2	.4	4	1.6%	1.7%	1.7%	.9%
Altium*	.7	.3	.4	20	1.5%	2.4%	1.9%	4.2%
Viewlogic Systems	.7	.0	.5	0	1.5%	.0%	2.4%	.0%
Digital	.7	.5	.0	21	1.4%	4.1%	.0%	4.5%
IEZ	.6	.2	.3	14	1.3%	1.5%	1.5%	2.9%

(Continued)

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Table 67 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Matra Datavision	.5	.2	.3	7	1.1%	1.5%	1.4%	1.5%
Other Companies	3.9	.0	3.1	0	8.6%	.0%	15.5%	.0%
All Companies	45.2	12.3	20.2	474	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	35.9	9.4	16.2	337	79.2%	76.3%	80.0%	71.2%
All Asian-Based Companies	.7	.2	.4	4	1.6%	1.7%	1.7%	.9%
All European-Based Companies	8.7	2.7	3.7	132	19.2%	22.0%	18.3%	27.9%
All Hardware Companies	6.6	5.7	.0	209	14.5%	46.5%	.0%	44.1%
All Turnkey & SW Companies	38.7	6.6	20.2	265	85.5%	53.5%	100.0%	55.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 68
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hard-ware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	1.4	.8	.3	18	40.2%	34.3%	61.4%	35.0%
Digital	.8	.7	.0	0	23.2%	27.3%	.0%	.0%
Other Companies	.9	.8	.0	28	24.1%	31.8%	2.3%	54.4%
All Companies	3.5	2.4	.4	52	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.2	2.3	.3	46	90.1%	93.4%	77.3%	89.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.4	.2	.1	5	9.9%	6.6%	22.7%	10.5%
All Hardware Companies	1.6	1.4	.0	28	46.2%	59.1%	.0%	54.2%
All Turnkey & SW Companies	1.9	1.0	.4	24	53.8%	40.9%	100.0%	45.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 69
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ESRI	1.3	.0	1.0	0	34.0%	.0%	62.8%	.0%
Digital	.6	.5	.0	5	14.6%	42.6%	.0%	25.3%
Other Companies	.9	.0	.4	2	23.3%	.9%	23.8%	9.0%
All Companies	3.9	1.1	1.6	19	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.9	1.1	1.6	19	99.7%	100.0%	100.0%	99.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.3%	.0%	.0%	.4%
All Hardware Companies	.9	.7	.0	11	23.0%	67.6%	.0%	55.5%
All Turnkey & SW Companies	3.0	.4	1.6	9	77.0%	32.4%	100.0%	44.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 70
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	1.2	.7	.5	122	15.9%	17.5%	14.6%	10.4%
Autodesk	1.1	.0	1.1	0	14.2%	.0%	30.5%	.0%
Altium*	.8	.3	.5	93	10.8%	7.3%	14.6%	7.9%
ESRI	.7	.0	.6	0	8.7%	.0%	17.9%	.0%
Investronica SA	.6	.4	.2	22	8.2%	10.2%	4.8%	1.8%
Other Companies	2.7	2.2	.4	866	34.8%	58.1%	10.9%	73.7%
All Companies	7.7	3.8	3.6	1,175	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	7.0	3.4	3.3	1,152	90.6%	89.8%	93.0%	98.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.7	.4	.3	23	9.4%	10.2%	7.0%	1.9%
All Hardware Companies	3.5	3.4	.0	1,147	45.2%	89.3%	.0%	97.6%
All Turnkey & SW Companies	4.2	.4	3.6	28	54.8%	10.7%	100.0%	2.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 71
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
SDRC	3.5	.0	2.4	0	18.4%	.0%	28.8%	.0%
IBM	3.1	1.3	1.2	58	15.9%	17.6%	14.8%	11.2%
Computervision	2.4	.5	1.2	23	12.2%	6.7%	14.1%	4.4%
Silicon Graphics	1.9	1.9	.0	51	10.1%	26.6%	.0%	10.0%
EDS Unigraphics	1.3	.4	.6	16	6.6%	5.1%	7.1%	3.1%
Altium*	1.2	.5	.7	87	6.4%	6.9%	8.3%	16.9%
Digital	.8	.7	.0	28	4.4%	9.2%	.0%	5.5%
Investronica SA	.6	.4	.2	22	3.3%	5.3%	2.0%	4.2%
Matra Datavision	.5	.2	.3	8	2.8%	2.5%	3.6%	1.5%
Other Companies	1.4	.9	.4	195	7.4%	11.8%	4.8%	38.0%
All Companies	19.2	7.3	8.4	513	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	17.6	6.6	7.7	477	91.7%	90.3%	92.1%	93.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.6	.7	.7	36	8.3%	9.7%	7.9%	6.9%
All Hardware Companies	4.7	4.4	.0	408	24.6%	60.9%	.0%	79.5%
All Turnkey & SW Companies	14.5	2.9	8.4	105	75.4%	39.1%	100.0%	20.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 72
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Computervision	.8	.2	.4	8	18.9%	8.5%	24.6%	3.0%
IBM	.6	.3	.2	23	13.0%	14.9%	10.5%	8.5%
IEZ	.6	.2	.3	14	13.0%	9.5%	17.5%	5.2%
Autodesk	.5	.0	.5	0	11.6%	.0%	29.8%	.0%
Intergraph	.5	.2	.2	9	11.6%	10.4%	8.8%	3.4%
Other Companies	.6	.5	.0	165	13.5%	27.4%	.6%	62.2%
All Companies	4.4	2.0	1.7	266	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.8	1.8	1.4	252	86.8%	90.5%	81.9%	94.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.6	.2	.3	14	13.2%	9.5%	18.1%	5.2%
All Hardware Companies	1.3	1.2	.0	229	29.9%	61.7%	.0%	86.3%
All Turnkey & SW Companies	3.1	.8	1.7	36	70.1%	38.3%	100.0%	13.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 73
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Siemens Nixdorf Info systeme	7.1	2.3	2.8	109	45.2%	59.5%	35.6%	27.9%
ESRI	3.4	.0	2.7	0	21.5%	.0%	34.3%	.0%
Other Companies	3.9	.7	2.1	218	25.0%	19.0%	27.0%	55.9%
All Companies	15.7	3.9	7.9	390	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	8.6	1.6	5.1	281	54.8%	40.5%	64.4%	72.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	7.1	2.3	2.8	109	45.2%	59.5%	35.6%	27.9%
All Hardware Companies	1.3	1.2	.0	270	8.0%	30.9%	.0%	69.2%
All Turnkey & SW Companies	14.4	2.7	7.9	120	92.0%	69.1%	100.0%	30.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 74
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Mentor Graphics	11.1	1.4	4.9	47	52.4%	21.7%	62.2%	8.5%
Sun Microsystems	2.3	1.8	.0	80	11.0%	28.5%	.0%	14.5%
Hewlett-Packard	1.1	.9	.0	39	5.1%	14.2%	.0%	7.0%
Digital	1.0	.8	.0	23	4.9%	12.7%	.0%	4.1%
Viewlogic Systems	.9	.0	.6	0	4.0%	.0%	8.1%	.0%
Zuken	.7	.2	.4	4	3.4%	3.3%	4.4%	.7%
Other Companies	2.4	.7	1.4	303	11.4%	10.1%	17.5%	54.9%
All Companies	21.1	6.5	7.9	552	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	19.9	6.2	7.3	545	94.3%	95.8%	92.3%	98.8%
All Asian-Based Companies	.7	.2	.4	4	3.4%	3.3%	4.4%	.7%
All European-Based Companies	.5	.1	.3	3	2.3%	.9%	3.3%	.5%
All Hardware Companies	5.3	4.4	.0	488	25.0%	68.4%	.0%	88.5%
All Turnkey & SW Companies	15.8	2.0	7.9	64	75.0%	31.6%	100.0%	11.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 75
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Mentor Graphics	6.3	.9	2.8	28	56.7%	28.9%	61.2%	10.6%
Sun Microsystems	1.0	.8	.0	35	8.9%	26.5%	.0%	13.3%
Viewlogic Systems	.9	.0	.6	0	7.6%	.0%	14.1%	.0%
Other Companies	1.5	.3	1.0	152	13.5%	9.9%	21.1%	57.1%
All Companies	11.2	2.9	4.5	266	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	11.1	2.9	4.5	265	99.1%	99.7%	98.9%	99.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.1	.0	.1	1	.9%	.3%	1.1%	.2%
All Hardware Companies	2.2	1.8	.0	229	19.6%	62.2%	.0%	86.3%
All Turnkey & SW Companies	9.0	1.1	4.5	36	80.4%	37.8%	100.0%	13.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 76
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Mentor Graphics	2.4	.3	1.1	9	70.5%	28.9%	92.3%	29.0%
Sun Microsystems	.6	.5	.0	18	17.1%	47.4%	.0%	54.7%
Other Companies	.1	.0	.1	0	3.5%	1.0%	6.8%	1.3%
All Companies	3.4	1.0	1.2	32	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.4	1.0	1.2	32	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.9	.7	.0	23	25.1%	70.1%	.0%	70.5%
All Turnkey & SW Companies	2.5	.3	1.2	10	74.9%	29.9%	100.0%	29.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 77
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Mentor Graphics	2.4	.3	1.1	9	35.9%	10.6%	47.9%	3.6%
Sun Microsystems	.8	.6	.0	27	11.5%	23.5%	.0%	10.7%
Zuken	.7	.2	.4	4	11.0%	8.2%	16.0%	1.6%
Hewlett-Packard	.6	.5	.0	21	8.5%	18.8%	.0%	8.2%
Other Companies	.8	.3	.3	151	11.8%	13.7%	15.5%	59.4%
All Companies	6.6	2.6	2.2	254	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	5.4	2.3	1.6	248	83.1%	89.8%	74.4%	97.6%
All Asian-Based Companies	.7	.2	.4	4	11.0%	8.2%	16.0%	1.6%
All European-Based Companies	.4	.1	.2	2	6.0%	2.0%	9.6%	.7%
All Hardware Companies	2.2	1.9	.0	236	34.0%	74.9%	.0%	93.0%
All Turnkey & SW Companies	4.3	.6	2.2	18	66.0%	25.1%	100.0%	7.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 78
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Autodesk	9.2	.0	9.2	0	10.8%	.0%	28.0%	.0%
Digital	9.0	7.1	.0	256	10.5%	18.7%	.0%	5.8%
Cadence	7.8	.0	5.0	0	9.1%	.0%	15.2%	.0%
IBM	6.4	3.3	2.1	218	7.5%	8.6%	6.2%	4.9%
Computervision	5.1	1.1	2.6	49	5.9%	2.8%	7.8%	1.1%
Sun Microsystems	4.9	3.9	.0	169	5.8%	10.4%	.0%	3.8%
Silicon Graphics	3.8	3.8	.0	101	4.4%	10.0%	.0%	2.3%
SDRC	3.5	.0	2.4	0	4.1%	.0%	7.3%	.0%
Intergraph	3.4	1.4	.9	49	3.9%	3.7%	2.8%	1.1%
Hewlett-Packard	2.9	2.5	.0	109	3.4%	6.5%	.0%	2.5%
ESRI	1.9	.0	1.5	0	2.2%	.0%	4.6%	.0%
Quickturn Design Systems	1.8	.5	.9	11	2.1%	1.4%	2.7%	.2%
Delcam International	1.6	.5	.7	20	1.8%	1.4%	2.0%	.5%
Altium*	1.5	.6	.9	113	1.8%	1.5%	2.7%	2.6%
Mentor Graphics	1.0	.1	.5	4	1.1%	.3%	1.4%	.1%
EDS Unigraphics	1.0	.3	.4	12	1.1%	.7%	1.3%	.3%
COMPASS Design Automation	.9	.0	.8	0	1.1%	.0%	2.3%	.0%
Hitachi Zosen Info Systems	.9	.8	.0	9	1.1%	2.0%	.1%	.2%
Zycad	.8	.5	.1	12	1.0%	1.3%	.3%	.3%
Gerber Systems	.8	.4	.3	13	.9%	1.0%	1.0%	.3%
Investronica SA	.6	.4	.2	22	.7%	1.0%	.5%	.5%

(Continued)

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Table 78 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Matra Datavision	.5	.2	.3	8	.6%	.5%	.9%	.2%
Other Companies	14.6	10.2	3.3	3,230	17.0%	27.0%	10.0%	73.1%
All Companies	85.7	37.8	33.0	4,416	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	81.2	35.7	31.4	4,350	94.7%	94.6%	95.2%	98.5%
All Asian-Based Companies	1.0	.8	.1	9	1.2%	2.1%	.3%	.2%
All European-Based Companies	3.5	1.3	1.5	57	4.1%	3.3%	4.5%	1.3%
All Hardware Companies	34.3	29.4	.9	4,150	40.0%	77.9%	2.7%	94.0%
All Turnkey & SW Companies	51.4	8.4	32.1	266	60.0%	22.1%	97.3%	6.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

Table 79
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cadence	7.8	.0	5.0	0	15.5%	.0%	24.8%	.0%
Computervision	5.0	1.1	2.5	49	10.0%	5.7%	12.4%	7.6%
Sun Microsystems	4.3	3.4	.0	158	8.7%	18.7%	.0%	24.6%
Silicon Graphics	3.8	3.8	.0	101	7.5%	20.6%	.0%	15.7%
SDRC	3.5	.0	2.4	0	7.0%	.0%	11.8%	.0%
Digital	3.0	2.3	.0	98	6.0%	12.8%	.0%	15.2%
Intergraph	2.9	1.2	.7	36	5.7%	6.7%	3.5%	5.6%
Hewlett-Packard	2.8	2.4	.0	89	5.5%	12.9%	.0%	13.8%
IBM	2.1	.8	.9	17	4.2%	4.3%	4.6%	2.6%
Quickturn Design Systems	1.8	.5	.9	11	3.6%	3.0%	4.4%	1.7%
Delcam International	1.5	.5	.6	18	3.0%	2.8%	3.2%	2.8%
Mentor Graphics	1.0	.1	.5	4	2.0%	.7%	2.2%	.6%
COMPASS Design Automation	.9	.0	.8	0	1.9%	.0%	3.7%	.0%
Hitachi Zosen Info Systems	.9	.7	.0	9	1.7%	3.9%	.2%	1.3%
EDS Unigraphics	.8	.2	.4	11	1.6%	1.3%	1.8%	1.7%
Gerber Systems	.8	.4	.3	13	1.6%	2.1%	1.7%	2.0%
Autodesk	.8	.0	.8	0	1.6%	.0%	3.9%	.0%
ESRI	.8	.0	.6	0	1.5%	.0%	2.9%	.0%
Altium*	.7	.3	.4	20	1.4%	1.6%	1.9%	3.1%
Zycad	.6	.3	.1	9	1.1%	1.7%	.3%	1.3%

(Continued)

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Table 79 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Technical Workstation
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Matra Datavision	.5	.2	.3	7	1.0%	1.0%	1.4%	1.1%
Other Companies	2.4	.0	2.3	0	4.8%	.0%	11.2%	.0%
All Companies	50.1	18.3	20.3	642	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	46.4	16.7	18.9	600	92.6%	91.3%	93.3%	93.5%
All Asian-Based Companies	1.0	.8	.1	9	2.0%	4.2%	.5%	1.5%
All European-Based Companies	2.7	.8	1.2	32	5.4%	4.6%	6.1%	5.0%
All Hardware Companies	15.7	12.5	.9	457	31.3%	68.1%	4.4%	71.2%
All Turnkey & SW Companies	34.4	5.8	19.4	185	68.7%	31.9%	95.6%	28.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 80
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Host-Dependent
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	3.5	2.8	.0	0	48.4%	52.4%	.0%	.0%
IBM	2.3	1.3	.5	30	31.7%	25.0%	76.7%	40.7%
Other Companies	1.2	1.1	.0	43	16.3%	21.0%	5.0%	58.5%
All Companies	7.3	5.3	.6	73	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	7.2	5.2	.6	73	99.2%	99.2%	100.0%	99.8%
All Asian-Based Companies	.1	.0	.0	0	.7%	.8%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.1%	.0%	.0%	.2%
All Hardware Companies	4.7	3.9	.0	43	65.0%	74.3%	.0%	58.8%
All Turnkey & SW Companies	2.6	1.4	.6	30	35.0%	25.7%	100.0%	41.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 81
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Server
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	1.9	1.5	.0	16	35.8%	55.1%	.0%	38.6%
ESRI	.8	.0	.6	0	14.4%	.0%	49.6%	.0%
Sun Microsystems	.6	.5	.0	10	11.3%	18.5%	.0%	24.9%
IBM	.5	.3	.1	4	10.2%	10.2%	11.3%	10.1%
Other Companies	.8	.1	.3	4	15.3%	3.4%	26.1%	8.9%
All Companies	5.2	2.7	1.2	42	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	5.2	2.7	1.2	42	99.8%	100.0%	100.0%	99.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.2%	.0%	.0%	.2%
All Hardware Companies	2.5	2.0	.0	27	48.1%	75.1%	.0%	65.4%
All Turnkey & SW Companies	2.7	.7	1.2	15	51.9%	24.9%	100.0%	34.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 82
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: Personal Computer
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Autodesk	8.5	.0	8.5	0	36.7%	.0%	76.7%	.0%
IBM	1.5	.9	.5	168	6.3%	7.8%	4.7%	4.6%
Altium*	.8	.3	.5	93	3.6%	2.4%	4.7%	2.5%
Investronica SA	.6	.4	.2	22	2.7%	3.4%	1.5%	.6%
Digital	.6	.5	.0	142	2.4%	4.6%	.0%	3.9%
Other Companies	10.2	9.3	.7	3,201	44.2%	80.4%	6.4%	87.5%
All Companies	23.0	11.6	11.0	3,660	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	22.3	11.2	10.8	3,635	96.8%	96.5%	97.8%	99.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.7	.4	.2	24	3.2%	3.5%	2.2%	.7%
All Hardware Companies	11.3	11.1	.0	3,623	49.1%	95.7%	.0%	99.0%
All Turnkey & SW Companies	11.7	.5	11.0	36	50.9%	4.3%	100.0%	1.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 83
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Computervision	4.7	1.0	2.4	45	13.0%	5.9%	16.5%	2.6%
IBM	4.5	2.1	1.6	96	12.3%	12.6%	11.1%	5.5%
Autodesk	3.7	.0	3.7	0	10.2%	.0%	25.8%	.0%
SDRC	3.5	.0	2.4	0	9.8%	.0%	16.9%	.0%
Silicon Graphics	3.4	3.4	.0	90	9.4%	20.7%	.0%	5.1%
Digital	2.3	1.8	.0	77	6.4%	11.2%	.0%	4.4%
Delcam International	1.6	.5	.7	20	4.3%	3.2%	4.7%	1.1%
Altium*	1.2	.5	.7	87	3.4%	3.0%	4.8%	5.0%
EDS Unigraphics	1.0	.3	.4	12	2.6%	1.7%	3.1%	.7%
Hitachi Zosen Info Systems	.9	.7	.0	8	2.4%	4.4%	.3%	.5%
Gerber Systems	.8	.4	.3	13	2.2%	2.3%	2.4%	.7%
Intergraph	.8	.3	.3	9	2.1%	1.6%	1.7%	.5%
Investronica SA	.6	.4	.2	22	1.7%	2.4%	1.2%	1.2%
Matra Datavision	.5	.2	.3	8	1.5%	1.1%	2.1%	.5%
Other Companies	5.5	4.4	.8	1,238	15.2%	26.5%	5.9%	70.8%
All Companies	36.1	16.4	14.3	1,748	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	32.4	14.6	13.1	1,688	89.8%	88.7%	91.4%	96.6%
All Asian-Based Companies	.9	.7	.0	8	2.4%	4.4%	.3%	.5%
All European-Based Companies	2.8	1.1	1.2	51	7.8%	6.9%	8.3%	2.9%
All Hardware Companies	11.5	10.8	.0	1,568	31.9%	65.9%	.0%	89.7%
All Turnkey & SW Companies	24.6	5.6	14.3	180	68.1%	34.1%	100.0%	10.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 84
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Autodesk	4.0	.0	4.0	0	33.0%	.0%	79.0%	.0%
Intergraph	1.3	.5	.4	22	10.5%	8.7%	7.1%	1.5%
IBM	1.0	.6	.2	59	8.3%	9.9%	4.8%	4.1%
Other Companies	4.2	3.9	.2	1,292	34.6%	63.6%	3.2%	89.5%
All Companies	12.1	6.2	5.0	1,444	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	12.0	6.1	5.0	1,444	99.4%	99.4%	99.6%	100.0%
All Asian-Based Companies	.1	.0	.0	0	.4%	.6%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.2%	.0%	.4%	.0%
All Hardware Companies	5.4	5.2	.0	1,410	44.5%	83.8%	.0%	97.6%
All Turnkey & SW Companies	6.7	1.0	5.0	34	55.5%	16.2%	100.0%	2.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 85
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
ESRI	1.9	.0	1.5	0	24.4%	.0%	40.3%	.0%
Autodesk	1.0	.0	1.0	0	13.2%	.0%	27.1%	.0%
Intergraph	1.0	.5	.2	16	13.0%	20.2%	5.0%	3.3%
Other Companies	2.6	1.4	.9	421	34.1%	50.6%	23.6%	87.0%
All Companies	7.8	2.7	3.8	484	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	7.6	2.6	3.7	481	97.4%	97.8%	98.1%	99.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.2	.1	.1	3	2.6%	2.2%	1.9%	.6%
All Hardware Companies	1.9	1.8	.0	458	24.0%	66.3%	.0%	94.7%
All Turnkey & SW Companies	5.9	.9	3.8	25	76.0%	33.7%	100.0%	5.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 86
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cadence	7.8	.0	5.0	0	26.2%	.0%	50.7%	.0%
Digital	6.1	4.8	.0	137	20.5%	38.3%	.0%	18.5%
Sun Microsystems	4.7	3.7	.0	161	15.6%	29.6%	.0%	21.7%
Hewlett-Packard	2.1	1.8	.0	77	7.2%	14.5%	.0%	10.4%
Quickturn Design Systems	1.8	.5	.9	11	6.0%	4.3%	9.0%	1.5%
Mentor Graphics	1.0	.1	.5	4	3.3%	1.0%	4.5%	.6%
COMPASS Design Automation	.9	.0	.8	0	3.2%	.0%	7.6%	.0%
Zycad	.8	.5	.1	12	2.8%	3.8%	1.0%	1.6%
Autodesk	.6	.0	.6	0	1.8%	.0%	5.5%	.0%
Other Companies	2.3	.5	1.4	279	7.7%	4.4%	14.2%	37.6%
All Companies	29.7	12.5	9.9	740	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	29.2	12.4	9.7	737	98.1%	99.2%	97.3%	99.6%
All Asian-Based Companies	.1	.0	.1	1	.5%	.3%	.7%	.1%
All European-Based Companies	.4	.1	.2	3	1.4%	.5%	2.0%	.3%
All Hardware Companies	15.5	11.7	.9	715	52.1%	93.2%	9.0%	96.5%
All Turnkey & SW Companies	14.3	.9	9.0	26	47.9%	6.8%	91.0%	3.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (July 1994)

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Table 87
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
Platform: All Platforms
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cadence	3.7	.0	2.4	0	22.2%	.0%	41.1%	.0%
Digital	3.4	2.7	.0	86	20.6%	39.3%	.0%	18.6%
Sun Microsystems	2.0	1.6	.0	71	11.9%	23.0%	.0%	15.4%
Quickturn Design Systems	1.8	.5	.9	11	10.7%	7.9%	15.2%	2.4%
Hewlett-Packard	1.1	1.0	.0	40	6.8%	14.1%	.0%	8.7%
Zycad	.8	.5	.1	12	5.0%	7.0%	1.7%	2.6%
COMPASS Design Automation	.6	.0	.5	0	3.4%	.0%	7.7%	.0%
Mentor Graphics	.6	.1	.3	2	3.4%	1.0%	4.3%	.5%
Other Companies	1.8	.3	1.1	213	10.6%	5.1%	19.5%	46.2%
All Companies	16.7	6.9	5.8	460	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	16.6	6.9	5.8	460	99.4%	99.9%	99.1%	99.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.1	.0	.1	1	.6%	.1%	.9%	.1%
All Hardware Companies	8.8	6.3	.9	441	53.0%	91.3%	15.2%	95.9%
All Turnkey & SW Companies	7.9	.6	5.0	19	47.0%	8.7%	84.8%	4.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

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Table 88
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cadence	3.6	.0	2.3	0	49.4%	.0%	75.8%	.0%
Digital	1.3	1.1	.0	20	18.7%	50.2%	.0%	33.9%
Sun Microsystems	1.2	.9	.0	35	16.2%	44.0%	.0%	59.5%
Other Companies	.3	.0	.3	0	4.2%	.5%	8.3%	.6%
All Companies	7.2	2.1	3.0	59	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	7.2	2.1	3.0	59	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	2.6	2.1	.0	58	36.1%	98.1%	.0%	98.1%
All Turnkey & SW Companies	4.6	.0	3.0	1	63.9%	1.9%	100.0%	1.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

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Table 89
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	1.5	1.2	.0	55	25.7%	33.8%	.0%	24.7%
Digital	1.3	1.0	.0	31	22.5%	29.3%	.0%	14.2%
Hewlett-Packard	.9	.8	.0	35	15.7%	22.3%	.0%	15.6%
Cadence	.5	.0	.3	0	8.9%	.0%	31.8%	.0%
Other Companies	.2	.2	.0	66	3.9%	5.4%	1.9%	29.8%
All Companies	5.9	3.6	1.1	221	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	5.4	3.5	.9	218	92.0%	97.5%	79.4%	98.8%
All Asian-Based Companies	.1	.0	.1	1	2.4%	1.1%	6.5%	.4%
All European-Based Companies	.3	.1	.2	2	5.6%	1.4%	14.0%	.9%
All Hardware Companies	4.1	3.3	.0	215	69.2%	94.1%	.0%	97.4%
All Turnkey & SW Companies	1.8	.2	1.1	6	30.8%	5.9%	100.0%	2.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

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Market Statistics

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Note: All tables show estimated data.

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CAD/CAM/CAE and GIS Asia Overview Forecast

Fluctuating exchange rates masked true market performance in the 1993 CAD/CAM/CAE and GIS market. Japanese CAD/CAM/CAE and GIS total revenue grew a surprising 3.3 percent from 1992 to 1993 when measured in U.S. dollars, contrary to what would be expected in the worst recession Japan has experienced in 50 years. However, the dollar depreciated against the yen at a rate of 12.3 percent so that when measured in yen, Japanese CAD/CAM/CAE and GIS total revenue declined 9.4 percent from 1992 to 1993.

In the meantime, European CAD/CAM/CAE and GIS total revenue declined 1.4 percent from 1992 to 1993 when measured in U.S. dollars. With the dollar appreciating 10.0 percent against the ECU, European CAD/CAM/CAE and GIS total revenue grew 9.9 percent from 1992 to 1993 when measured in ECU. Table 1 shows the dramatic impact that currency fluctuation has on the CAD/CAM/CAE and GIS.

The yen has been strengthening against the dollar for the past three years, changing in 1993 at a rate twice that of previous years. And the end is not in sight. In contrast, Hong Kong and Singapore had relatively stable currency during 1993, while the currencies in China, Korea, and Taiwan weakened against the dollar. In Europe, 1993 was a year for weakening of local currencies against the dollar after having currencies strengthened against the dollar in 1992.

The early indications are that currencies will follow the same pattern in each country for the coming year (see Table 2). Although Dataquest does not forecast currency exchange rates, we do forecast with the best information available. The exchange rate is calculated as the simple arithmetic mean of the 12 average monthly rates for each country. For the purpose of this forecast, Dataquest assumes the February exchange rate will apply for all future months of 1994.

Dataquest's forecast is based upon the early market share data, gathered primarily before the end of 1993. This data is being verified and updated and will be available May 31 as the Market Share Update. Dataquest will then perform an updated forecast to include country-level information and in-depth analysis. This Forecast Update will be available July 31.

This document contains Dataquest's detailed forecast information for the CAD/CAM/CAE and GIS industry. Included are the following:

- Five-year historical data
- Five-year forecast data

More detailed data is available through Dataquest's client inquiry service, which can provide custom analysis of the multidimensional database.

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Table 1
CAD/CAM/CAE and GIS Revenue Growth Comparison
(U.S. Dollars versus Local Currency for Both Europe and Japan)

	1992	1993	Forecast 1994	Growth (%) 1992-1993	Growth (%) 1993-1994
Europe (U.S.$ Million)					
Software Revenue	1,708.6	1,755.2	1,863	2.7	6.1
Hardware Revenue	2,778.1	2,628.5	2,624	-5.4	-0.2
Service Revenue	1,087.7	1,118.8	1,133	2.9	1.3
Total Factory Revenue	5,582.6	5,502.6	5,620	-1.4	2.1
ECU/U.S.$ Exchange Rate	*0.7686*	*0.8566*	*0.8879**	*11.4*	*3.7*
Europe (ECU Million)					
Software Revenue	1,313.2	1,503.5	1,654.0	14.5	10.0
Hardware Revenue	2,135.2	2,251.6	2,330	5.4	3.5
Service Revenue	836.0	958.4	1,006	14.6	5.0
Total Factory Revenue	4,290.8	4,713.5	4,990	9.9	5.9
Japan (U.S.$ Million)					
Software Revenue	1,316.5	1,435.1	1,514	9.0	5.5
Hardware Revenue	2,477.7	2,427.8	2,446	-2.0	0.7
Service Revenue	601.1	676.8	702	12.6	3.7
Total Factory Revenue	4,395.3	4,539.6	4,662	3.3	2.7
Yen/U.S.$ Exchange Rate	*126.34*	*110.85*	*106.54**	*-12.3*	*-3.9*
Japan (Yen Million)					
Software Revenue	166,328	159,076	161,314	-4.4	1.4
Hardware Revenue	313,036	269,117	260,569	-14.0	-3.2
Service Revenue	75,947	75,022	74,792	-1.2	-0.3
Total Factory Revenue	555,317	503,216	496,672	-9.4	-1.3
North America (U.S.$ Million)					
Software Revenue	1,629.3	1,804.5	2,008	10.8	11.3
Hardware Revenue	2,920.2	2,951.1	3,184	1.1	7.9
Service Revenue	931.8	1,039.0	1,133	11.5	9.0
Total Factory Revenue	5,482.4	5,794.6	6,325	5.7	9.1
Worldwide (U.S.$ Million)					
Software Revenue	4,835.9	5,189.2	5,614	7.3	8.2
Hardware Revenue	8,501.2	8,323.4	8,607	-2.1	3.4
Service Revenue	2,739.0	2,968.9	3,122	8.4	5.2
Total Factory Revenue	16,086.0	16,481.3	17,342	2.5	5.2

*1994 currency calculated by projecting February exchange rate to end of year.

Source: Dataquest (April 1994)

The CAD/CAM/CAE and GIS *Dataquest Perspective,* dated April 18, 1994, contains additional tables and analysis and is a companion piece to this book.

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Table 2
Exchange Rates

Country	Currency	Actual 1990	Actual 1991	Actual 1992	Actual 1993	Current 1994	Year-to-Year Change (Percent) 1990-1991	1991-1992	1992-1993	1993-1994
European Community	ECU		0.8079	0.7686	0.8566	0.8879	-	-5	11	4
Belgium	Franc	33.31	34.01	31.94	34.61	35.46	2	-6	8	2
France	Franc	5.4277	5.6183	5.2571	5.6641	5.8422	4	-6	8	3
Germany	Mark	1.6111	1.6523	1.5513	1.6543	1.7204	3	-6	7	4
Italy	Lira	1195.03	1235.03	1220.85	1575.05	1689.22	3	-1	29	7
Norway	Krone	6.2383	6.4641	6.1652	7.0972	7.4249	4	-5	15	5
Spain	Peseta	101.7	103.48	101.5	127.1	139.8	2	-2	25	10
United Kingdom	Pound	0.5599	0.5658	0.5652	0.6665	0.6698	1	0	18	1
Japan	Yen	144.05	134.59	126.34	110.85	106.54	-7	-6	-12	-4
Hong Kong	Dollar	7.79	7.7712	7.7399	7.7351	7.7244	0	0	0	0
Singapore	Dollar	1.8129	1.7277	1.6284	1.6155	1.5851	-5	-6	-1	-2
Taiwan	Dollar	26.64	26.49	24.93	26.15	26.45	-1	-6	5	1
Korea	Won	242.7	730.67	782.41	799.42	808.34	201	7	2	1
China	Renminbi	4.7912	5.334	5.5076	5.758	8.5616	11	3	5	49

Source: Dataquest (April 1994)

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A new forecasting process for each application is being used to improve revenue and unit shipment control by region and by platform. This new process may cause some mismatch in market share tables and forecast tables. Please use the forecast tables to understand the year-to-year changes. Use the market share tables to compare company-to-company performance.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is an underlying philosophy that says the best data and analyses come from a well-balanced program. This program includes the following: balance between primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from the more than 25 separate high-technology industries Dataquest covers; and balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macro environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at gross national product (GNP) growth, interest rate fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1994.

Figure 1 shows the CAD/CAM/CAE and GIS forecasting model. The overall forecasting process uses a combination of forecasting techniques such as time series and technological modeling. Market estimates and forecasts are derived using the following research techniques:

- "Bottom-up" aggregation—This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting—For each application segment tracked by the CAD/CAM/CAE and GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis—Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market model and a satisfied available market figure to assess the levels of penetration accurately. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Dataquest analysts also factor in the acceptance or ability for users to consume new technology.

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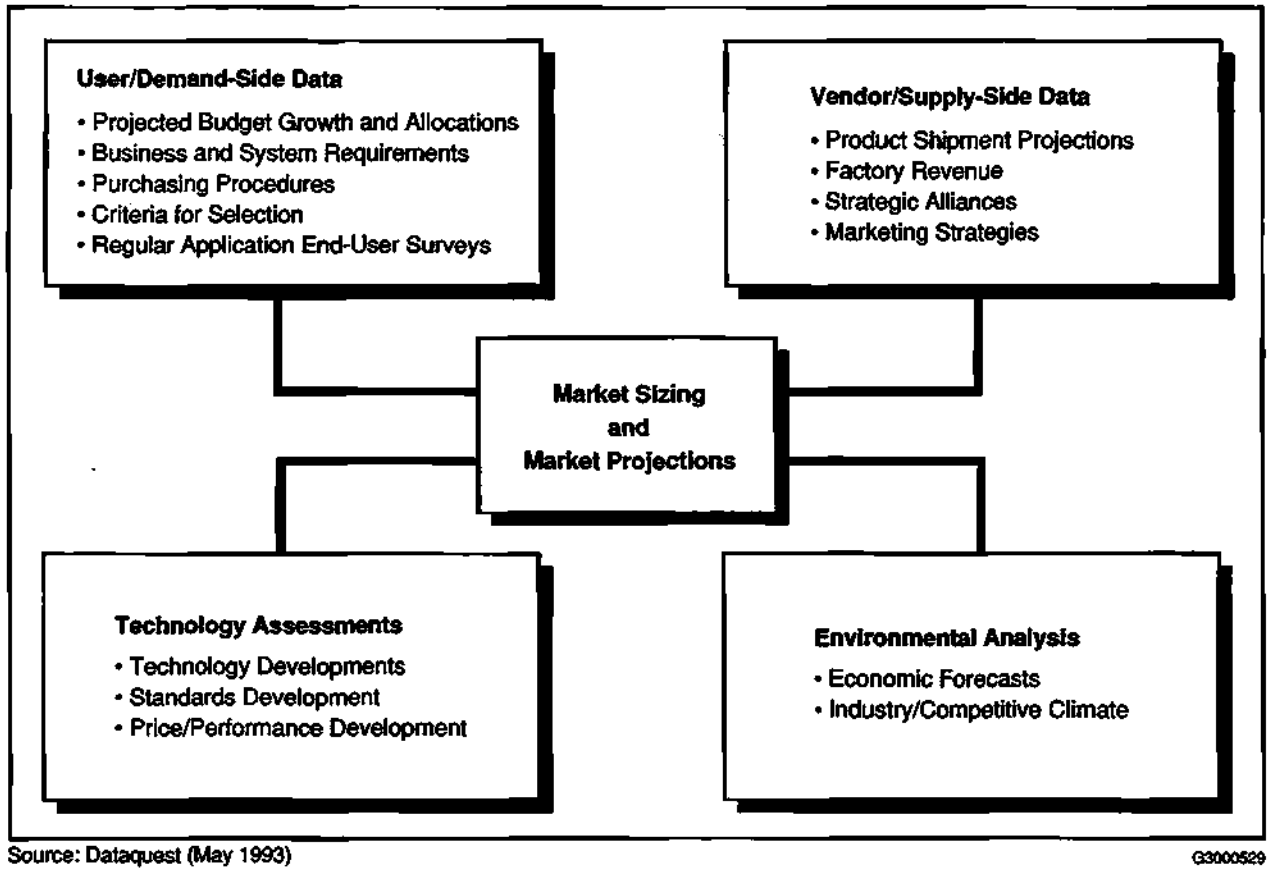
Figure 1
CAD/CAM/CAE and GIS Forecasting Model



Source: Dataquest (May 1993) G3000529

- Capacity-based analysis—This method involves identifying future shipment volume constraints. These constraints, or "ceilings," can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below the demand level.

Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and

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electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic computer-aided engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of ECAE applications are schematic capture and simulation.
- IC layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- PCB/hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe (which includes Austria, Switzerland, and eastern Europe)

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong.

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Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

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Line Items

Line item definitions are as follows:

- Average selling price (ASP) is defined as the average price of a product, inclusive of any discounts.
- CPU revenue is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
- CPU shipment is defined as the number of CPUs delivered.
- CPU installed base is defined as the total number of CPUs in active, day-to-day use.
- Unit shipment is defined as the number of products delivered (that is, seats).
- Seats are defined as the number of possible simultaneous users.
- Installed seats are defined as the total number of seats in active, day-to-day use.
- Hardware revenue is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
- Peripherals revenue is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
- Terminal revenue is defined as revenue derived from the sale of terminals used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform, as terminal revenue is contained within CPU revenue for technical workstations and PCs.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
- Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars and is the sum of hardware, software, and service revenue. Total factory revenue does not include revenue that a company may receive from products sold to another company for resale (OEM revenue).

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Table 3
CAD/CAM/CAE/GIS History and Forecast

Application: All Applications
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	77,568	99,810	132,019	151,596	157,746	167,740	177,920	190,380	204,250	218,000	19	7
Unit Shipments or Seats	86,159	107,844	139,829	158,642	165,704	174,990	184,480	196,160	209,480	222,810	18	6
CPU Installed Base	174,040	259,935	368,547	480,484	566,677	629,760	678,280	727,930	780,860	829,990	34	8
Installed Seats	202,073	297,062	412,418	528,956	619,164	684,510	732,710	780,550	829,290	874,280	32	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	51.5	47.0	39.3	38.5	38.6	37.4	35.5	33.7	32.3	31.3	-7	-4
Hardware-Only ASP	13.4	12.6	9.7	9.9	9.4	9.4	9.5	9.6	9.9	10.1	-8	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,931	2,316	2,341	2,573	2,519	2,553	2,594	2,676	2,813	2,962	7	3
CPU Revenue	1,453	1,795	1,859	2,104	2,073	2,119	2,168	2,255	2,387	2,529	9	4
Terminal Revenue	158	131	109	88	72	66	61	56	53	51	-18	-7
Peripheral Revenue (Turnkey)	321	390	373	381	374	368	364	365	373	382	4	0
Software Revenue	949	1,113	1,224	1,373	1,497	1,590	1,687	1,808	1,950	2,094	12	7
Bundled	663	714	691	748	819	826	848	874	900	922	5	2
Unbundled	286	399	533	625	677	763	840	934	1,050	1,172	24	12
Service Revenue	394	523	541	640	725	759	799	849	918	989	16	6
Total Factory Revenue	3,273	3,952	4,106	4,586	4,741	4,902	5,081	5,333	5,681	6,045	10	5
Increase over Prior Year (%)	12	21	4	12	3	3	4	5	7	6		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (April 1994)

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Table 4
CAD/CAM/CAE/GIS History and Forecast

Application: All Applications
Region: Asia
Platform: Technical Workstation

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	26,878	34,709	38,345	47,101	51,738	56,370	61,460	67,540	74,430	81,340	18	9
Unit Shipments or Seats	26,878	34,709	38,345	47,101	51,738	56,370	61,460	67,540	74,430	81,340	18	9
CPU Installed Base	48,811	80,568	114,441	153,474	190,394	225,630	256,840	287,950	318,880	344,870	41	13
Installed Seats	47,622	80,568	114,441	153,474	190,394	225,630	256,840	287,950	318,880	344,870	41	13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	54.8	46.5	50.2	53.1	54.6	51.9	49.0	46.6	45.0	43.7	-0	-4
Hardware-Only ASP	19.0	25.1	24.2	25.9	24.0	23.9	23.8	23.7	23.6	23.5	6	-0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	825	1,055	1,179	1,512	1,592	1,640	1,692	1,777	1,900	2,026	18	5
CPU Revenue	624	790	911	1,223	1,307	1,358	1,411	1,494	1,609	1,728	20	6
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	201	265	268	289	285	282	280	283	291	298	9	1
Software Revenue	555	623	710	862	988	1,068	1,153	1,255	1,373	1,492	16	9
Bundled	409	410	422	485	559	573	598	625	648	667	8	4
Unbundled	146	213	288	377	430	495	555	630	725	824	31	14
Service Revenue	174	257	312	412	516	550	587	633	692	752	31	8
Total Factory Revenue	1,555	1,934	2,201	2,786	3,096	3,258	3,431	3,666	3,966	4,270	19	7
Increase over Prior Year (%)	41	24	14	27	11	5	5	7	8	8		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (April 1994)

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Table 5
CAD/CAM/CAE/GIS History and Forecast

Application: All Applications
Region: Asia
Platform: Host-Dependent

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	4,389	6,972	4,501	4,308	4,241	4,220	4,310	4,360	4,570	4,890	-1	3
Unit Shipments or Seats	12,980	15,005	12,311	11,354	12,200	11,470	10,870	10,140	9,800	9,690	-2	-5
CPU Installed Base	10,377	16,879	20,697	24,033	26,750	29,310	30,390	30,830	31,730	32,510	27	4
Installed Seats	39,766	54,005	64,568	72,506	79,236	84,060	84,820	83,440	80,160	76,800	19	-1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	253.3	172.8	147.9	138.2	110.4	103.6	95.5	87.3	79.6	73.0	-19	-8
Hardware-Only ASP	121.5	105.4	283.8	170.9	207.9	218.9	212.7	207.7	204.8	199.7	14	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	727	840	615	500	394	369	351	327	315	312	-14	-5
CPU Revenue	495	636	454	371	281	264	252	236	228	226	-13	-4
Terminal Revenue	158	131	109	88	72	66	61	56	53	51	-18	-7
Peripheral Revenue (Turnkey)	74	73	53	40	41	39	37	35	34	34	-14	-3
Software Revenue	204	254	165	141	140	126	115	102	94	89	-9	-9
Bundled	154	200	124	116	117	107	98	88	83	79	-7	-8
Unbundled	50	54	41	25	23	19	16	14	12	11	-18	-14
Service Revenue	178	220	160	138	121	115	110	103	100	99	-9	-4
Total Factory Revenue	1,109	1,314	940	779	654	610	576	533	510	500	-12	-5
Increase over Prior Year (%)	-17	18	-28	-17	-16	-7	-6	-7	-4	-2		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (April 1994)

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Table 6
CAD/CAM/CAE/GIS History and Forecast

Application: All Applications
Region: Asia
Platform: Server

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	1,681	1,347	1,442	1,530	1,690	1,900	2,120	2,330	NA	10
Unit Shipments or Seats	NA	NA	1,681	1,347	1,442	1,530	1,690	1,900	2,120	2,330	NA	10
CPU Installed Base	NA	NA	1,681	3,028	4,390	5,760	6,940	8,150	9,010	9,800	NA	17
Installed Seats	NA	NA	1,681	3,028	4,390	5,760	6,940	8,150	9,010	9,800	NA	17
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	66.5	86.9	74.7	70.8	66.6	63.3	61.2	60.0	NA	-4
Hardware-Only ASP	NA	NA	46.3	40.6	42.9	42.1	41.2	40.4	39.6	38.9	NA	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	71	67	70	71	74	78	84	89	NA	5
CPU Revenue	NA	NA	60	57	63	64	67	71	76	81	NA	5
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	11	10	8	7	7	7	8	8	NA	0
Software Revenue	NA	NA	36	22	22	24	27	31	35	39	NA	13
Bundled	NA	NA	32	16	16	17	20	24	27	31	NA	14
Unbundled	NA	NA	4	6	6	6	6	7	8	8	NA	8
Service Revenue	NA	NA	27	26	27	28	30	34	38	42	NA	10
Total Factory Revenue	NA	NA	134	115	119	122	131	143	157	170	NA	7
Increase over Prior Year (%)	NA	NA	NA	-14	3	3	7	9	9	9		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (April 1994)

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Table 7
CAD/CAM/CAE/GIS History and Forecast

Application: All Applications
Region: Asia
Platform: Personal Computer

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	46,301	58,130	87,492	98,841	100,324	105,620	110,460	116,580	123,140	129,450	21	5
Unit Shipments or Seats	46,301	58,130	87,492	98,841	100,324	105,620	110,460	116,580	123,140	129,450	21	5
CPU Installed Base	114,852	162,488	231,728	299,948	345,144	369,070	384,100	401,010	421,240	442,820	32	5
Installed Seats	114,684	162,488	231,728	299,948	345,144	369,070	384,100	401,010	421,240	442,820	32	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	18.2	18.2	12.7	12.0	11.9	11.9	11.4	11.1	10.9	10.7	-10	-2
Hardware-Only ASP	5.3	4.4	3.9	3.8	3.4	3.4	3.3	3.3	3.3	3.3	-11	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	379	421	475	495	463	473	477	493	514	535	5	3
CPU Revenue	334	369	434	452	423	433	438	454	473	493	6	3
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	45	51	41	43	41	40	39	39	41	42	-2	1
Software Revenue	190	237	313	348	347	372	394	420	447	474	16	6
Bundled	100	105	114	131	128	128	131	136	142	146	6	3
Unbundled	90	132	200	217	219	244	263	283	305	328	25	8
Service Revenue	42	46	42	64	62	67	72	79	88	95	10	9
Total Factory Revenue	610	703	830	907	872	911	943	992	1,049	1,104	9	5
Increase over Prior Year (%)	22	15	18	9	-4	5	3	5	6	5		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (April 1994)

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Table 8
CAD/CAM/CAE/GIS History and Forecast

Application: Mechanical
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	37,328	50,091	69,394	81,250	81,379	83,430	85,920	88,970	92,400	96,650	22	3
Unit Shipments or Seats	43,540	56,367	75,501	86,448	87,257	88,890	90,910	93,390	96,430	100,390	19	3
CPU Installed Base	91,008	132,878	189,319	249,668	294,324	323,350	341,040	355,880	371,000	384,740	34	6
Installed Seats	111,993	160,768	222,537	286,326	333,973	364,700	382,140	395,440	407,590	418,420	31	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	57.3	50.5	42.4	41.7	42.0	39.8	37.6	35.7	34.4	33.5	-7	-4
Hardware-Only ASP	14.8	13.4	9.8	8.5	8.2	8.4	8.5	8.6	8.7	8.9	-14	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,069	1,316	1,335	1,437	1,400	1,387	1,365	1,353	1,360	1,383	7	-0
CPU Revenue	790	1,012	1,059	1,162	1,133	1,128	1,115	1,110	1,123	1,148	9	0
Terminal Revenue	109	92	82	61	47	43	40	35	33	31	-19	-8
Peripheral Revenue (Turnkey)	170	212	195	214	219	216	210	207	205	204	7	-1
Software Revenue	462	554	612	681	744	776	808	843	881	925	13	4
Bundled	343	394	391	436	476	489	501	512	515	516	9	2
Unbundled	118	160	220	245	268	287	307	331	365	409	23	9
Service Revenue	227	298	290	329	355	366	375	383	397	414	12	3
Total Factory Revenue	1,757	2,168	2,236	2,446	2,499	2,529	2,548	2,578	2,638	2,722	9	2
Increase over Prior Year (%)	2	23	3	9	2	1	1	1	2	3		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (April 1994)

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Table 9
CAD/CAM/CAE/GIS History and Forecast

Application: AEC
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	16,471	21,909	28,518	28,612	31,842	37,100	42,420	48,280	54,330	59,580	18	13
Unit Shipments or Seats	17,683	22,890	29,601	29,675	33,297	38,420	43,650	49,400	55,360	60,510	17	13
CPU Installed Base	30,441	50,489	75,228	96,155	112,441	125,900	140,670	159,190	180,630	201,890	39	12
Installed Seats	33,511	54,558	80,273	101,998	119,304	133,540	148,860	167,720	189,010	209,870	37	12
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	34.9	35.1	27.0	30.8	31.0	29.3	27.4	25.9	24.7	24.0	-3	-5
Hardware-Only ASP	6.8	5.8	5.0	5.1	5.6	5.2	4.9	4.7	4.7	4.6	-5	-4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	277	331	331	357	358	386	413	447	494	536	7	8
CPU Revenue	215	256	264	293	283	307	331	360	399	432	7	9
Terminal Revenue	19	13	16	12	18	17	17	16	17	17	-2	-0
Peripheral Revenue (Turnkey)	43	62	51	51	58	62	65	71	79	86	8	8
Software Revenue	109	146	157	174	214	233	253	276	303	324	18	9
Bundled	80	102	96	108	130	136	145	155	170	181	13	7
Unbundled	30	45	61	66	84	96	108	121	134	144	30	11
Service Revenue	48	68	67	94	119	128	139	151	169	184	25	9
Total Factory Revenue	434	546	556	625	691	746	804	874	967	1,044	12	9
Increase over Prior Year (%)	48	26	2	12	11	8	8	9	11	8		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (April 1994)

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Table 10
CAD/CAM/CAE/GIS History and Forecast

Application: GIS/Mapping
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	3,139	5,938	6,574	8,346	9,681	10,820	12,370	14,080	16,060	18,120	33	13
Unit Shipments or Seats	3,631	6,416	6,957	9,027	10,178	11,180	12,630	14,260	16,180	18,210	29	12
CPU Installed Base	5,143	10,896	17,003	24,107	30,873	37,010	43,190	49,660	56,820	64,090	57	16
Installed Seats	6,341	12,597	19,055	26,756	33,874	40,170	46,310	52,620	59,390	66,190	52	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	65.0	51.0	50.8	48.7	46.0	43.2	40.8	39.0	38.0	37.3	-8	-4
Hardware-Only ASP	17.1	14.2	11.5	11.8	8.3	7.8	7.5	7.2	7.0	6.8	-17	-4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	118	174	180	205	195	202	213	227	247	267	13	6
CPU Revenue	81	128	131	151	147	154	164	175	192	209	16	7
Terminal Revenue	10	6	6	10	5	4	3	2	2	1	-17	-21
Peripheral Revenue (Turnkey)	27	40	43	44	43	44	47	49	53	57	12	6
Software Revenue	43	69	75	98	110	119	134	151	170	191	26	12
Bundled	33	51	54	71	79	85	94	105	117	130	25	10
Unbundled	11	18	22	27	31	34	39	46	53	61	31	15
Service Revenue	21	36	40	47	51	58	65	75	85	96	24	13
Total Factory Revenue	183	279	295	349	356	378	412	452	502	555	18	9
Increase over Prior Year (%)	39	52	6	18	2	6	9	10	11	10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 11
CAD/CAM/CAE/GIS History and Forecast

Application: Electronic Design Automation
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	20,630	21,873	27,534	33,388	34,843	36,380	37,210	39,050	41,460	43,650	14	5
Unit Shipments or Seats	21,304	22,172	27,770	33,493	34,972	36,510	37,300	39,110	41,510	43,690	13	5
CPU Installed Base	47,448	65,672	86,997	110,554	129,039	143,510	153,370	163,200	172,400	179,270	28	7
Installed Seats	50,227	69,138	90,552	113,877	132,013	146,100	155,400	164,770	173,300	179,800	27	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	51.5	47.9	40.7	32.5	32.2	35.6	36.4	36.1	35.9	36.0	-11	2
Hardware-Only ASP	15.4	17.1	13.5	15.9	15.0	14.7	15.4	16.2	17.0	17.8	-1	3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	467	494	495	575	566	578	603	650	712	777	5	7
CPU Revenue	367	399	405	497	510	530	560	610	673	739	9	8
Terminal Revenue	20	20	5	5	3	2	2	2	2	2	-37	-13
Peripheral Revenue (Turnkey)	81	76	85	73	53	46	41	38	37	36	-10	-8
Software Revenue	334	345	380	420	428	463	493	539	595	653	6	9
Bundled	207	168	151	133	134	116	108	102	98	95	-10	-7
Unbundled	127	177	230	287	294	346	385	437	498	558	23	14
Service Revenue	98	120	144	171	200	207	221	240	267	294	20	8
Total Factory Revenue	899	959	1,019	1,166	1,194	1,248	1,317	1,429	1,574	1,724	7	8
Increase over Prior Year (%)	14	7	6	14	2	5	5	9	10	10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
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Table 12
CAD/CAM/CAE/GIS History and Forecast

Application: Electronic CAE
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	10,431	11,523	14,048	16,679	17,449	19,040	19,020	19,090	19,300	19,430	14	2
Unit Shipments or Seats	10,587	11,605	14,121	16,682	17,429	19,050	19,020	19,090	19,300	19,430	13	2
CPU Installed Base	23,708	33,496	44,462	55,976	64,379	71,250	75,720	79,760	82,710	83,630	28	5
Installed Seats	24,028	34,129	45,148	56,621	64,938	71,740	76,110	80,080	82,850	83,660	28	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	41.4	34.3	27.8	23.8	22.6	25.0	25.8	25.9	25.9	26.3	-14	3
Hardware-Only ASP	11.4	12.7	10.5	14.2	14.1	13.4	14.1	15.0	15.9	16.8	5	4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	178	184	176	242	245	262	275	289	307	327	8	6
CPU Revenue	140	151	152	210	216	236	250	266	284	303	11	7
Terminal Revenue	6	8	3	3	2	1	1	1	1	1	-28	-11
Peripheral Revenue (Turnkey)	32	25	21	29	27	24	23	22	22	23	-3	-4
Software Revenue	144	138	160	187	194	213	219	225	232	238	8	4
Bundled	89	57	50	45	44	34	29	26	24	23	-16	-12
Unbundled	55	81	110	142	150	179	190	198	208	215	29	7
Service Revenue	37	55	62	78	94	100	104	109	115	122	26	5
Total Factory Revenue	359	377	398	507	533	575	598	623	654	686	10	5
Increase over Prior Year (%)	35	5	6	27	5	8	4	4	5	5		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 13
CAD/CAM/CAE/GIS History and Forecast

Application: IC Layout
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	2,894	3,309	3,258	4,681	4,462	4,950	5,710	6,880	8,380	9,880	11	17
Unit Shipments or Seats	3,024	3,299	3,267	4,682	4,436	4,950	5,710	6,880	8,380	9,880	10	17
CPU Installed Base	6,992	9,864	12,295	15,696	18,336	21,030	23,770	27,250	31,730	36,420	27	15
Installed Seats	7,377	10,280	12,696	16,052	18,625	21,310	23,990	27,390	31,700	36,330	26	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	88.4	62.0	55.5	61.6	59.7	58.4	56.8	55.1	54.1	53.5	-9	-2
Hardware-Only ASP	30.2	36.0	26.2	26.7	26.7	26.4	26.8	27.2	27.7	28.2	-3	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	100	124	92	132	122	132	153	186	229	275	5	18
CPU Revenue	86	108	84	125	117	128	150	183	227	273	8	18
Terminal Revenue	7	9	1	1	0	0	0	0	0	0	-49	-21
Peripheral Revenue (Turnkey)	7	8	8	7	5	4	3	2	2	2	-9	-17
Software Revenue	67	78	71	93	86	100	119	149	189	233	7	22
Bundled	21	18	20	18	17	15	13	12	11	10	-5	-10
Unbundled	46	60	51	74	69	85	106	137	178	223	11	26
Service Revenue	27	31	37	37	41	47	55	69	87	107	11	21
Total Factory Revenue	194	233	200	262	250	278	327	403	505	615	7	20
Increase over Prior Year (%)	-4	20	-14	31	-5	11	17	23	25	22		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

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Table 14
CAD/CAM/CAE/GIS History and Forecast

Application: PCB/Hybrid/MCM
Region: Asia
Platform: All Platforms

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	7,305	7,041	10,229	12,028	12,931	12,390	12,490	13,080	13,780	14,340	15	2
Unit Shipments or Seats	7,693	7,267	10,382	12,129	13,107	12,510	12,570	13,140	13,830	14,380	14	2
CPU Installed Base	16,748	22,312	30,240	38,882	46,325	51,230	53,880	56,200	57,960	59,220	29	5
Installed Seats	18,822	24,729	32,708	41,203	48,450	53,050	55,300	57,300	58,750	59,810	27	4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	57.9	59.3	50.5	37.7	39.3	42.8	43.6	43.2	42.9	42.9	-9	2
Hardware-Only ASP	11.2	11.8	13.3	12.6	11.0	11.1	11.1	11.2	11.1	10.9	-0	-0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	189	186	227	201	199	184	176	175	176	175	1	-3
CPU Revenue	140	140	169	162	176	165	160	161	162	163	6	-2
Terminal Revenue	6	3	2	1	1	1	1	1	1	1	-36	-13
Peripheral Revenue (Turnkey)	43	43	57	38	22	18	16	14	13	11	-16	-12
Software Revenue	124	129	149	140	148	150	155	165	175	182	5	4
Bundled	97	93	81	69	73	67	65	64	63	62	-7	-3
Unbundled	27	35	68	71	74	82	90	101	112	120	29	10
Service Revenue	33	35	45	55	65	61	61	63	64	65	18	0
Total Factory Revenue	346	349	421	397	411	395	392	403	415	423	4	1
Increase over Prior Year (%)	8	1	21	-6	4	-4	-1	3	3	2		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
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Note: All tables show estimated data.

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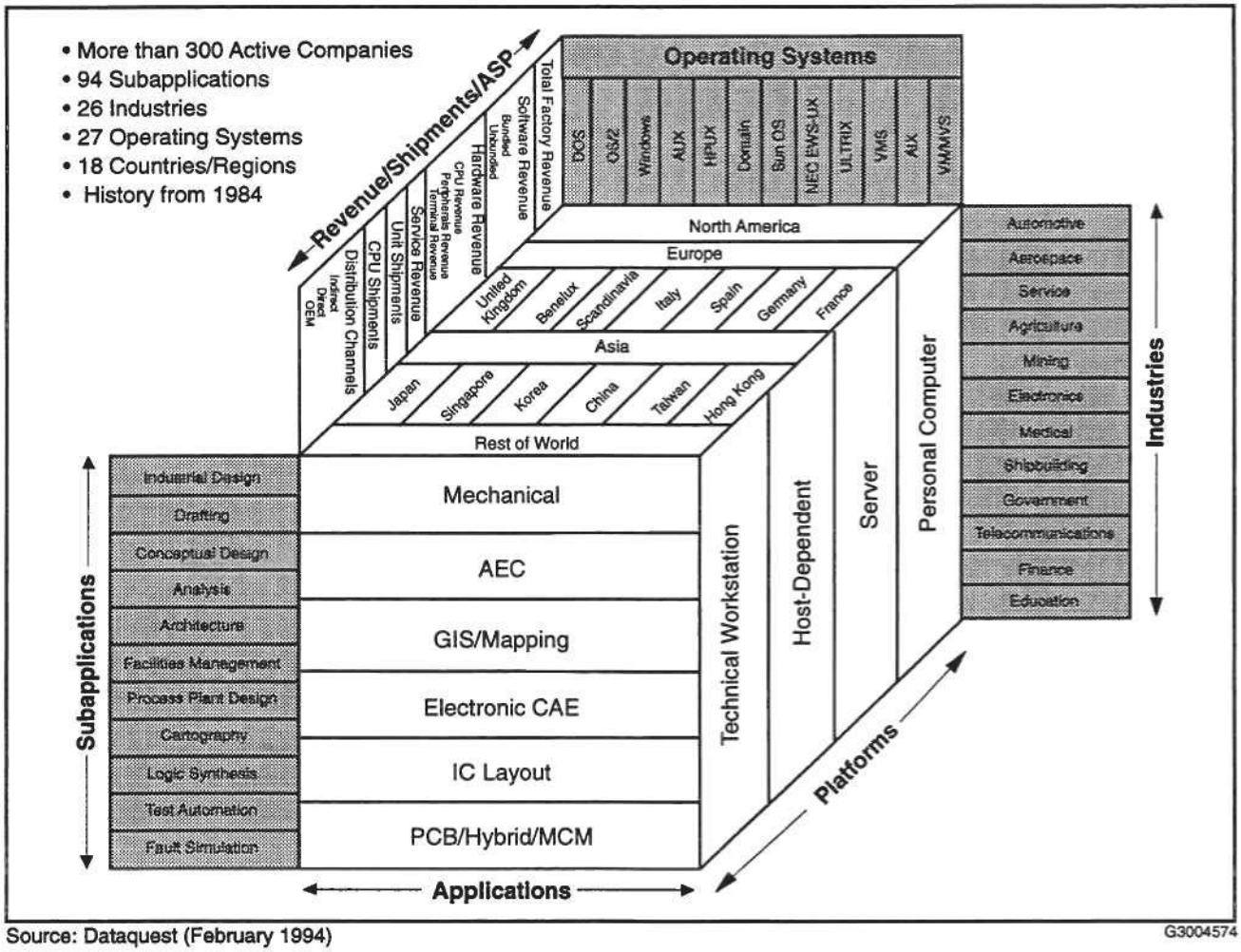
CAD/CAM/CAE and GIS Asia Overview Market Share—1993

Introduction

CAD/CAM/CAE/GIS systems have dramatically changed the methods by which designers and production managers originate and implement products. CAD and CAE systems allow designers to create, draft, analyze, test, and manipulate products on a screen in two and three dimensions. As CAD/CAM/CAE/GIS systems continue to decrease in cost, they become more available and cost justifiable to new users.

In order to provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure 1.

Figure 1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (February 1994)

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Table 1
CAD/CAM/CAE/GIS 1992-1993 Market Summary

	Software Revenue 1992 ($M)	Software Revenue 1993 ($M)	Growth Rate (%)	Total Revenue 1992 ($M)	Total Revenue 1993 ($M)	Growth Rate (%)	Hardware Unit Shipments 1992	Hardware Unit Shipments 1993	Growth Rate (%)
Application									
Mechanical	2,235.1	2,391.6	7.0	8,079.0	8,126.7	0.6	312,647	341,620	9.3
AEC	754.4	828.5	9.8	2,385.7	2,399.1	0.6	167,517	187,728	12.1
GIS/Mapping	587.1	653.8	11.4	2,018.3	2,124.8	5.3	87,918	104,504	18.9
Electronic CAE	740.7	787.7	6.3	2,135.7	2,295.7	7.5	96,797	102,196	5.6
IC Layout	228.6	234.6	2.6	640.6	686.5	7.2	14,580	17,368	19.1
PCB/Hybrid/MCM	290.9	290.2	-0.3	915.9	933.2	1.9	35,858	36,999	3.2
Total	4,836.7	5,186.3	7.2	16,175.2	16,565.8	2.4	715,317	790,415	10.5
Region									
North America	1,629.3	1,804.5	10.8	5,262.4	5,538.4	5.2	295,649	337,773	14.2
Europe	1,709.9	1,755.9	2.7	5,959.5	5,851.8	-1.8	238,241	261,348	9.7
Asia	1,375.1	1,500.0	9.1	4,575.7	4,799.7	4.9	160,991	168,811	4.9
Rest of World	122.5	125.9	2.8	377.7	375.9	-0.5	20,436	22,483	10.0
Total	4,836.7	5,186.3	7.2	16,175.2	16,565.8	2.4	715,317	790,415	10.5
In Local Currency									
Europe (ECU)	1,314.3	1,504.0	14.4	4,580.6	5,012.5	9.4			
Asia (Yen)	173,879	166,799	-4.1	578,591	533,729	-7.8			
Platform									
Technical Workstation	3,100.5	3,358.5	8.3	9,838.5	10,472.6	6.4	195,523	221,887	13.5
Host-Dependent	353.8	320.5	-9.4	2,324.6	1,925.0	-17.2	29,886	32,548	8.9
Server	190.6	210.8	10.6	1,040.4	1,070.6	2.9	15,030	17,482	16.3
Personal Computer	1,191.8	1,296.6	8.8	2,971.8	3,097.7	4.2	474,879	518,498	9.2
Total	4,836.7	5,186.3	7.2	16,175.2	16,565.8	2.4	715,317	790,415	10.5

Source: Dataquest (February 1994)

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A companion article analyzing major shifts in the 1993 market was published in our *Dataquest Alert*, dated January 31, 1994.

Table 1 summarizes the performance in various segments of the CAD/CAM/CAE/GIS markets in 1993 versus 1992. With the devaluation of the dollar against the yen (¥126.45/$ in 1992 versus ¥111.20/$ in 1993) and the appreciation of the dollar against the ECU (ECU 0.770/$ in 1992 versus ECU 0.858/$ in 1993) actual growth is not as it appears when denominated in U.S. dollars. With 75 percent of the Asian market in Japan, denominating in yen gives a rough indication of real growth in the Asian market, which was a negative 7.8 percent.

About This Document

This document contains Dataquest's detailed market share information on the CAD/CAM/CAE/GIS industry. Following is a description of the companies included in the *Market Share* books:

- Mechanical applications—All companies in database with mechanical revenue
- GIS and AEC applications—All companies in database with GIS revenue and all companies in database with AEC revenue
- Electronic design automation applications—All companies in database with EDA (electronic CAE, IC layout, PCB/hybrid/MCM) revenue
- Europe Overview—All Europe-based companies and all other companies with more than $1 million in European revenue
- Asia—All Asia-based companies and all other companies with more than $1 million in Asian revenue
- PC CAD—All companies in database with personal computer revenue

We no longer publish top-level market statistics for the entire CAD/CAM/CAE/GIS industry or companies whose revenue in any segment is less than $1 million. This data is available by calling Kathy Klotz at (408) 437-8243. More detailed data on these markets may be requested through our client inquiry service.

We recognize that final bookeeping is not yet complete for all companies. This document represents our best effort to get early, accurate information to our subscribers. We will follow up with primary and secondary research from February 1 through April 30 to verify and crosstab and refine, producing our market share update by May 31.

Dataquest's policy is to continually update its market information, for current and past years, with any new data received in order to arrive at the most accurate market representation possible.

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Segmentation Definitions

This section lists the definitions specific to this document. The following paragraphs define the segments.

Applications

Mechanical

The mechanical segment refers to computer-aided tools used by engineers, designers, analysts, technicians, and draftspeople working predominantly in the discrete manufacturing industries, but includes government and education. Users of mechanical CAD/CAM/CAE tools work in all departments across the typical organization, with a majority found in product design, advanced engineering, and manufacturing engineering. Common design applications include conceptual design, industrial design, structural or thermal analysis, detail design, and electromechanical design (the mechanical part of design with electrical or electronic components and mechanisms). Common manufacturing applications include tool and fixture design, numerical control part programming, off-line robotics programming, and interface to quality control systems. Management tools for database control and distribution are included in this segment, as well as user-defined application programming.

Architecture, Engineering, and Construction (AEC)

The AEC segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

Geographic Information Systems (GIS)/Mapping

GIS is computer-based technology, and the segment is composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.

Electronic Design Automation (EDA)

The EDA segment covers computer-based tools used to automate the process of designing an electronic product, including printed circuit boards, ICs, and systems. EDA includes ECAE, IC layout, and PCB/hybrid/MCM, as follows:

- Electronic Computer-Aided Engineering (ECAE)—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of electronic CAE applications are schematic capture and simulation.
- IC Layout—This is a software application tool used to create and validate the physical implementation of an IC. The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.

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- PCB/Hybrid/MCM—This segment covers products used to create the placement and routing of the traces and components laid out on a printed circuit board. Also included in this category are thermal analysis tools.

Regions

The following paragraphs define the regions.

North America

North America includes United States, Mexico, and Canada.

Europe

Europe includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe.

Asia

Asia includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong.

Rest of World

Rest of World includes all other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East.

Platforms

The following paragraphs define the platforms.

Technical Workstation

A technical workstation is a single-user computer distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, or Domain); the computer is designed by the manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.

Host-Dependent

Host-dependent is a shared logic system in which the external workstations' functions are dependent on a host computer.

Server

A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, and compute capability. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.

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- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

Personal Computer

A personal computer is a single-user computer distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

Metrics

The following paragraphs define measurements.

- Total factory revenue is defined as the amount of money received by a manufacturer for its goods and services measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue). Total factory revenue is the sum of software revenue, hardware revenue, and service revenue.
- Unit shipment is defined as the number of seats delivered (number of possible simultaneous users of product delivered) excluding OEM shipments.
- Hardware revenue is revenue derived from sales of CPUs (including operating systems), terminals (for host-dependent systems), and peripherals.
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled application software.
- Service revenue is defined as all revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
  - Maintenance fees for hardware and software
  - Management and operations services—help desk, education and training, disaster recovery, vaulting, and configuration management.
  - Service bureau—project work, including construction of database, data conversion, product design, analysis, or manufacturing.
  - Application development—design and development of customized software applications or the modification, enhancement of customization of existing software applications, adding new functionality.

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- Consulting revenue—assessment of CAD/CAM/CAE/GIS business and information technology needs and the formulation of a plan based on needs identification.
- Implementation and integration services—planning, implementation, migration, and integration of software products (software network support and integration, account integration management, data center design, and construction).

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year and second quarter of the subsequent year, we survey all participants in each industry. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contacts at large companies. (Dataquest maintains a large contact database on all sources of information). Examples of the job titles of people contacted for information are the following:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning
- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE/GIS Marketing Programs
- Market research analyst

The Audit Process

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks

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- Articles in both the general and trade press
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice and checks with multiple sources at one company to cross-check data on that company.

Dataquest analysts have many years of experience in how to apply the above tools to get the most accurate information possible on a particular company (such as what to use when and what industry averages are). We believe that the estimates presented here are the most accurate and meaningful generally available today. It is the CAD/CAM/CAE/GIS group's policy to continually update our market information for any year, based on any new data received, in order to arrive at the most accurate market representation possible.

Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

Publishing Schedule

We publish market share and forecasting, twice each year for each, allowing for both timely distribution of data and thorough analysis and forecasting. Our annual delivery schedule is as follows:

- Market share data are available January 31. All tables will be published and distributed to clients by March 31.
- Forecasting from the market share tables provides a five-year forecast period, available after March 31. The books will be shipped by May 31.
- Final updated market share tables, based on additional data collection and analysis, will be completed by May 31. At this point, the market share database is frozen and will not be changed until the end of the year. For the next six months, supplementary market data will be based on these final market data. Books will be shipped by July 31.
- We provide complete final forecast tables by July 31. These tables take into consideration changes in the market share during the previous six months. Books will be shipped by September 31.

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Database Changes

Tables 2 through 5 show changes made to the database since last year's market share update. PC clone manufacturers are no longer tracked individually. We continue to show PC sales by IBM, Hewlett-Packard, and Digital, which also sell other platforms. The 1993 sale of GeoVision Systems to SHL Systemhouse, Computervision-GIS to Unisys, and Logic Modeling Corporation to Synopsys will be recognized in market reporting beginning in 1994.

Table 2
Companies Renamed

Company Name	Renamed to:
Alper Systems	Sysdeco Ltd.
Areon	Kreon
CADAM	Altium
Catalpa	Catalpa groupe Missler
Geotrace Technologies	Cadlynx
Logic Control	Logic Systems Designers
RIB/RZB	RIB Bausoftware
Sener Sistemas Marinos	Sener Inginiera y Sistemas
STI Strassle	Strassle Informationssysteme

Source: Dataquest (February 1994)

Table 3
Companies (or CAD Portions Thereof) Sold/Merged

Company Name	Acquired by, Merged with, Technology Sold to:
Aries Technology	MacNeal Schwendler
ASG	Softdesk
CAD Language Systems	Compass Design Automation
CAD/CAM Group	Data I/O
Comdisco	Cadence
DAT Standard info ssystemes	ISD Software
EEsof	Hewlett-Packard
Expertest	Sunrise Test
Fides Industrielle Automation	Strassle
HP Cade	Hewlett-Packard
Inca	Zycad
Infocel	Understanding Systems
PiE Design	Quickturn Design Systems
Quad Design Technology	Viewlogic
Wisdom Systems	ICAD

Source: Dataquest (February 1994)

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Table 4
Companies Deleted

Company Removed from Database:
European
Club Informatico SA
DATAID Technologies
DECISA
Micrograph
Olivetti*
North American
Bechtel
Compaq*
Dell Computer*
Engineering Systems Corporation
GeoQuest
Mega CADD
Object Design
Objectivity
Ontos
The CAD Group
Ultimap

*We no longer follow individual PC clone makers.
Source: Dataquest (February 1994)

Table 5
Companies Added

Company Added to Database:
European
APIC Systemes
ISD Software
North American
Aptix
Earth Resource Mapping
Graftek
Graphic Data Systems (GDS)
Systems Science, Inc.
Tactics Int'l Ltd.
VLSI Libraries
Asian
Adam Net
Kozo
Okura
Tachnodia
TECHSPERT
Toshiba Engineering
Yokogawa Digital Computer

Source: Dataquest (February 1994)

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Table 6
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Fujitsu	523.7	298.0	165.8	18,152	10.9%	11.5%	11.1%	10.8%
NEC	402.9	269.1	97.8	22,773	8.4%	10.4%	6.5%	13.5%
IBM	344.4	178.4	112.4	17,010	7.2%	6.9%	7.5%	10.1%
Nihon Unisys	265.3	155.9	56.0	1,458	5.5%	6.0%	3.7%	.9%
Sun Microsystems	263.5	209.4	.0	11,412	5.5%	8.1%	.0%	6.8%
Hewlett-Packard	192.1	140.0	17.6	6,762	4.0%	5.4%	1.2%	4.0%
Hitachi	187.9	88.3	80.8	7,870	3.9%	3.4%	5.4%	4.7%
Toshiba*	179.9	89.9	71.9	4,944	3.7%	3.5%	4.8%	2.9%
Digital	154.6	119.8	2.7	3,968	3.2%	4.6%	.2%	2.4%
Cadence	120.2	.0	105.8	0	2.5%	.0%	7.1%	.0%
Mitsubishi Electric	116.9	91.4	14.6	1,849	2.4%	3.5%	1.0%	1.1%
Computervision	99.7	36.3	18.1	447	2.1%	1.4%	1.2%	.3%
Seiko*	99.3	34.7	49.7	587	2.1%	1.3%	3.3%	.3%
Hitachi Zosen Info Systems	98.9	83.9	4.8	946	2.1%	3.2%	.3%	.6%
Zuken	96.0	27.7	45.8	545	2.0%	1.1%	3.1%	.3%
Mutoh Industries*	94.4	33.7	51.7	2,157	2.0%	1.3%	3.4%	1.3%
Altium*	93.0	22.5	67.0	7,500	1.9%	.9%	4.5%	4.4%
C. Itoh Techno-Science*	87.0	27.0	53.1	1,610	1.8%	1.0%	3.5%	1.0%
Intergraph	82.3	30.2	24.7	1,920	1.7%	1.2%	1.6%	1.1%
Sumisho Electronics*	75.6	53.3	19.3	1,475	1.6%	2.1%	1.3%	.9%
Info. Services Int'l. Dentsu*	72.0	5.0	50.4	124	1.5%	.2%	3.4%	.1%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Kozo Keikaku Engineering	71.9	3.6	18.6	134	1.5%	.1%	1.2%	.1%
Autodesk	68.8	.0	68.8	0	1.4%	.0%	4.6%	.0%
ARGO GRAPHICS*	66.2	58.6	3.4	1,398	1.4%	2.3%	.2%	.8%
Mentor Graphics	61.5	6.6	27.1	221	1.3%	.3%	1.8%	.1%
Tachnodia	59.3	47.2	.8	870	1.2%	1.8%	.1%	.5%
Sharp*	53.7	25.8	27.9	494	1.1%	1.0%	1.9%	.3%
Silicon Graphics	51.8	51.8	.0	1,645	1.1%	2.0%	.0%	1.0%
Marubeni Hytech*	47.7	7.1	39.7	252	1.0%	.3%	2.6%	.1%
SDRC	47.2	.0	41.0	0	1.0%	.0%	2.7%	.0%
Sony	47.0	47.0	.0	2,331	1.0%	1.8%	.0%	1.4%
Hakuto	43.1	25.4	17.6	1,006	.9%	1.0%	1.2%	.6%
CADIX	41.5	17.8	20.3	229	.9%	.7%	1.4%	.1%
Mitsui Engineering	38.7	26.7	7.9	313	.8%	1.0%	.5%	.2%
Kubota Computer	38.2	29.1	6.1	438	.8%	1.1%	.4%	.3%
Uchida Yoko	36.0	21.2	13.1	1,002	.7%	.8%	.9%	.6%
Andor	35.9	7.9	26.6	652	.7%	.3%	1.8%	.4%
Dassault*	31.0	.0	27.0	0	.6%	.0%	1.8%	.0%
Yokogawa Digital Computer	30.9	12.3	15.4	285	.6%	.5%	1.0%	.2%
Synopsys	30.2	.0	21.1	0	.6%	.0%	1.4%	.0%
GDS	27.6	14.3	10.6	503	.6%	.6%	.7%	.3%
Toyo Information Systems*	27.5	16.4	8.4	309	.6%	.6%	.6%	.2%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Tokyo Electron*	27.0	8.7	12.6	124	.6%	.3%	.8%	.1%
Toshiba Engineering*	27.0	12.1	13.5	482	.6%	.5%	.9%	.3%
Wacom	27.0	5.4	18.8	902	.6%	.2%	1.3%	.5%
Informatix*	25.5	20.4	3.0	188	.5%	.8%	.2%	.1%
Apple Computer	23.9	23.9	.0	5,028	.5%	.9%	.0%	3.0%
EDS Unigraphics	22.5	6.6	10.5	332	.5%	.3%	.7%	.2%
Century Research Center	19.8	10.3	7.4	133	.4%	.4%	.5%	.1%
Parametric Technology	18.4	.0	15.1	0	.4%	.0%	1.0%	.0%
Racal-Redac	17.0	2.4	6.8	80	.4%	.1%	.5%	.0%
INS Engineering	15.4	7.6	7.9	56	.3%	.3%	.5%	.0%
Graphtec Engineering	15.3	7.5	7.0	404	.3%	.3%	.5%	.2%
Nihon Itek*	15.3	7.2	6.3	97	.3%	.3%	.4%	.1%
Landmark Graphics	15.1	6.8	3.3	75	.3%	.3%	.2%	.0%
Kanematsu Computer Systems*	15.0	7.3	6.2	218	.3%	.3%	.4%	.1%
Adam Net	14.4	7.1	5.4	19	.3%	.3%	.4%	.0%
CPU	14.4	4.8	9.6	343	.3%	.2%	.6%	.2%
Omron	13.5	6.8	5.4	300	.3%	.3%	.4%	.2%
Control Data Systems	11.3	5.3	2.3	468	.2%	.2%	.2%	.3%
Viewlogic Systems	11.2	.0	8.3	0	.2%	.0%	.6%	.0%
Design Automation	11.0	2.2	8.3	375	.2%	.1%	.6%	.2%
OKURA*	10.8	.0	10.8	0	.2%	.0%	.7%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
MacNeal-Schwendler	10.2	.0	10.2	0	.2%	.0%	.7%	.0%
Pasco*	10.1	3.7	5.5	83	.2%	.1%	.4%	.0%
COMPASS Design Automation	9.7	.0	7.6	7	.2%	.0%	.5%	.0%
Quickturn Design Systems	9.5	8.7	.7	116	.2%	.3%	.0%	.1%
Sumitomo Denko Workstation	9.0	9.0	.0	978	.2%	.3%	.0%	.6%
Harris EDA	8.9	.8	5.4	34	.2%	.0%	.4%	.0%
Zycad	8.0	4.4	1.2	56	.2%	.2%	.1%	.0%
Siemens Nixdorf Info systeme	7.9	2.5	3.1	125	.2%	.1%	.2%	.1%
MARC	7.8	.0	7.4	0	.2%	.0%	.5%	.0%
ESRI	7.7	.0	6.2	0	.2%	.0%	.4%	.0%
Ricoh*	7.2	.0	6.5	0	.2%	.0%	.4%	.0%
Cisigraph	6.3	1.7	3.0	73	.1%	.1%	.2%	.0%
Sophia Systems*	5.7	1.2	3.9	59	.1%	.0%	.3%	.0%
CrossCheck Technology	5.7	.0	3.0	0	.1%	.0%	.2%	.0%
Gerber Systems	5.4	2.5	2.3	79	.1%	.1%	.2%	.0%
Alias Research	5.3	.0	4.9	0	.1%	.0%	.3%	.0%
PADS Software	5.2	.0	4.6	0	.1%	.0%	.3%	.0%
Graftek	5.0	2.1	1.9	129	.1%	.1%	.1%	.1%
ICAD	4.9	.0	4.0	0	.1%	.0%	.3%	.0%
Logic Modeling Corp.	4.8	.0	4.2	0	.1%	.0%	.3%	.0%
Cascade Design Automation	4.7	.0	3.6	0	.1%	.0%	.2%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Mechanical Dynamics	4.7	.0	3.8	0	.1%	.0%	.3%	.0%
Silvar-Lisco	4.6	.0	3.6	0	.1%	.0%	.2%	.0%
Swanson Analysis	4.3	.0	3.8	0	.1%	.0%	.3%	.0%
Aspen Technology	4.3	.0	2.8	0	.1%	.0%	.2%	.0%
ADRA Systems	4.2	.1	3.2	7	.1%	.0%	.2%	.0%
GeoVision Systems	3.5	.3	1.9	7	.1%	.0%	.1%	.0%
Microsim	3.5	.0	3.2	0	.1%	.0%	.2%	.0%
Cimatron	3.4	1.5	1.5	113	.1%	.1%	.1%	.1%
PDA Engineering	3.4	.0	3.2	0	.1%	.0%	.2%	.0%
Investronica SA	3.2	2.0	.9	108	.1%	.1%	.1%	.1%
Kockums Computer Systems	3.0	.8	1.9	140	.1%	.0%	.1%	.1%
Altera	2.9	.0	2.5	0	.1%	.0%	.2%	.0%
CAD Centre	2.9	.0	2.3	0	.1%	.0%	.2%	.0%
Applicon	2.8	1.0	1.2	29	.1%	.0%	.1%	.0%
Meta-Software	2.8	.0	1.8	0	.1%	.0%	.1%	.0%
Straessle Informationssysteme	2.6	.4	1.6	16	.1%	.0%	.1%	.0%
MCS	2.4	.1	2.1	13	.1%	.0%	.1%	.0%
EA Systems	2.3	.0	2.3	0	.0%	.0%	.2%	.0%
CAMAX Systems Inc.	2.3	.3	1.5	30	.0%	.0%	.1%	.0%
SPATIAL Technology	2.2	.2	2.0	0	.0%	.0%	.1%	.0%
Test Systems Strategies	2.2	.0	2.0	0	.0%	.0%	.1%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
TSSI Japan	2.2	.0	1.6	0	.0%	.0%	.1%	.0%
Auto-Trol	2.1	.7	.9	27	.0%	.0%	.1%	.0%
LSI Logic	2.1	.2	1.6	4	.0%	.0%	.1%	.0%
Contec Microelectronics	2.0	.0	1.8	0	.0%	.0%	.1%	.0%
Genasys II	1.9	.2	1.4	9	.0%	.0%	.1%	.0%
Xilinx	1.9	.0	1.7	0	.0%	.0%	.1%	.0%
Synercom	1.9	.0	.8	0	.0%	.0%	.1%	.0%
Data I/O	1.8	.0	1.8	0	.0%	.0%	.1%	.0%
Analogy	1.7	.0	1.3	0	.0%	.0%	.1%	.0%
Ascent Logic Corp	1.6	.0	1.3	0	.0%	.0%	.1%	.0%
Matra Datavision	1.6	.4	.9	15	.0%	.0%	.1%	.0%
Ikos Systems	1.5	1.1	.4	18	.0%	.0%	.0%	.0%
Anilam Electronics	1.4	.3	1.0	46	.0%	.0%	.1%	.0%
Radan Computational	1.3	.5	.7	27	.0%	.0%	.0%	.0%
Isicad CAD/CAM Systeme	1.3	.3	.8	11	.0%	.0%	.1%	.0%
TECHSPERT	1.3	.2	1.1	11	.0%	.0%	.1%	.0%
Compact Software	1.2	.0	.9	0	.0%	.0%	.1%	.0%
Teradyne	1.1	.2	.8	3	.0%	.0%	.1%	.0%
BETRONEX	1.1	.1	1.0	20	.0%	.0%	.1%	.0%
Point Control	1.1	.0	.8	0	.0%	.0%	.1%	.0%
Moss Systems	1.0	.0	.7	0	.0%	.0%	.0%	.0%

(Continued)

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Table 6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
CADKEY	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
ERDAS	1.0	.2	.7	18	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	31,115	.0%	.0%	.0%	18.4%
All Companies	4,799.7	2,582.4	1,500.0	168,811	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2,083.0	1,083.4	633.3	96,307	43.4%	42.0%	42.2%	57.0%
All Asian-Based Companies	2,658.0	1,485.5	837.2	71,638	55.4%	57.5%	55.8%	42.4%
All European-Based Companies	58.8	13.5	29.5	867	1.2%	.5%	2.0%	.5%
All Hardware Companies	1,061.8	953.1	1.3	100,603	22.1%	36.9%	.1%	59.6%
All Turnkey & SW Companies	3,737.9	1,629.3	1,498.7	68,208	77.9%	63.1%	99.9%	40.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 7
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Fujitsu	314.3	170.0	103.1	7,175	10.4%	11.0%	10.4%	13.6%
Sun Microsystems	230.6	182.2	.0	10,483	7.6%	11.8%	.0%	19.9%
NEC	212.2	131.8	61.5	5,981	7.0%	8.5%	6.2%	11.4%
Hewlett-Packard	185.4	134.1	17.6	5,415	6.1%	8.7%	1.8%	10.3%
Hitachi	142.8	67.1	61.4	2,825	4.7%	4.3%	6.2%	5.4%
Toshiba*	125.2	62.6	50.1	1,389	4.1%	4.1%	5.1%	2.6%
Nihon Unisys	122.8	67.6	33.2	696	4.1%	4.4%	3.4%	1.3%
Cadence	119.6	.0	105.3	0	3.9%	.0%	10.6%	.0%
Seiko*	99.3	34.7	49.7	587	3.3%	2.2%	5.0%	1.1%
Computervision	99.0	36.3	17.4	447	3.3%	2.3%	1.8%	.8%
Zuken	96.0	27.7	45.8	545	3.2%	1.8%	4.6%	1.0%
Hitachi Zosen Info Systems	93.9	79.3	4.8	946	3.1%	5.1%	.5%	1.8%
Mitsubishi Electric	90.0	76.5	6.3	844	3.0%	5.0%	.6%	1.6%
C. Itoh Techno-Science*	70.7	21.9	43.1	1,379	2.3%	1.4%	4.4%	2.6%
Info. Services Int'l. Dentsu*	68.4	4.8	47.8	118	2.3%	.3%	4.8%	.2%
Intergraph	67.0	25.0	17.4	942	2.2%	1.6%	1.8%	1.8%
IBM	65.8	32.8	18.5	1,183	2.2%	2.1%	1.9%	2.2%
Mentor Graphics	61.5	6.6	27.1	221	2.0%	.4%	2.7%	.4%
Sumisho Electronics*	58.7	41.5	14.2	250	1.9%	2.7%	1.4%	.5%
Sharp*	52.6	25.3	27.3	487	1.7%	1.6%	2.8%	.9%
Digital	52.3	39.0	2.0	1,470	1.7%	2.5%	.2%	2.8%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Silicon Graphics	51.8	51.8	.0	1,645	1.7%	3.4%	.0%	3.1%
Sony	47.0	47.0	.0	2,331	1.6%	3.0%	.0%	4.4%
Tachnodia	47.0	37.6	.5	529	1.5%	2.4%	.0%	1.0%
SDRC	46.7	.0	40.6	0	1.5%	.0%	4.1%	.0%
Mutoh Industries*	42.6	15.2	23.3	630	1.4%	1.0%	2.4%	1.2%
Marubeni Hytech*	41.7	7.1	33.8	252	1.4%	.5%	3.4%	.5%
CADIX	41.5	17.8	20.3	229	1.4%	1.2%	2.1%	.4%
Mitsui Engineering	35.6	24.6	7.3	246	1.2%	1.6%	.7%	.5%
Uchida Yoko	32.3	19.1	11.6	807	1.1%	1.2%	1.2%	1.5%
Yokogawa Digital Computer	30.9	12.3	15.4	285	1.0%	.8%	1.6%	.5%
Kubota Computer	30.6	23.2	4.9	292	1.0%	1.5%	.5%	.6%
Synopsys	30.2	.0	21.1	0	1.0%	.0%	2.1%	.0%
ARGO GRAPHICS*	28.1	24.9	1.5	234	.9%	1.6%	.1%	.4%
GDS	27.6	14.3	10.6	503	.9%	.9%	1.1%	1.0%
Tokyo Electron*	27.0	8.7	12.6	124	.9%	.6%	1.3%	.2%
Toshiba Engineering*	27.0	12.1	13.5	482	.9%	.8%	1.4%	.9%
Toyo Information Systems*	23.4	14.2	7.0	285	.8%	.9%	.7%	.5%
Kozo Keikaku Engineering	21.7	2.2	6.5	23	.7%	.1%	.7%	.0%
Informatix*	20.2	16.0	2.5	156	.7%	1.0%	.3%	.3%
EDS Unigraphics	19.0	5.5	9.0	293	.6%	.4%	.9%	.6%
Century Research Center	18.6	9.7	7.0	131	.6%	.6%	.7%	.2%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Parametric Technology	18.4	.0	15.1	0	.6%	.0%	1.5%	.0%
Racal-Redac	17.0	2.4	6.8	80	.6%	.2%	.7%	.2%
Dassault*	16.6	.0	14.3	0	.5%	.0%	1.4%	.0%
Graphtec Engineering	15.3	7.5	7.0	404	.5%	.5%	.7%	.8%
Nihon Itek*	15.3	7.2	6.3	97	.5%	.5%	.6%	.2%
INS Engineering	14.7	7.2	7.5	41	.5%	.5%	.8%	.1%
Omron	13.5	6.8	5.4	300	.4%	.4%	.5%	.6%
OKURA*	10.8	.0	10.8	0	.4%	.0%	1.1%	.0%
Kanematsu Computer Systems*	10.5	6.1	2.9	100	.3%	.4%	.3%	.2%
COMPASS Design Automation	9.7	.0	7.6	7	.3%	.0%	.8%	.0%
Quickturn Design Systems	9.5	8.7	.7	116	.3%	.6%	.1%	.2%
Pasco*	9.2	3.5	4.8	46	.3%	.2%	.5%	.1%
Landmark Graphics	9.1	4.1	2.0	45	.3%	.3%	.2%	.1%
Adam Net	8.6	1.3	5.4	17	.3%	.1%	.5%	.0%
Sumitomo Denko Workstation	8.4	8.4	.0	926	.3%	.5%	.0%	1.8%
Viewlogic Systems	8.1	.0	5.9	0	.3%	.0%	.6%	.0%
Harris EDA	7.7	.6	4.6	23	.3%	.0%	.5%	.0%
Siemens Nixdorf Info systeme	7.5	2.4	3.0	118	.2%	.2%	.3%	.2%
Ricoh*	7.2	.0	6.5	0	.2%	.0%	.7%	.0%
Autodesk	5.9	.0	5.9	0	.2%	.0%	.6%	.0%
MARC	5.8	.0	5.5	0	.2%	.0%	.6%	.0%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
CrossCheck Technology	5.7	.0	3.0	0	.2%	.0%	.3%	.0%
Cisigraph	5.7	1.5	2.8	70	.2%	.1%	.3%	.1%
Gerber Systems	5.4	2.5	2.3	79	.2%	.2%	.2%	.2%
Alias Research	5.3	.0	4.9	0	.2%	.0%	.5%	.0%
Control Data Systems	5.1	2.8	1.3	131	.2%	.2%	.1%	.2%
ICAD	4.9	.0	4.0	0	.2%	.0%	.4%	.0%
Logic Modeling Corp.	4.8	.0	4.1	0	.2%	.0%	.4%	.0%
Cascade Design Automation	4.7	.0	3.6	0	.2%	.0%	.4%	.0%
Silvar-Lisco	4.6	.0	3.6	0	.2%	.0%	.4%	.0%
Graftek	4.0	1.6	1.6	83	.1%	.1%	.2%	.2%
ESRI	4.0	.0	3.1	0	.1%	.0%	.3%	.0%
Mechanical Dynamics	3.4	.0	2.7	0	.1%	.0%	.3%	.0%
Aspen Technology	3.2	.0	2.1	0	.1%	.0%	.2%	.0%
Kockums Computer Systems	3.0	.8	1.9	140	.1%	.1%	.2%	.3%
ADRA Systems	3.0	.1	2.3	7	.1%	.0%	.2%	.0%
PDA Engineering	3.0	.0	2.8	0	.1%	.0%	.3%	.0%
GeoVision Systems	2.9	.2	1.6	6	.1%	.0%	.2%	.0%
CAD Centre	2.9	.0	2.3	0	.1%	.0%	.2%	.0%
Applicon	2.8	1.0	1.2	29	.1%	.1%	.1%	.1%
Zycad	2.6	1.5	.4	19	.1%	.1%	.0%	.0%
Straessle Informationssysteme	2.6	.4	1.6	16	.1%	.0%	.2%	.0%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hakuto	2.6	1.6	1.0	31	.1%	.1%	.1%	.1%
Wacom	2.6	.5	2.0	44	.1%	.0%	.2%	.1%
Meta-Software	2.5	.0	1.7	0	.1%	.0%	.2%	.0%
CAMAX Systems Inc.	2.3	.3	1.5	30	.1%	.0%	.1%	.1%
Cimatron	2.3	1.0	1.0	52	.1%	.1%	.1%	.1%
Swanson Analysis	2.3	.0	2.0	0	.1%	.0%	.2%	.0%
TSSI Japan	2.2	.0	1.6	0	.1%	.0%	.2%	.0%
Auto-Trol	2.1	.7	.9	27	.1%	.0%	.1%	.1%
Test Systems Strategies	2.1	.0	1.9	0	.1%	.0%	.2%	.0%
SPATIAL Technology	2.0	.0	2.0	0	.1%	.0%	.2%	.0%
LSI Logic	2.0	.1	1.5	4	.1%	.0%	.2%	.0%
Contec Microelectronics	1.9	.0	1.7	0	.1%	.0%	.2%	.0%
Genasys II	1.7	.2	1.2	4	.1%	.0%	.1%	.0%
Analogy	1.6	.0	1.3	0	.1%	.0%	.1%	.0%
Sophia Systems*	1.6	.2	1.2	10	.1%	.0%	.1%	.0%
Matra Datavision	1.6	.4	.9	15	.1%	.0%	.1%	.0%
Synercom	1.4	.0	.6	0	.0%	.0%	.1%	.0%
Radan Computational	1.3	.5	.7	26	.0%	.0%	.1%	.0%
MacNeal-Schwendler	1.3	.0	1.3	0	.0%	.0%	.1%	.0%
MCS	1.3	.1	1.1	5	.0%	.0%	.1%	.0%
Ascent Logic Corp	1.2	.0	.9	0	.0%	.0%	.1%	.0%

(Continued)

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Table 7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Isicad CAD/CAM Systeme	1.2	.3	.6	11	.0%	.0%	.1%	.0%
Moss Systems	1.0	.0	.7	0	.0%	.0%	.1%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	3,032.0	1,543.8	989.4	52,667	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1,243.3	553.2	411.5	23,347	41.0%	35.8%	41.6%	44.3%
All Asian-Based Companies	1,740.4	980.7	553.7	28,763	57.4%	63.5%	56.0%	54.6%
All European-Based Companies	48.3	9.9	24.2	557	1.6%	.6%	2.4%	1.1%
All Hardware Companies	555.4	479.7	1.1	22,963	18.3%	31.1%	.1%	43.6%
All Turnkey & SW Companies	2,476.6	1,064.1	988.3	29,704	81.7%	68.9%	99.9%	56.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 8
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Host-Dependent
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Nihon Unisys	142.5	88.3	22.8	762	20.1%	19.8%	16.3%	6.2%
Fujitsu	133.9	61.6	53.6	2,019	18.9%	13.8%	38.4%	16.4%
IBM	118.8	73.8	17.7	1,423	16.7%	16.5%	12.6%	11.5%
NEC	61.4	45.5	10.5	127	8.7%	10.2%	7.5%	1.0%
Digital	54.1	42.0	.3	0	7.6%	9.4%	.2%	.0%
Mitsubishi Electric	15.2	7.2	4.3	42	2.1%	1.6%	3.1%	.3%
Hitachi	14.3	6.7	6.1	3,467	2.0%	1.5%	4.4%	28.1%
Kozo Keikaku Engineering	11.8	.0	2.4	0	1.7%	.0%	1.7%	.0%
Dassault*	10.4	.0	9.2	0	1.5%	.0%	6.6%	.0%
C. Itoh Techno-Science*	9.4	2.9	5.7	120	1.3%	.7%	4.1%	1.0%
Tachnodia	9.0	6.6	.3	253	1.3%	1.5%	.2%	2.1%
Toshiba*	8.8	4.4	3.5	118	1.2%	1.0%	2.5%	1.0%
Control Data Systems	5.9	2.3	1.0	337	.8%	.5%	.7%	2.7%
MacNeal-Schwendler	5.6	.0	5.6	0	.8%	.0%	4.0%	.0%
Informatix*	5.3	4.4	.5	31	.7%	1.0%	.3%	.3%
Hitachi Zosen Info Systems	5.1	4.5	.0	0	.7%	1.0%	.0%	.0%
Toyo Information Systems*	4.2	2.3	1.3	24	.6%	.5%	1.0%	.2%
EA Systems	2.3	.0	2.3	0	.3%	.0%	1.7%	.0%
MARC	1.9	.0	1.8	0	.3%	.0%	1.3%	.0%
Swanson Analysis	1.3	.0	1.2	0	.2%	.0%	.8%	.0%
Century Research Center	1.2	.6	.5	2	.2%	.1%	.3%	.0%

(Continued)

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Table 8 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Host-Dependent
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Aspen Technology	1.1	.0	.7	0	.1%	.0%	.5%	.0%
Other Companies	79.9	92.4	.0	3,545	11.3%	20.7%	.0%	28.8%
All Companies	709.4	446.3	139.6	12,324	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	302.3	218.9	34.4	5,515	42.6%	49.0%	24.7%	44.8%
All Asian-Based Companies	406.4	227.2	104.8	6,803	57.3%	50.9%	75.1%	55.2%
All European-Based Companies	.7	.2	.4	6	.1%	.0%	.3%	.1%
All Hardware Companies	160.1	142.5	.2	3,767	22.6%	31.9%	.1%	30.6%
All Turnkey & SW Companies	549.3	303.8	139.4	8,557	77.4%	68.1%	99.9%	69.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 9
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Server
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	38.6	30.2	.0	581	24.2%	29.8%	.0%	24.3%
IBM	37.0	19.5	9.3	488	23.2%	19.3%	38.9%	20.5%
Sun Microsystems	32.9	27.3	.0	929	20.7%	27.0%	.0%	38.9%
Intergraph	8.0	2.7	2.5	87	5.0%	2.7%	10.3%	3.6%
C. Itoh Techno-Science*	6.9	2.1	4.2	111	4.3%	2.1%	17.6%	4.6%
Landmark Graphics	6.0	2.7	1.3	30	3.8%	2.7%	5.5%	1.2%
Adam Net	5.8	5.8	.0	2	3.6%	5.7%	.0%	.1%
Kubota Computer	5.7	4.4	.9	47	3.6%	4.3%	3.9%	2.0%
Zycad	5.4	3.0	.8	36	3.4%	2.9%	3.4%	1.5%
Dassault*	4.0	.0	3.4	0	2.5%	.0%	14.4%	.0%
Info. Services Int'l. Dentsu*	3.6	.3	2.5	6	2.3%	.2%	10.5%	.3%
Kozo Keikaku Engineering	3.6	.0	.7	0	2.3%	.0%	3.0%	.0%
EDS Unigraphics	3.5	1.1	1.6	39	2.2%	1.0%	6.6%	1.6%
MacNeal-Schwendler	3.1	.0	3.1	0	1.9%	.0%	12.8%	.0%
ESRI	2.4	.0	1.9	0	1.5%	.0%	7.8%	.0%
Hewlett-Packard	1.9	1.6	.0	38	1.2%	1.6%	.0%	1.6%
Ikos Systems	1.5	1.1	.4	18	.9%	1.1%	1.6%	.8%

(Continued)

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Table 9 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Server
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sharp*	1.1	.5	.6	7	.7%	.5%	2.3%	.3%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	159.4	101.2	23.9	2,386	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	141.6	89.7	21.3	2,272	88.9%	88.6%	89.1%	95.2%
All Asian-Based Companies	16.8	11.2	2.3	109	10.5%	11.1%	9.5%	4.6%
All European-Based Companies	1.0	.3	.4	6	.6%	.3%	1.5%	.2%
All Hardware Companies	74.4	60.0	.0	1,621	46.7%	59.2%	.2%	67.9%
All Turnkey & SW Companies	85.0	41.3	23.8	766	53.3%	40.8%	99.8%	32.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 10
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Personal Computer
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
NEC	129.2	91.8	25.8	16,665	14.4%	18.7%	7.4%	16.4%
IBM	122.8	52.3	67.0	13,916	13.7%	10.6%	19.3%	13.7%
Altium*	93.0	22.5	67.0	7,500	10.3%	4.6%	19.3%	7.4%
Fujitsu	75.5	66.4	9.1	8,958	8.4%	13.5%	2.6%	8.8%
Autodesk	63.0	.0	63.0	0	7.0%	.0%	18.1%	.0%
Mutoh Industries*	51.8	18.5	28.4	1,527	5.8%	3.8%	8.2%	1.5%
Toshiba*	45.9	22.9	18.3	3,437	5.1%	4.7%	5.3%	3.4%
Hakuto	40.5	23.9	16.6	975	4.5%	4.9%	4.8%	1.0%
ARGO GRAPHICS*	38.1	33.6	1.9	1,164	4.2%	6.8%	.6%	1.1%
Andor	35.9	7.9	26.6	652	4.0%	1.6%	7.7%	.6%
Kozo Keikaku Engineering	34.9	1.4	9.1	111	3.9%	.3%	2.6%	.1%
Hitachi	30.9	14.5	13.3	1,578	3.4%	3.0%	3.8%	1.6%
Wacom	24.4	4.9	16.8	858	2.7%	1.0%	4.9%	.8%
Apple Computer	23.9	23.9	.0	5,028	2.7%	4.9%	.0%	5.0%
Sumisho Electronics*	16.8	11.8	5.0	1,225	1.9%	2.4%	1.5%	1.2%
CPU	14.4	4.8	9.6	343	1.6%	1.0%	2.8%	.3%
Mitsubishi Electric	11.7	7.7	4.0	964	1.3%	1.6%	1.1%	.9%
Design Automation	11.0	2.2	8.3	375	1.2%	.5%	2.4%	.4%
Digital	9.5	8.6	.4	1,918	1.1%	1.8%	.1%	1.9%
Intergraph	7.1	2.5	4.7	891	.8%	.5%	1.3%	.9%
Marubeni Hytech*	5.9	.0	5.9	0	.7%	.0%	1.7%	.0%

(Continued)

Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Personal Computer
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Hewlett-Packard	4.7	4.3	.0	1,309	.5%	.9%	.0%	1.3%
PADS Software	4.7	.0	4.2	0	.5%	.0%	1.2%	.0%
Kanematsu Computer Systems*	4.5	1.2	3.3	118	.5%	.2%	.9%	.1%
Sophia Systems*	4.1	1.0	2.7	49	.5%	.2%	.8%	.0%
Uchida Yoko	3.6	2.2	1.5	195	.4%	.4%	.4%	.2%
Tachnodia	3.4	3.0	.0	88	.4%	.6%	.0%	.1%
Investronica SA	3.2	2.0	.9	108	.4%	.4%	.2%	.1%
Mitsui Engineering	3.1	2.1	.6	67	.3%	.4%	.2%	.1%
Microsim	3.0	.0	2.9	0	.3%	.0%	.8%	.0%
Viewlogic Systems	3.0	.0	2.4	0	.3%	.0%	.7%	.0%
Altera	2.9	.0	2.5	0	.3%	.0%	.7%	.0%
Kubota Computer	1.9	1.5	.3	99	.2%	.3%	.1%	.1%
Data I/O	1.6	.0	1.6	0	.2%	.0%	.5%	.0%
Anilam Electronics	1.4	.3	1.0	46	.2%	.1%	.3%	.0%
ESRI	1.3	.0	1.2	0	.1%	.0%	.3%	.0%
Xilinx	1.3	.0	1.1	0	.1%	.0%	.3%	.0%
ADRA Systems	1.2	.0	.9	0	.1%	.0%	.3%	.0%
MCS	1.2	.0	1.0	8	.1%	.0%	.3%	.0%
TECHSPERT	1.1	.2	1.0	11	.1%	.0%	.3%	.0%
BETRONEX	1.1	.1	1.0	20	.1%	.0%	.3%	.0%

(Continued)

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Table 10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: All Applications
Platform: Personal Computer
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cimatron	1.1	.5	.5	61	.1%	.1%	.1%	.1%
Other Companies	.0	50.1	.0	31,090	.0%	10.2%	.0%	30.7%
All Companies	899.0	491.2	347.2	101,434	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	395.8	221.6	166.1	65,172	44.0%	45.1%	47.8%	64.3%
All Asian-Based Companies	494.4	266.4	176.5	35,964	55.0%	54.2%	50.8%	35.5%
All European-Based Companies	8.8	3.2	4.6	297	1.0%	.6%	1.3%	.3%
All Hardware Companies	271.9	271.0	.0	72,252	30.2%	55.2%	.0%	71.2%
All Turnkey & SW Companies	627.1	220.2	347.2	29,182	69.8%	44.8%	100.0%	28.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 11
1993 CAD/CAM/CAE/GIS Market Share

Application: Mechanical
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	275.0	137.6	92.1	10,636	10.8%	9.5%	12.4%	11.4%
NEC	245.8	165.4	58.4	11,515	9.7%	11.4%	7.8%	12.3%
Fujitsu	219.9	128.9	67.4	8,751	8.7%	8.9%	9.0%	9.4%
Nihon Unisys	217.5	128.8	44.4	1,191	8.6%	8.9%	6.0%	1.3%
Hitachi	143.6	67.5	61.8	6,076	5.7%	4.6%	8.3%	6.5%
Toshiba*	125.9	63.0	50.4	4,070	5.0%	4.3%	6.8%	4.4%
Hewlett-Packard	118.6	79.5	15.7	3,375	4.7%	5.5%	2.1%	3.6%
Hitachi Zosen Info Systems	89.8	76.1	4.4	865	3.5%	5.2%	.6%	.9%
Computervision	83.1	30.2	15.0	373	3.3%	2.1%	2.0%	.4%
Altium*	73.6	17.3	53.5	5,775	2.9%	1.2%	7.2%	6.2%
Info. Services Int'l. Dentsu*	72.0	5.0	50.4	124	2.8%	.3%	6.8%	.1%
Mutoh Industries*	70.8	25.3	38.8	1,692	2.8%	1.7%	5.2%	1.8%
ARGO GRAPHICS*	66.2	58.6	3.4	1,398	2.6%	4.0%	.5%	1.5%
Sumisho Electronics*	65.1	45.9	16.5	1,155	2.6%	3.2%	2.2%	1.2%
Digital	56.2	44.4	.0	1,493	2.2%	3.1%	.0%	1.6%
C. Itoh Techno-Science*	50.5	15.6	30.8	916	2.0%	1.1%	4.1%	1.0%
Mitsubishi Electric	50.3	39.3	6.3	795	2.0%	2.7%	.8%	.9%
SDRC	47.2	.0	41.0	0	1.9%	.0%	5.5%	.0%
Hakuto	43.1	25.4	17.6	1,006	1.7%	1.7%	2.4%	1.1%
Sharp*	43.0	20.7	22.3	398	1.7%	1.4%	3.0%	.4%
Silicon Graphics	41.6	41.6	.0	1,320	1.6%	2.9%	.0%	1.4%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Mechanical
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Seiko*	40.6	14.2	20.3	241	1.6%	1.0%	2.7%	.3%
Kubota Computer	38.2	29.1	6.1	438	1.5%	2.0%	.8%	.5%
Sun Microsystems	36.2	28.9	.0	1,497	1.4%	2.0%	.0%	1.6%
Tachnodia	33.2	26.0	.5	526	1.3%	1.8%	.1%	.6%
Dassault*	29.0	.0	25.2	0	1.1%	.0%	3.4%	.0%
Tokyo Electron*	27.0	8.7	12.6	124	1.1%	.6%	1.7%	.1%
Toshiba Engineering*	27.0	12.1	13.5	482	1.1%	.8%	1.8%	.5%
Autodesk	26.3	.0	26.3	0	1.0%	.0%	3.5%	.0%
Andor	23.1	5.1	17.1	421	.9%	.3%	2.3%	.5%
Toyo Information Systems*	23.0	13.7	6.9	258	.9%	.9%	.9%	.3%
EDS Unigraphics	22.5	6.6	10.5	332	.9%	.5%	1.4%	.4%
Mitsui Engineering	22.1	15.3	4.5	178	.9%	1.1%	.6%	.2%
Kozo Keikaku Engineering	21.6	1.3	5.8	40	.8%	.1%	.8%	.0%
Marubeni Hytech*	18.6	3.2	15.1	112	.7%	.2%	2.0%	.1%
Parametric Technology	18.4	.0	15.1	0	.7%	.0%	2.0%	.0%
Sony	16.6	16.6	.0	823	.7%	1.1%	.0%	.9%
Apple Computer	16.0	16.0	.0	3,377	.6%	1.1%	.0%	3.6%
Graphtec Engineering	15.3	7.5	7.0	404	.6%	.5%	.9%	.4%
Nihon Itek*	12.2	5.8	5.0	78	.5%	.4%	.7%	.1%
Intergraph	12.1	3.7	4.4	276	.5%	.3%	.6%	.3%
Adam Net	11.5	6.6	3.6	14	.5%	.5%	.5%	.0%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Mechanical
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Omron	11.5	5.7	4.6	255	.5%	.4%	.6%	.3%
MacNeal-Schwendler	10.2	.0	10.2	0	.4%	.0%	1.4%	.0%
Control Data Systems	10.1	4.6	2.0	431	.4%	.3%	.3%	.5%
Design Automation	8.6	1.8	6.5	295	.3%	.1%	.9%	.3%
CADIX	8.3	3.6	4.1	46	.3%	.2%	.5%	.0%
Wacom	8.1	1.6	5.7	261	.3%	.1%	.8%	.3%
Sumitomo Denko Workstation	7.9	7.9	.0	855	.3%	.5%	.0%	.9%
MARC	7.8	.0	7.4	0	.3%	.0%	1.0%	.0%
Ricoh*	7.2	.0	6.5	0	.3%	.0%	.9%	.0%
Cisigraph	6.3	1.7	3.0	73	.2%	.1%	.4%	.1%
Gerber Systems	5.4	2.5	2.3	79	.2%	.2%	.3%	.1%
Alias Research	5.3	.0	4.9	0	.2%	.0%	.7%	.0%
Graftek	5.0	2.1	1.9	129	.2%	.1%	.3%	.1%
Mechanical Dynamics	4.7	.0	3.8	0	.2%	.0%	.5%	.0%
ICAD	4.4	.0	3.6	0	.2%	.0%	.5%	.0%
Swanson Analysis	4.3	.0	3.8	0	.2%	.0%	.5%	.0%
ADRA Systems	4.2	.1	3.2	7	.2%	.0%	.4%	.0%
Cimatron	3.4	1.5	1.5	113	.1%	.1%	.2%	.1%
PDA Engineering	3.4	.0	3.2	0	.1%	.0%	.4%	.0%
Investronica SA	3.2	2.0	.9	108	.1%	.1%	.1%	.1%
Century Research Center	2.9	1.5	1.1	14	.1%	.1%	.1%	.0%

(Continued)

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Table 11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Mechanical
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Applicon	2.8	1.0	1.2	29	.1%	.1%	.2%	.0%
Straessle Informationssysteme	2.6	.4	1.6	16	.1%	.0%	.2%	.0%
MCS	2.4	.1	2.1	13	.1%	.0%	.3%	.0%
CAMAX Systems Inc.	2.3	.3	1.5	30	.1%	.0%	.2%	.0%
SPATIAL Technology	2.2	.2	2.0	0	.1%	.0%	.3%	.0%
Uchida Yoko	2.0	1.2	.7	53	.1%	.1%	.1%	.1%
Matra Datavision	1.6	.4	.9	15	.1%	.0%	.1%	.0%
Anilam Electronics	1.4	.3	1.0	46	.1%	.0%	.1%	.0%
Radan Computational	1.2	.4	.6	24	.0%	.0%	.1%	.0%
Auto-Trol	1.1	.4	.4	14	.0%	.0%	.1%	.0%
Point Control	1.1	.0	.8	0	.0%	.0%	.1%	.0%
CADKEY	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
Zuken	1.0	.3	.5	6	.0%	.0%	.1%	.0%
Other Companies	.0	.0	.0	17,920	.0%	.0%	.0%	19.2%
All Companies	2,541.1	1,455.0	744.8	93,452	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1,000.4	559.9	279.9	52,310	39.4%	38.5%	37.6%	56.0%
All Asian-Based Companies	1,518.0	888.2	453.0	40,718	59.7%	61.0%	60.8%	43.6%
All European-Based Companies	22.7	6.9	11.9	424	.9%	.5%	1.6%	.5%
All Hardware Companies	459.5	429.6	.6	53,721	18.1%	29.5%	.1%	57.5%
All Turnkey & SW Companies	2,081.6	1,025.4	744.3	39,731	81.9%	70.5%	99.9%	42.5%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 12
1993 CAD/CAM/CAE/GIS Market Share

Application: AEC
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenur	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardwarr Units Shipped
Fujitsu	151.8	88.1	47.3	5,982	21.9%	23.9%	22.1%	19.6%
NEC	64.5	43.2	15.6	5,325	9.3%	11.7%	7.3%	17.5%
Kozo Keikaku Engineering	50.4	2.3	12.8	93	7.3%	.6%	6.0%	.3%
Nihon Unisys	47.8	27.1	11.6	267	6.9%	7.4%	5.4%	.9%
IBM	38.7	22.7	10.8	3,233	5.6%	6.2%	5.0%	10.6%
Autodesk	30.1	.0	30.1	0	4.3%	.0%	14.1%	.0%
Tachnodia	26.1	21.2	.3	344	3.8%	5.8%	.1%	1.1%
Intergraph	25.6	7.8	8.3	728	3.7%	2.1%	3.9%	2.4%
Informatix*	25.5	20.4	3.0	188	3.7%	5.6%	1.4%	.6%
Toshiba*	21.6	10.8	8.6	515	3.1%	2.9%	4.0%	1.7%
Mutoh Industries*	18.9	6.7	10.3	362	2.7%	1.8%	4.8%	1.2%
Hitachi	18.4	8.7	7.9	750	2.6%	2.4%	3.7%	2.5%
C. Itoh Techno-Science*	18.3	5.7	11.2	347	2.6%	1.5%	5.2%	1.1%
Mitsubishi Electric	17.5	13.7	2.2	277	2.5%	3.7%	1.0%	.9%
Computervision	16.6	6.0	3.1	74	2.4%	1.6%	1.5%	.2%
Kanematsu Computer Systems*	15.0	7.3	6.2	218	2.2%	2.0%	2.9%	.7%
Sony	14.9	14.9	.0	737	2.1%	4.0%	.0%	2.4%
CPU	14.4	4.8	9.6	343	2.1%	1.3%	4.5%	1.1%
Silicon Graphics	10.2	10.2	.0	325	1.5%	2.8%	.0%	1.1%
Andor	10.0	2.2	7.4	182	1.4%	.6%	3.5%	.6%
Century Research Center	9.9	5.2	3.7	69	1.4%	1.4%	1.7%	.2%

(Continued)

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Table 12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: AEC
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenur	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardwarr Units Shipped
Hitachi Zosen Info Systems	9.1	7.7	.4	81	1.3%	2.1%	.2%	.3%
Altium*	8.6	2.0	6.2	675	1.2%	.5%	2.9%	2.2%
Digital	8.5	7.0	.0	542	1.2%	1.9%	.0%	1.8%
GDS	8.3	4.2	3.3	148	1.2%	1.1%	1.5%	.5%
Hewlett-Packard	7.8	6.6	.0	504	1.1%	1.8%	.0%	1.7%
INS Engineering	7.5	3.7	3.8	34	1.1%	1.0%	1.8%	.1%
Sumisho Electronics*	6.0	4.2	1.6	225	.9%	1.1%	.8%	.7%
Apple Computer	5.7	5.7	.0	1,191	.8%	1.5%	.0%	3.9%
Uchida Yoko	5.2	3.1	1.9	145	.8%	.8%	.9%	.5%
Toyo Information Systems*	4.6	2.7	1.4	51	.7%	.7%	.7%	.2%
Aspen Technology	4.3	.0	2.8	0	.6%	.0%	1.3%	.0%
Nihon Itek*	3.1	1.4	1.3	19	.4%	.4%	.6%	.1%
Kockums Computer Systems	3.0	.8	1.9	140	.4%	.2%	.9%	.5%
Adam Net	2.9	.4	1.8	6	.4%	.1%	.8%	.0%
CAD Centre	2.5	.0	2.0	0	.4%	.0%	.9%	.0%
Design Automation	2.3	.5	1.8	80	.3%	.1%	.8%	.3%
EA Systems	2.3	.0	2.3	0	.3%	.0%	1.1%	.0%
Dassault*	2.0	.0	1.7	0	.3%	.0%	.8%	.0%
Mitsui Engineering	1.9	1.3	.4	15	.3%	.4%	.2%	.0%
Sun Microsystems	1.5	1.2	.0	64	.2%	.3%	.0%	.2%
Moss Systems	1.0	.0	.7	0	.1%	.0%	.3%	.0%

(Continued)

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Table 12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: AEC
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenur	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardwarr Units Shipped
Auto-Trol	1.0	.4	.4	13	.1%	.1%	.2%	.0%
Other Companies	.0	.0	.0	6,055	.0%	.0%	.0%	19.9%
All Companies	693.6	368.1	214.1	30,454	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	195.1	101.8	64.9	14,701	28.1%	27.7%	30.3%	48.3%
All Asian-Based Companies	490.6	265.1	143.9	15,547	70.7%	72.0%	67.2%	51.0%
All European-Based Companies	7.9	1.2	5.4	207	1.1%	.3%	2.5%	.7%
All Hardware Companies	123.8	120.5	.0	17,849	17.8%	32.7%	.0%	58.6%
All Turnkey & SW Companies	569.8	247.6	214.1	12,605	82.2%	67.3%	100.0%	41.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 13
1993 CAD/CAM/CAE/GIS Market Share

Application: GIS/Mapping
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Fujitsu	57.7	29.7	20.2	1,172	15.7%	14.7%	18.1%	11.6%
Mitsubishi Electric	49.1	38.4	6.1	777	13.4%	19.0%	5.5%	7.7%
Intergraph	38.1	16.7	9.9	841	10.4%	8.3%	8.9%	8.4%
Uchida Yoko	22.5	13.3	8.2	624	6.1%	6.6%	7.4%	6.2%
GDS	19.3	10.1	7.3	355	5.3%	5.0%	6.5%	3.5%
Hitachi	18.9	8.9	8.1	726	5.1%	4.4%	7.3%	7.2%
Toshiba*	18.0	9.0	7.2	200	4.9%	4.4%	6.4%	2.0%
Landmark Graphics	15.1	6.8	3.3	75	4.1%	3.4%	3.0%	.7%
Mitsui Engineering	14.7	10.2	3.0	120	4.0%	5.0%	2.7%	1.2%
Digital	10.6	8.8	.0	380	2.9%	4.3%	.0%	3.8%
Pasco*	10.1	3.7	5.5	83	2.7%	1.8%	4.9%	.8%
IBM	8.9	6.2	1.3	790	2.4%	3.1%	1.1%	7.9%
Hewlett-Packard	8.3	7.1	.0	350	2.3%	3.5%	.0%	3.5%
Autodesk	8.2	.0	8.2	0	2.2%	.0%	7.3%	.0%
NEC	8.1	5.1	2.3	308	2.2%	2.5%	2.0%	3.1%
Siemens Nixdorf Info systeme	7.9	2.5	3.1	125	2.2%	1.3%	2.8%	1.2%
INS Engineering	7.9	3.9	4.0	22	2.2%	1.9%	3.6%	.2%
ESRI	7.7	.0	6.2	0	2.1%	.0%	5.5%	.0%
Sun Microsystems	6.7	5.4	.0	271	1.8%	2.7%	.0%	2.7%
Mutoh Industries*	4.7	1.7	2.6	102	1.3%	.8%	2.3%	1.0%
Century Research Center	4.7	2.5	1.8	33	1.3%	1.2%	1.6%	.3%

(Continued)

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Table 13 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: GIS/Mapping
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
CADIX	4.2	1.8	2.0	23	1.1%	.9%	1.8%	.2%
GeoVision Systems	3.5	.3	1.9	7	.9%	.1%	1.7%	.1%
C. Itoh Techno-Science*	3.0	1.0	1.9	58	.8%	.5%	1.7%	.6%
Genasys II	1.9	.2	1.4	9	.5%	.1%	1.2%	.1%
Synercom	1.9	.0	.8	0	.5%	.0%	.7%	.0%
Andor	1.7	.4	1.3	31	.5%	.2%	1.1%	.3%
Other Companies	1.1	8.2	.0	2,546	.3%	4.0%	.0%	25.3%
All Companies	366.3	202.1	111.7	10,067	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	148.7	76.1	43.1	5,854	40.6%	37.7%	38.6%	58.2%
All Asian-Based Companies	208.3	123.0	65.0	4,077	56.9%	60.9%	58.2%	40.5%
All European-Based Companies	9.2	3.0	3.6	135	2.5%	1.5%	3.2%	1.3%
All Hardware Companies	49.5	44.7	.1	4,687	13.5%	22.1%	.0%	46.6%
All Turnkey & SW Companies	316.8	157.4	111.6	5,380	86.5%	77.9%	100.0%	53.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 14
1993 CAD/CAM/CAE/GIS Market Share

Application: Electronic Design Automation
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	219.2	174.0	.0	9,581	18.3%	31.2%	.0%	27.5%
Cadence	120.2	.0	105.8	0	10.0%	.0%	24.6%	.0%
Zuken	95.0	27.4	45.4	540	7.9%	4.9%	10.6%	1.5%
Fujitsu	94.3	51.3	30.9	2,247	7.9%	9.2%	7.2%	6.4%
NEC	84.6	55.4	21.6	5,625	7.1%	9.9%	5.0%	16.1%
Digital	79.3	59.6	2.6	1,552	6.6%	10.7%	.6%	4.5%
Mentor Graphics	61.5	6.6	27.1	221	5.1%	1.2%	6.3%	.6%
Seiko*	58.7	20.5	29.4	346	4.9%	3.7%	6.8%	1.0%
Hewlett-Packard	57.4	46.7	1.8	2,533	4.8%	8.4%	.4%	7.3%
Yokogawa Digital Computer	30.9	12.3	15.4	285	2.6%	2.2%	3.6%	.8%
Synopsys	30.2	.0	21.1	0	2.5%	.0%	4.9%	.0%
Marubeni Hytech*	29.1	4.0	24.7	140	2.4%	.7%	5.7%	.4%
CADIX	29.0	12.5	14.2	160	2.4%	2.2%	3.3%	.5%
IBM	21.8	11.9	8.2	2,350	1.8%	2.1%	1.9%	6.7%
Wacom	18.9	3.8	13.1	641	1.6%	.7%	3.1%	1.8%
Racal-Redac	17.0	2.4	6.8	80	1.4%	.4%	1.6%	.2%
Sony	15.5	15.6	.0	770	1.3%	2.8%	.0%	2.2%
C. Itoh Techno-Science*	15.2	4.7	9.3	289	1.3%	.8%	2.2%	.8%
Toshiba*	14.4	7.2	5.8	160	1.2%	1.3%	1.3%	.5%
Viewlogic Systems	11.2	.0	8.3	0	.9%	.0%	1.9%	.0%
OKURA*	10.8	.0	10.8	0	.9%	.0%	2.5%	.0%
Altium*	10.8	3.2	7.3	1,050	.9%	.6%	1.7%	3.0%

(Continued)

Table 14 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Electronic Design Automation
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sharp*	10.7	5.2	5.6	97	.9%	.9%	1.3%	.3%
COMPASS Design Automation	9.7	.0	7.6	7	.8%	.0%	1.8%	.0%
Quickturn Design Systems	9.5	8.7	.7	116	.8%	1.6%	.2%	.3%
Harris EDA	8.9	.8	5.4	34	.7%	.1%	1.3%	.1%
Zycad	8.0	4.4	1.2	56	.7%	.8%	.3%	.2%
Hitachi	7.1	3.3	3.1	319	.6%	.6%	.7%	.9%
Intergraph	6.5	2.0	2.1	75	.5%	.3%	.5%	.2%
Uchida Yoko	6.3	3.7	2.3	180	.5%	.7%	.5%	.5%
Sophia Systems*	5.7	1.2	3.9	59	.5%	.2%	.9%	.2%
CrossCheck Technology	5.7	.0	3.0	0	.5%	.0%	.7%	.0%
PADS Software	5.2	.0	4.6	0	.4%	.0%	1.1%	.0%
Logic Modeling Corp.	4.8	.0	4.2	0	.4%	.0%	1.0%	.0%
Cascade Design Automation	4.7	.0	3.6	0	.4%	.0%	.8%	.0%
Silvar-Lisco	4.6	.0	3.6	0	.4%	.0%	.8%	.0%
Sumisho Electronics*	4.5	3.2	1.2	95	.4%	.6%	.3%	.3%
Autodesk	4.2	.0	4.2	0	.4%	.0%	1.0%	.0%
Microsim	3.5	.0	3.2	0	.3%	.0%	.8%	.0%
Altera	2.9	.0	2.5	0	.2%	.0%	.6%	.0%
Meta-Software	2.8	.0	1.8	0	.2%	.0%	.4%	.0%
Century Research Center	2.3	1.2	.9	16	.2%	.2%	.2%	.0%
Apple Computer	2.2	2.2	.0	461	.2%	.4%	.0%	1.3%
Test Systems Strategies	2.2	.0	2.0	0	.2%	.0%	.5%	.0%

(Continued)

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Table 14 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Electronic Design Automation
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
TSSI Japan	2.2	.0	1.6	0	.2%	.0%	.4%	.0%
LSI Logic	2.1	.2	1.6	4	.2%	.0%	.4%	.0%
Omron	2.0	1.0	.8	45	.2%	.2%	.2%	.1%
Contec Microelectronics	2.0	.0	1.8	0	.2%	.0%	.4%	.0%
Xilinx	1.9	.0	1.7	0	.2%	.0%	.4%	.0%
Data I/O	1.8	.0	1.8	0	.1%	.0%	.4%	.0%
Analogy	1.7	.0	1.3	0	.1%	.0%	.3%	.0%
Ascent Logic Corp	1.6	.0	1.3	0	.1%	.0%	.3%	.0%
Ikos Systems	1.5	1.1	.4	18	.1%	.2%	.1%	.1%
TECHSPERT	1.3	.2	1.1	11	.1%	.0%	.2%	.0%
Compact Software	1.2	.0	.9	0	.1%	.0%	.2%	.0%
Teradyne	1.1	.2	.8	3	.1%	.0%	.2%	.0%
BETRONEX	1.1	.1	1.0	20	.1%	.0%	.2%	.1%
Andor	1.0	.2	.8	19	.1%	.0%	.2%	.1%
Other Companies	.0	.0	.0	4,594	.0%	.0%	.0%	13.2%
All Companies	1,198.8	557.2	429.4	34,838	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	738.8	345.5	245.5	23,442	61.6%	62.0%	57.2%	67.3%
All Asian-Based Companies	441.1	209.2	175.3	11,296	36.8%	37.5%	40.8%	32.4%
All European-Based Companies	19.0	2.5	8.7	101	1.6%	.4%	2.0%	.3%
All Hardware Companies	429.1	358.3	.7	24,347	35.8%	64.3%	.2%	69.9%
All Turnkey & SW Companies	769.7	198.9	428.7	10,492	64.2%	35.7%	99.8%	30.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 15
1993 CAD/CAM/CAE/GIS Market Share

Application: Electronic CAE
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	110.1	87.5	.0	4,772	19.2%	31.9%	.0%	24.6%
NEC	52.4	34.2	13.5	3,324	9.1%	12.5%	6.9%	17.1%
Cadence	49.6	.0	43.6	0	8.6%	.0%	22.4%	.0%
Digital	44.1	33.4	1.3	953	7.7%	12.2%	.7%	4.9%
Hewlett-Packard	40.8	32.6	1.8	1,757	7.1%	11.9%	.9%	9.1%
Fujitsu	36.7	20.2	11.8	848	6.4%	7.4%	6.0%	4.4%
Mentor Graphics	34.3	3.7	15.2	123	6.0%	1.3%	7.8%	.6%
Seiko*	32.0	11.2	16.0	188	5.6%	4.1%	8.2%	1.0%
Synopsys	30.2	.0	21.1	0	5.3%	.0%	10.8%	.0%
Marubeni Hytech*	27.6	3.7	23.5	131	4.8%	1.4%	12.1%	.7%
Zuken	25.3	7.3	12.1	144	4.4%	2.7%	6.2%	.7%
Wacom	18.9	3.8	13.1	641	3.3%	1.4%	6.7%	3.3%
Sony	11.2	11.2	.0	557	2.0%	4.1%	.0%	2.9%
Viewlogic Systems	11.2	.0	8.3	0	1.9%	.0%	4.2%	.0%
Quickturn Design Systems	9.5	8.7	.7	116	1.7%	3.2%	.3%	.6%
C. Itoh Techno-Science*	9.4	2.9	5.7	178	1.6%	1.1%	2.9%	.9%
Zycad	8.0	4.4	1.2	56	1.4%	1.6%	.6%	.3%
IBM	6.0	6.0	.0	1,601	1.0%	2.2%	.0%	8.2%
COMPASS Design Automation	5.8	.0	4.6	3	1.0%	.0%	2.3%	.0%
CrossCheck Technology	5.7	.0	3.0	0	1.0%	.0%	1.5%	.0%
Logic Modeling Corp.	4.8	.0	4.2	0	.8%	.0%	2.1%	.0%

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Table 15 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Electronic CAE
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sophia Systems*	4.6	1.0	3.1	49	.8%	.4%	1.6%	.3%
Racal-Redac	4.3	.6	1.7	20	.7%	.2%	.9%	.1%
Harris EDA	3.7	.4	2.3	17	.6%	.1%	1.2%	.1%
Autodesk	3.5	.0	3.5	0	.6%	.0%	1.8%	.0%
Microsim	3.5	.0	3.2	0	.6%	.0%	1.7%	.0%
Intergraph	2.9	.9	.9	33	.5%	.3%	.5%	.2%
Altera	2.9	.0	2.5	0	.5%	.0%	1.3%	.0%
Meta-Software	2.8	.0	1.8	0	.5%	.0%	.9%	.0%
Test Systems Strategies	2.2	.0	2.0	0	.4%	.0%	1.0%	.0%
Contec Microelectronics	2.0	.0	1.8	0	.3%	.0%	.9%	.0%
Apple Computer	1.9	1.9	.0	402	.3%	.7%	.0%	2.1%
LSI Logic	1.9	.1	1.5	4	.3%	.1%	.8%	.0%
Xilinx	1.9	.0	1.7	0	.3%	.0%	.9%	.0%
Data I/O	1.8	.0	1.8	0	.3%	.0%	.9%	.0%
Analogy	1.7	.0	1.3	0	.3%	.0%	.7%	.0%
Ascent Logic Corp	1.6	.0	1.3	0	.3%	.0%	.7%	.0%
Ikos Systems	1.5	1.1	.4	18	.3%	.4%	.2%	.1%
PADS Software	1.4	.0	1.3	0	.2%	.0%	.6%	.0%
Century Research Center	1.3	.7	.5	9	.2%	.2%	.2%	.0%
Teradyne	1.1	.2	.8	3	.2%	.1%	.4%	.0%

(Continued)

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Table 15 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: Electronic CAE
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cascade Design Automation	1.1	.0	.9	0	.2%	.0%	.4%	.0%
Other Companies	.0	.0	.0	3,461	.0%	.0%	.0%	17.8%
All Companies	574.0	274.3	195.0	19,409	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	423.1	196.4	141.4	13,866	73.7%	71.6%	72.5%	71.4%
All Asian-Based Companies	145.7	77.3	51.0	5,523	25.4%	28.2%	26.2%	28.5%
All European-Based Companies	5.2	.6	2.6	21	.9%	.2%	1.3%	.1%
All Hardware Companies	240.7	202.5	.7	14,285	41.9%	73.8%	.3%	73.6%
All Turnkey & SW Companies	333.3	71.8	194.3	5,124	58.1%	26.2%	99.7%	26.4%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Table 16
1993 CAD/CAM/CAE/GIS Market Share

Application: IC Layout
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	59.8	47.4	.0	2,637	27.6%	53.0%	.0%	64.2%
Cadence	53.9	.0	47.5	0	24.9%	.0%	54.9%	.0%
Seiko*	26.7	9.4	13.4	159	12.3%	10.5%	15.4%	3.9%
Digital	19.4	15.1	.0	273	8.9%	16.9%	.0%	6.6%
Fujitsu	15.7	9.2	4.7	512	7.2%	10.2%	5.5%	12.5%
Mentor Graphics	14.3	1.5	6.3	51	6.6%	1.7%	7.3%	1.3%
OKURA*	10.8	.0	10.8	0	5.0%	.0%	12.5%	.0%
Silvar-Lisco	4.6	.0	3.6	0	2.1%	.0%	4.2%	.0%
NEC	4.0	2.5	1.2	114	1.9%	2.8%	1.4%	2.8%
COMPASS Design Automation	3.9	.0	3.1	4	1.8%	.0%	3.5%	.1%
Cascade Design Automation	3.6	.0	2.7	0	1.6%	.0%	3.2%	.0%
Intergraph	2.7	.8	.9	31	1.3%	.9%	1.0%	.8%
TSSI Japan	2.2	.0	1.6	0	1.0%	.0%	1.9%	.0%
Hewlett-Packard	1.9	1.6	.0	79	.9%	1.8%	.0%	1.9%
Marubeni Hytech*	1.4	.3	1.2	9	.7%	.3%	1.3%	.2%
Other Companies	.0	1.3	.0	220	.0%	1.4%	.0%	5.4%
All Companies	216.6	89.4	86.5	4,109	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	167.6	68.0	65.6	3,305	77.4%	76.0%	75.9%	80.4%
All Asian-Based Companies	49.0	21.4	20.9	805	22.6%	24.0%	24.1%	19.6%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	86.9	69.9	.0	3,501	40.1%	78.2%	.0%	85.2%
All Turnkey & SW Companies	129.7	19.5	86.5	609	59.9%	21.8%	100.0%	14.8%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

Table 17
1993 CAD/CAM/CAE/GIS Market Share

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Zuken	69.7	20.1	33.3	396	17.1%	10.4%	22.5%	3.5%
Sun Microsystems	49.3	39.1	.0	2,172	12.1%	20.2%	.0%	19.2%
Fujitsu	41.9	21.9	14.4	887	10.3%	11.3%	9.7%	7.8%
Yokogawa Digital Computer	30.9	12.3	15.4	285	7.6%	6.4%	10.4%	2.5%
CADIX	29.0	12.5	14.2	160	7.1%	6.5%	9.6%	1.4%
NEC	28.2	18.8	6.9	2,188	6.9%	9.7%	4.7%	19.3%
Cadence	16.7	.0	14.7	0	4.1%	.0%	9.9%	.0%
Digital	15.9	11.2	1.3	327	3.9%	5.8%	.9%	2.9%
IBM	15.8	5.9	8.2	749	3.9%	3.0%	5.6%	6.6%
Hewlett-Packard	14.7	12.5	.0	696	3.6%	6.5%	.0%	6.1%
Toshiba*	14.4	7.2	5.8	160	3.5%	3.7%	3.9%	1.4%
Mentor Graphics	12.9	1.4	5.7	46	3.2%	.7%	3.8%	.4%
Racal-Redac	12.7	1.8	5.1	60	3.1%	.9%	3.4%	.5%
Altium*	10.8	3.2	7.3	1,050	2.6%	1.6%	4.9%	9.3%
Sharp*	10.7	5.2	5.6	97	2.6%	2.7%	3.8%	.9%
Hitachi	7.1	3.3	3.1	319	1.7%	1.7%	2.1%	2.8%
Uchida Yoko	6.3	3.7	2.3	180	1.5%	1.9%	1.6%	1.6%
C. Itoh Techno-Science*	5.8	1.8	3.6	111	1.4%	.9%	2.4%	1.0%
Harris EDA	5.2	.4	3.1	17	1.3%	.2%	2.1%	.2%
Sumisho Electronics*	4.5	3.2	1.2	95	1.1%	1.6%	.8%	.8%
Sony	3.9	3.9	.0	193	1.0%	2.0%	.0%	1.7%

(Continued)

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Table 17 (Continued)
1993 CAD/CAM/CAE/GIS Market Share

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
PADS Software	3.8	.0	3.3	0	.9%	.0%	2.3%	.0%
Omron	2.0	1.0	.8	45	.5%	.5%	.5%	.4%
TECHSPERT	1.3	.2	1.1	11	.3%	.1%	.7%	.1%
Sophia Systems*	1.1	.2	.8	10	.3%	.1%	.5%	.1%
BETRONEX	1.1	.1	1.0	20	.3%	.0%	.7%	.2%
Andor	1.0	.2	.8	19	.3%	.1%	.5%	.2%
Century Research Center	1.0	.5	.4	7	.3%	.3%	.3%	.1%
Other Companies	.0	1.1	.0	914	.0%	.6%	.0%	8.1%
All Companies	408.2	193.5	147.9	11,320	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	148.0	81.2	38.4	6,271	36.3%	41.9%	26.0%	55.4%
All Asian-Based Companies	246.4	110.5	103.4	4,969	60.4%	57.1%	69.9%	43.9%
All European-Based Companies	13.8	1.9	6.1	80	3.4%	1.0%	4.1%	.7%
All Hardware Companies	101.5	85.9	.0	6,561	24.9%	44.4%	.0%	58.0%
All Turnkey & SW Companies	306.8	107.6	147.9	4,759	75.1%	55.6%	100.0%	42.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.

Source: Dataquest (February 1994)

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Chapter 1
Report Overview

This report presents the results of Dataquest's research in the 1993 Asian CAD/CAM/CAE/GIS market and provides a comprehensive market analysis. The Asian market, under Dataquest's definition, comprises Japan, Singapore, Taiwan, Korea, China, and Hong Kong. The report is organized as follows:

- Executive Summary—An overview of the major findings of the report is presented.
- Trends Analysis—The major trends and issues driving the market are defined, discussed, and analyzed.
- Market Analysis—Methodology and definitions are presented, and the market results of 1993 are analyzed by region and application.
- Appendix A—Market statistics tables from Dataquest are provided that support the text in the document.

Methodology

Market and trends analyses are based upon many years of industry experience in the CAD/CAM/CAE/GIS group. We use the results of primary research to define, measure, and estimate the significant parameters of the market. Vendor and end user-based surveys are conducted to gain further insight into significant market dynamics. Firsthand discussions with end users, investors, and vendors are used to verify assumptions and to check analysis results.

Project Analyst: Tamio Fukuda

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Chapter 2
Executive Summary

The Asian CAD/CAM/CAE/GIS market size was $4,875 million in 1993. It represents 30 percent of the worldwide CAD/CAM/CAE/GIS market, which Dataquest divides into the following segments: North America, Asia, Europe, and Rest of World.

Trends Analysis

Dataquest has observed the following major trends and issues in the Asian market:

- Economy—The general recessionary climate throughout much of Asia during 1993 depressed capital investment in all the major Asian industries.
- End-user industries—The major Asian end-user industries are undergoing significant changes that will affect CAD/CAM/CAE/GIS sales into the various industries in one way or another.
- Dollar exchange rates—Many Asian currencies became stronger and strengthened their exchange rates against the U.S. dollar in 1993.

Market Analysis

Market highlights are as follows:

- Overall, the Asian CAD/CAM/CAE/GIS market grew 7 percent in 1993, reaching $4,875 million in total factory revenue.
- The software segment grew 13 percent, reaching $1,534 million.
- The hardware segment increased 2 percent, reaching $2,591 million.
- Shipments from North America-based vendors accounted for 41.5 percent of the overall Asian CAD/CAM/CAE/GIS revenue, while those from Asian vendors made up 56.5 percent. Most major products are sold by U.S. vendors.
- The largest regional market in 1993 was Japan, with $4,439 million in revenue, representing 91 percent of the total Asian CAD/CAM/CAE/GIS market.
- The largest application sector in Asia is the mechanical segment, which has 54 percent of the total Asian CAD/CAM/CAE/GIS market.
- The fastest growing software segment in 1993 was AEC, with 25 percent growth.

Table 2-1 shows Asian revenue distribution by region, and Figure 2-1 shows the change in Asian revenue distribution by application and hardware platform.

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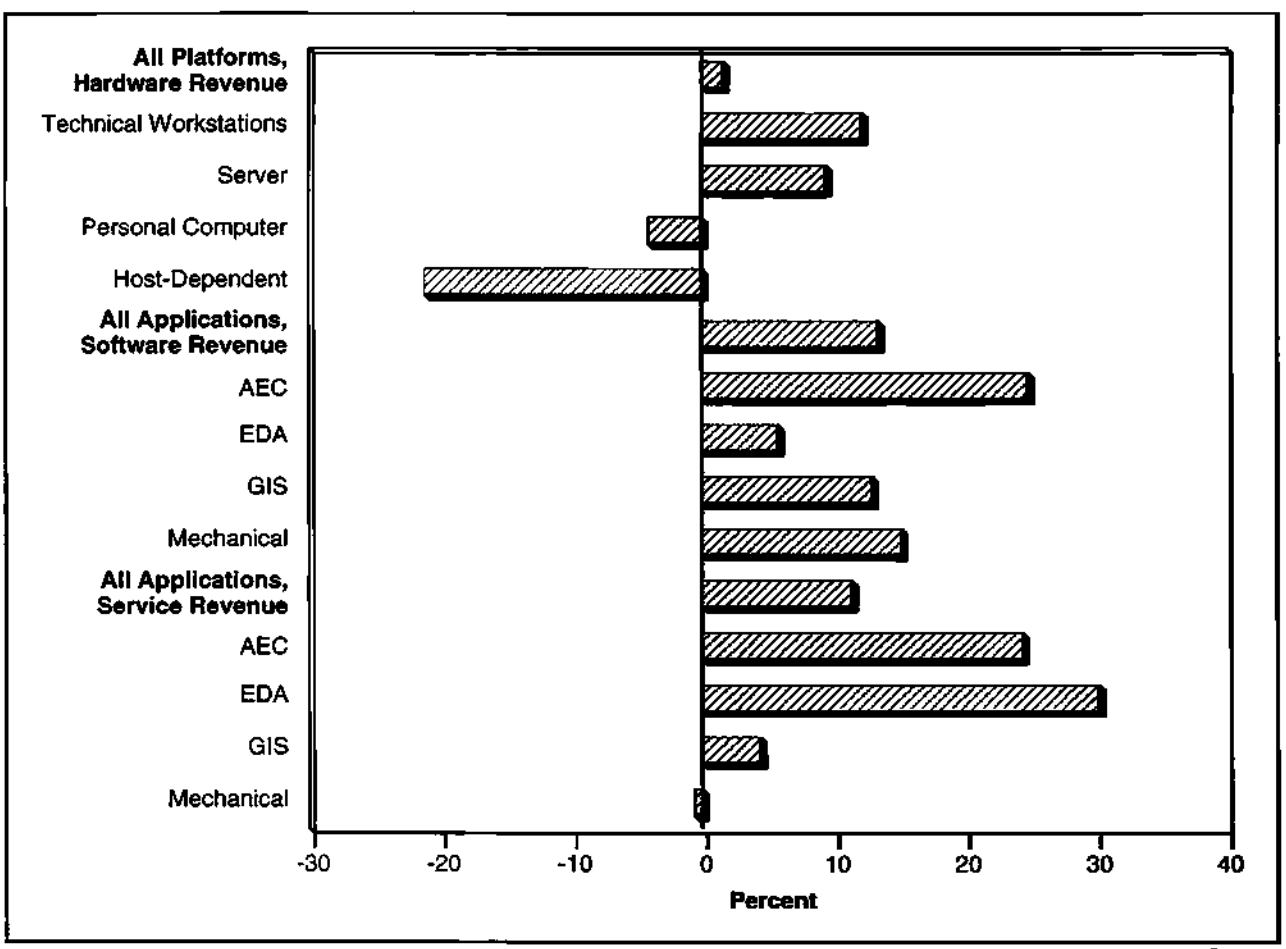
Table 2-1
1993 Asian CAD/CAM/CAE/GIS Revenue Distribution by Region

Country	1993 Total Factory Revenue ($M)	1993 Share of Asian Market (%)	1992 Total Factory Revenue ($M)	1992 Share of Asian Market (%)
China	76	1.6	42	0.9
Hong Kong	49	1.0	39	0.9
Japan	4,439	91.1	4,318	94.3
Korea	151	3.1	78	1.7
Singapore	70	1.4	52	1.1
Taiwan	89	1.8	48	1.0
Total	4,875	100.0	4,577	100.0

Note: Columns may not add up to totals shown because of rounding.
Source: Dataquest (December 1994)

Figure 2-1
Percentage Change in Asian CAD/CAM/CAE/GIS Revenue Distribution by Application and Platform, 1992-1993



Source: Dataquest (December 1994)

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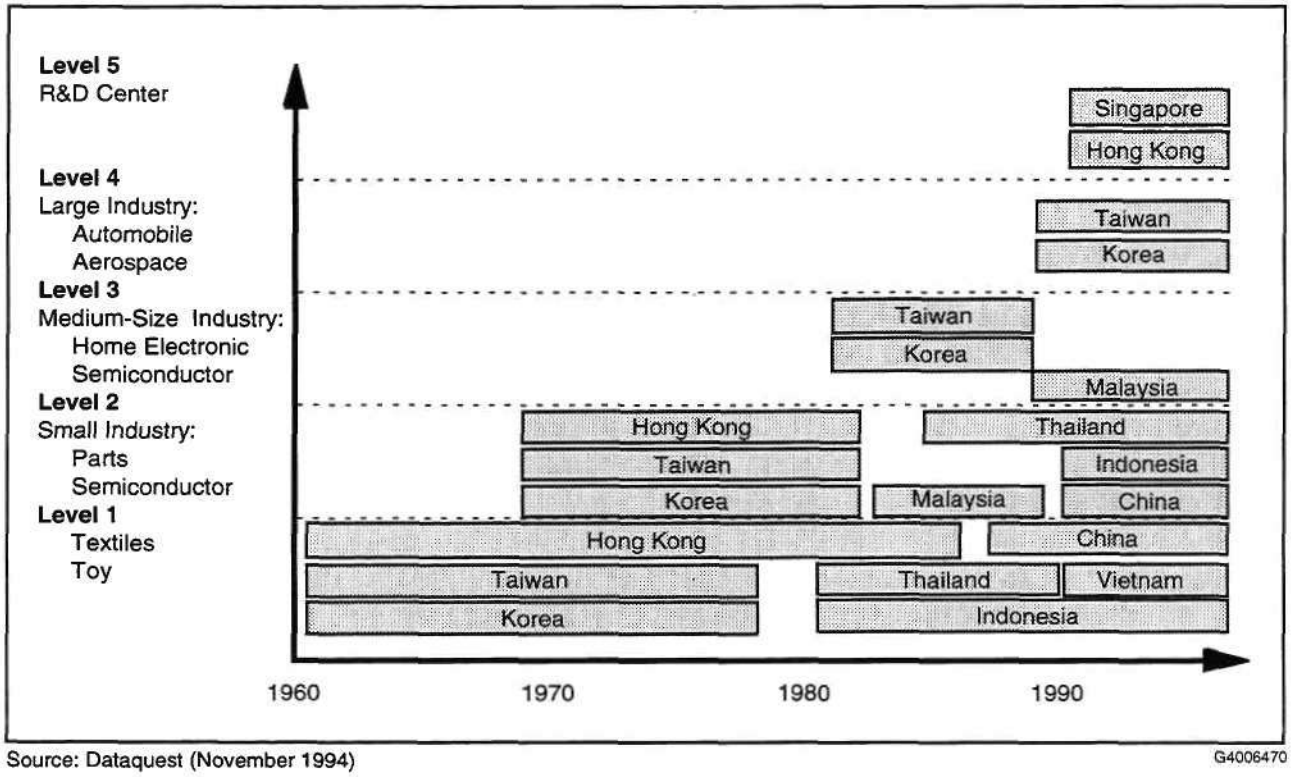
Chapter 3
Economics of the Asian Region

In the 1980s, trade grew in the Asian region, accompanied by high growth in the newly industrialized economies (NIEs) and the Association of Southeast Asian Nations (ASEAN). It is believed that the comparative advantages of the Asian region changed significantly in the latter half of the 1980s. The major factors that contributed to this were the rise of labor costs in Japan and the NIEs caused by exchange rate adjustments and the tighter labor supply-demand relationship; progress in the international division of labor through stepped-up direct foreign investment; and full-scale efforts by ASEAN to promote export-oriented industrialization. Figure 3-1 shows the strategy of Japanese businesses from the 1960s to the 1990s.

Dollar Exchange Rate and Country Statistics

Since 1990, the Japanese yen and the Singaporean dollar have been appreciating against the U.S. dollar (see Table 3-1). But the value of the Chinese renminbi decreased 49 percent against the U.S. dollar. As a result, the cost of labor in China is very inexpensive. At most Chinese construction sites, labor is about U.S.$2 per day. Therefore, enterprises throughout the world are interested in the Chinese market.

Figure 3-1
Japanese Enterprises' Strategy History in Asia



Source: Dataquest (November 1994)

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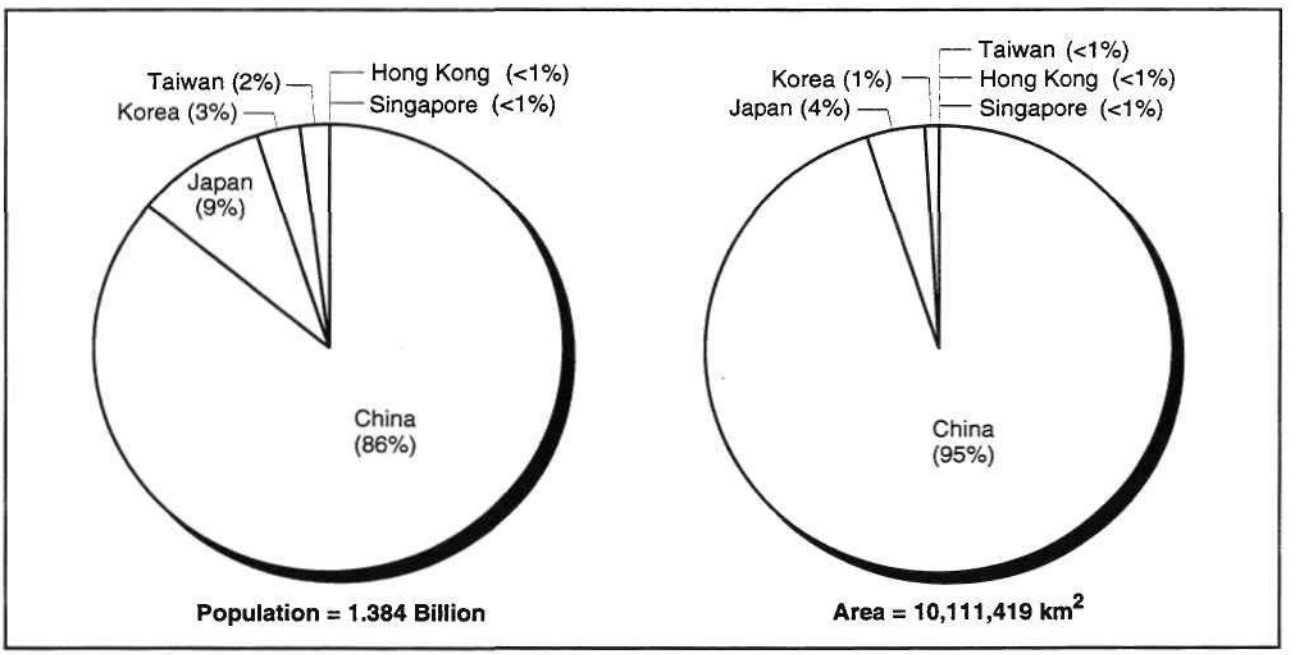
Statistics of the Asian countries are shown in Table 3-2. Figure 3-2 shows the population and geographic area distribution of the countries that make up the Asian region. China comprises 95 percent of Asian geographic area and makes up 86 percent of the Asian population.

Figure 3-2
Population and Area Distribution of Asia



Source: Dataquest (December 1994) G4006471

Table 3-1
Exchange Rates by Region

		Actual				Current	Current	Year-to-Year Change (%)				
		1990	1991	1992	1993	1994	1995-1998	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995
European Community	ECU	NA	0.8079	0.7686	0.8566	0.8561	0.8419	-	-5	11	0	-2
France	Franc	5.4277	5.6183	5.2571	5.6641	5.6343	5.5346	4	-6	8	-1	-2
Germany	Mark	1.6111	1.6523	1.5513	1.6543	1.6485	1.6163	3	-6	7	0	-2
Italy	Lira	1195.03	1235.03	1220.85	1575.05	1610.71	1584.79	3	-1	29	2	-2
United Kingdom	Pound	0.5599	0.5658	0.5652	0.6665	0.6604	0.6549	1	0	18	-1	-1
China	Renminbi	4.7912	5.3340	5.5076	5.7580	8.5534	8.6895	11	3	5	49	2
Hong Kong	Dollar	7.7900	7.7712	7.7399	7.7351	7.7271	7.7280	0	0	0	0	0
Japan	Yen	144.05	134.59	126.34	110.85	103.08	101.56	-7	-6	-12	-7	-1
Korea	Won	242.70	730.67	782.41	799.42	806.49	805.80	201	7	2	1	0
Singapore	Dollar	1.8129	1.7277	1.6284	1.6155	1.5481	1.5300	-5	-6	-1	-4	-1
Taiwan	Dollar	26.64	26.49	24.93	26.15	26.77	26.98	-1	-6	5	2	1

NA = Not applicable
Source: Dataquest (December 1994)

Table 3-2
Asian Statistics

	Year	China	Hong Kong	Japan	Korea	Singapore	Taiwan	Malaysia	Philippines	Indonesia	Thailand
Population (M)	1993	1,185	6	125	44	3	21	19	64	191	58
Area (km^2)		9,596,961	1,076	377,727	99,016	639	36,000	329,749	300,000	1,948,732	513,115
Per Capita GDP (U.S.$)	1993	463	14,600	19,800	6,500	16,500	10,000	2,960	860	680	1,800
Real GDP Growth Rate (%)	1993	12.8	5.9	1.5	5.0	5.8	6.7	8.0	0.6	6.0	7.0

Source: Diamond Weekly and Jetro Ace Database

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Chapter 4
Market Analysis

Methodology

Every year the Dataquest CAD/CAM/CAE/GIS group conducts two vendor surveys to define the market performance for the previous year. In the fourth quarter, the process begins with direct contact of more than 400 vendors worldwide (see Figure 4-1). This information contributes to the preliminary market share analysis published in February of each year. Additional surveys are completed during the first and second quarters that refine and update the earlier analysis. This refinement results in a market share update publication in July. The information described resides in a multidimensional database with the following information:

- Over 300 companies
- 4 major applications
- 94 subapplications
- 27 operating systems
- 18 countries/regions
- History from 1984

Definitions

Regions

The regions covered in the database are defined as follows:

- North America—The United States and Canada
- Europe—Benelux (Belgium, Luxembourg, and the Netherlands), France, Germany, Italy, Scandinavia (Denmark, Finland, Norway, and Sweden), Spain, the United Kingdom, and the rest of Europe
- Asia—Japan, Singapore, Taiwan, Korea, China, and Hong Kong
- Rest of World—All other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East including Israel

Applications

Applications covered in our surveys are as follows:

- Mechanical—This segment includes computer-aided applications used to design, analyze, document, and manufacture discrete parts, components, and assemblies.
- AEC—This segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people

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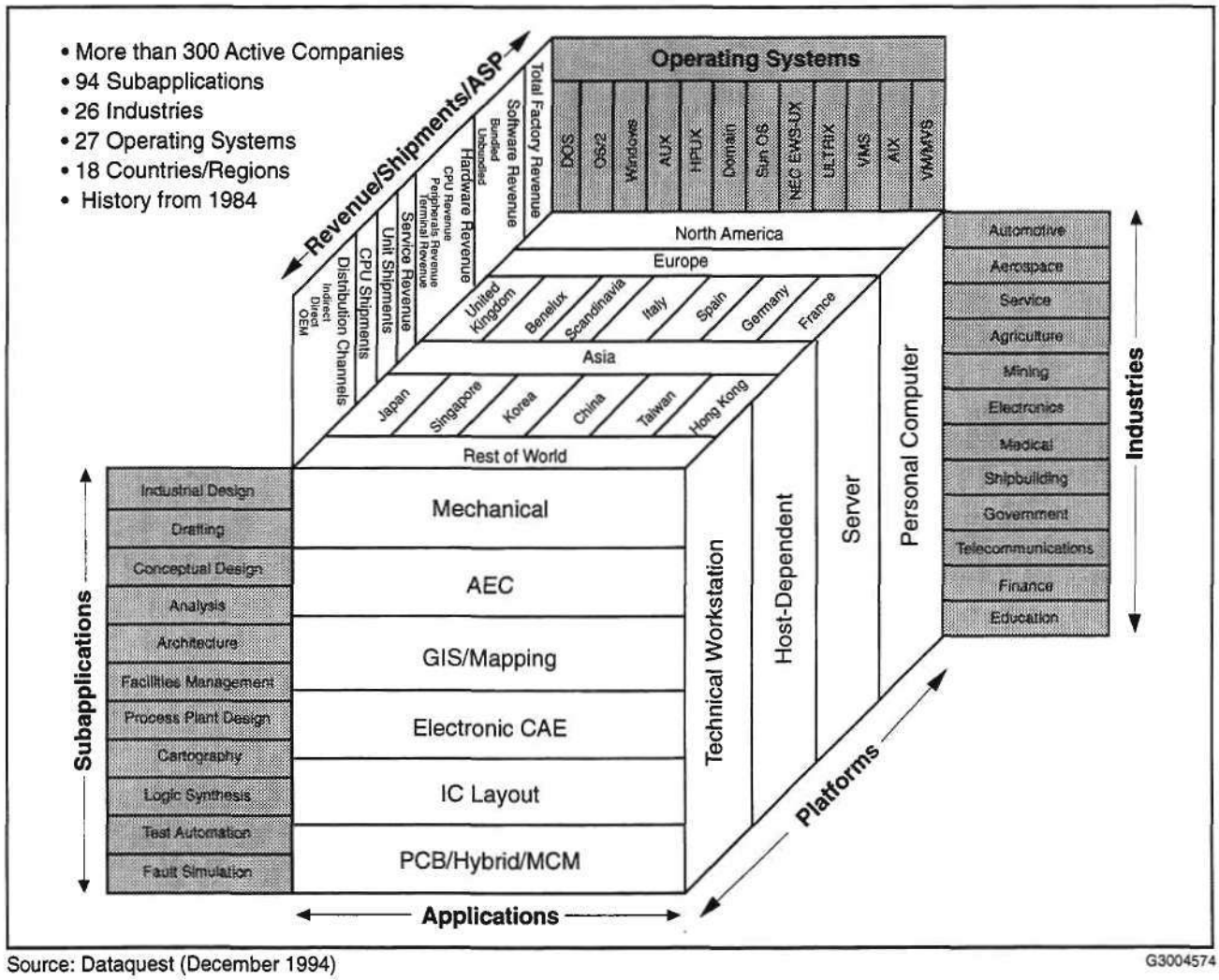
Figure 4-1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (December 1994) G3004574

associated with these disciplines to aid designing and managing buildings, industrial plants, ships, and other types of discrete entities.

- Geographic information system (GIS)—This computer-based technology includes hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.
- Electronic design automation (EDA)—This segment covers computer-based tools used to automate the process of designing an electronic product including the applications of electronic CAE, integrated circuit layout, and printed circuit board (PCB)/hybrid/multichip module (MCM) design.

Computing Platforms

The computing platforms used for CAD/CAM/CAE/GIS include everything from notebook to supercomputers. The Dataquest CAD/CAM/CAE/GIS database uses four platform designations—technical

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workstations, host-dependent systems, servers, and personal computers—to track the market as follows:

- Technical workstations operate as a single-user computer with a large range of performance options. These include a virtual multitasking operating system (UNIX, VMS, and DOMAIN) and built-in functions for networking and high-performance graphics.
- Host-dependent systems consist of a shared logic device with external workstations/terminals that are dependent on the host for operation.
- Servers can be used for a variety of services that operate transparently for the user. Typical functions of servers include file storage, database access, and computer capability.
- Personal computers are defined as single-user computers that have features similar to technical workstations but are optional rather than integrated by the manufacturer. Overall performance characteristics are generally positioned lower than those of a workstation.

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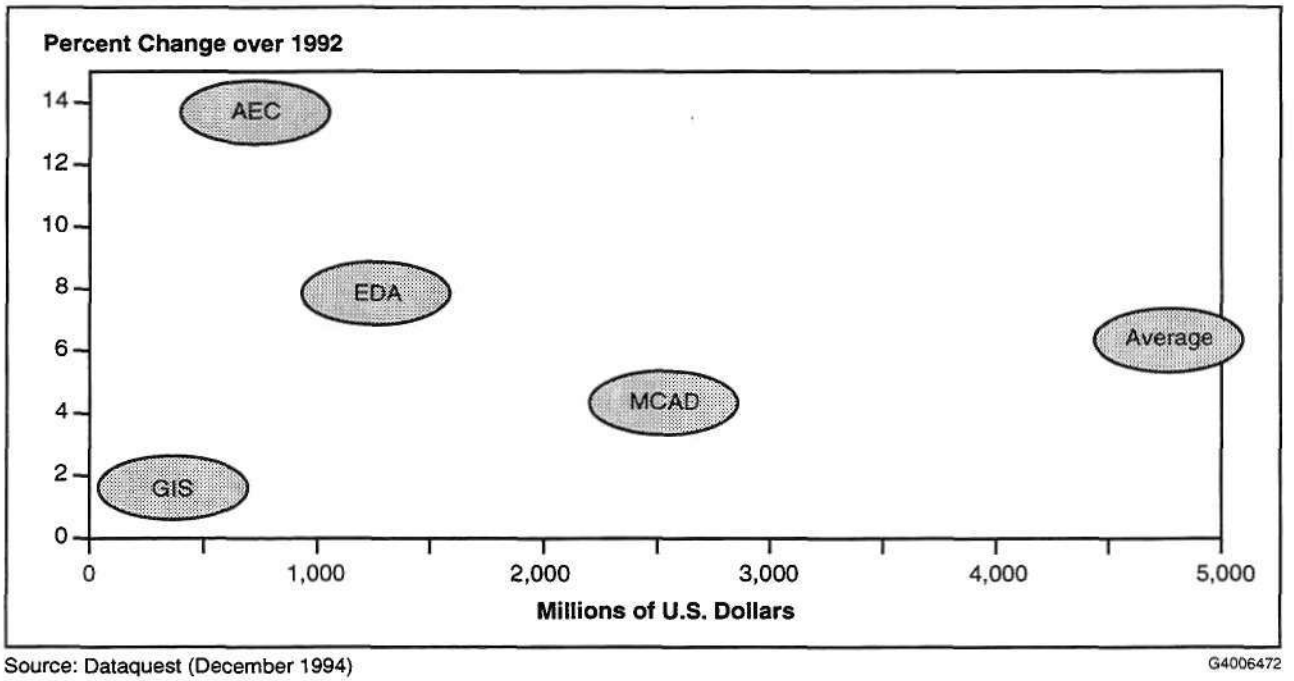
Chapter 5
The Asian CAD/CAM/CAE/GIS Market in Review

The Asian CAD/CAM/CAE/GIS market comprised 30 percent of the worldwide market in 1993. Overall, the market grew 7 percent in 1993, reaching $4,875 million in total factory revenue. The software segment grew 13 percent, reaching $1,534 million. The AEC software market and mechanical software market experienced the highest growth, with 25 and 15 percent growth, respectively, during 1993.

In certain situations, monetary conversions may play an important role in gauging the growth of a geographic region. In particular, the exchange rate in yen has had a noticeable impact on the Japanese CAD/CAD/CAE/GIS market. In U.S. dollars, the Japanese CAD/CAM/CAE/GIS market decreased 2.8 percent. However, the Dataquest conversion factor for yen changed from ¥126.45 per U.S. dollar in 1992 to ¥110.85 per U.S. dollar in 1993. The effect of this change is that in yen, the Japanese CAD/CAM/CAE/GIS market decreased 9.8 percent. Figure 5-1 shows the 1993 Asia CAD/CAM/CAE/GIS market growth comparison by application based on the U.S. dollar. It is important to remember that the vast majority of Asian CAD/CAM/CAE revenue, 91 percent, was generated from Japan in 1993.

Figure 5-1
1993 Asia CAD/CAM/CAE/GIS Market Growth Comparison by Application



Source: Dataquest (December 1994)

G4006472

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Major Market Segments

The following set of tables, which appear in Appendix A, highlights leading vendors in the various Asian regions in terms of total revenue and software revenue:

- 1993 CAD/CAM/CAE/GIS Final Asia Market Share
- 1993 CAD/CAM/CAE/GIS Final Asia Market Share, Mechanical
- 1993 CAD/CAM/CAE/GIS Final Asia Market Share, AEC/GIS/Mapping
- 1993 CAD/CAM/CAE/GIS Final Asia Market Share, EDA
- 1993 CAD/CAM/CAE/GIS Final China Market Share, All Applications
- 1993 CAD/CAM/CAE/GIS Final Hong Kong Market Share, All Applications
- 1993 CAD/CAM/CAE/GIS Final Japan Market Share, All Applications
- 1993 CAD/CAM/CAE/GIS Final Korea Market Share, All Applications
- 1993 CAD/CAM/CAE/GIS Final Singapore Market Share, All Applications
- 1993 CAD/CAM/CAE/GIS Final Taiwan Market Share, All Applications

Event Highlights of the 1994 Asian CAD/CAM/CAE/GIS Market by Application

During 1994, the U.S., Japanese, and European CAD vendors made advances into the Asian market. The development of a Chinese market for CAD is promising, and vendors are creating bases in Hong Kong, Taiwan, and Singapore. Even Vietnam and India are being targeted for new markets.

In the following sections, we analyze the year's major events for the Asian CAD/CAM/CAE/GIS market by application.

Mechanical Industry

The automobile industry is a big user of CAD/CAM/CAE software in Japan. However, appreciation of the yen makes a Japanese car more expensive than an overseas car. Chrysler has taken advantage of this and placed a 2000 cc Neon car for $10,000 on the Japanese market. In 1994, many Japanese automobile enterprises began to advance overseas and formed technological and capital alliances with automobile companies in China and Korea. Not surprisingly, many of these overseas strategies are being helped by the Japanese mechanical CAD vendors. Local production of automobiles is also being examined. Figure 5-2 shows the top Japanese car vendors' revenue share in 1993.

Seiko began to sell U-Graph, the Japanese version of Unigraphics software from EDS, in Southeast Asia in October 1994.

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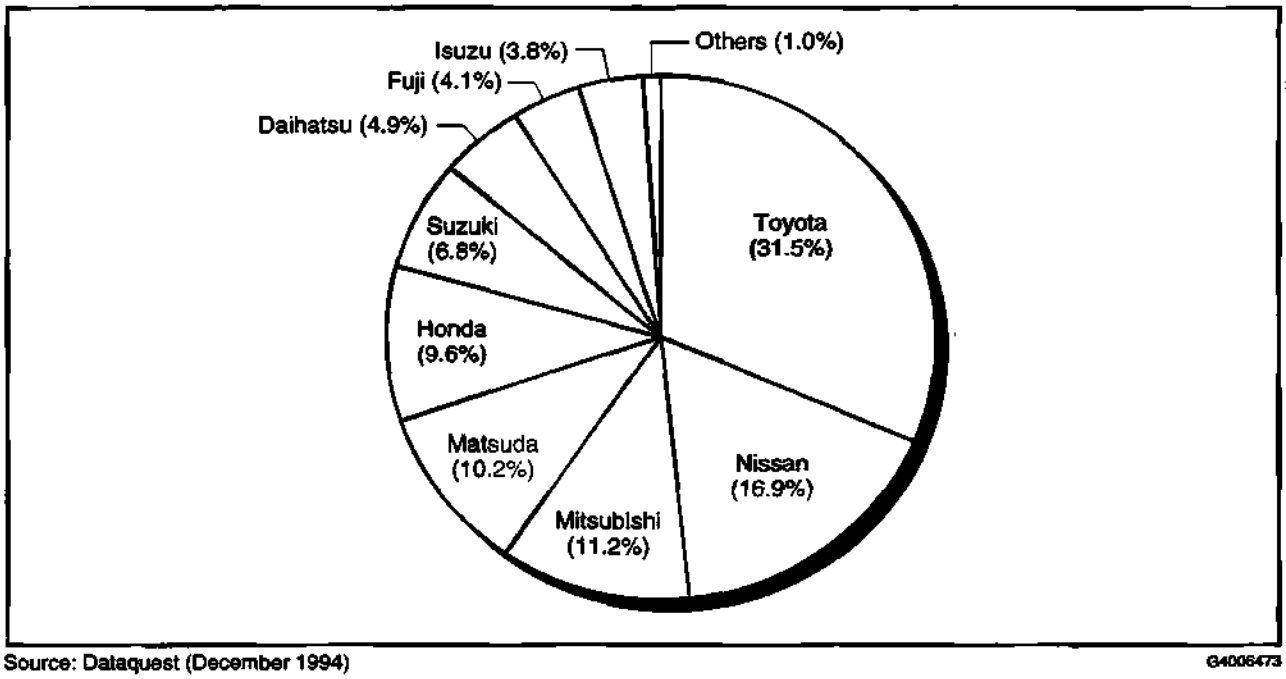
Figure 5-2
1993 Japanese Automobile Companies' Production Revenue Market Share



Source: Dataquest (December 1994) G4006473

C. Itoh Techno-Science began selling a workstation version of AdvanceCAD. Since 1988, AdvanceCAD has sold about 4,800 units. Sales to Taiwan began in 1994 (sales to South Korea will be examined in the future).

CADAM Systems has sold 150 seats of MicroCADAM since July 1992 to Korea, Taiwan, and east Asian countries.

Total sales of Toyota Caelum, which began shipping in June 1991, exceeded 1,000 systems in 1994. Customers of this product include 20 major companies, such as Nihon Unisys, Fujitsu, and IBM. Overseas, this system is being experimentally introduced to Ford Motor and General Motor, which has supplied to Toyota car parts worth ¥40 billion in 1994.

Nissan Motors began selling its proprietary CAD system in an effort to reach standardization of CAD data from the design and development side. Nissan is also aiming to reduce its own development costs.

To meet users' needs, IBM and Fujitsu are selling several CAD/CAM/CAE products. For instance, IBM is selling MicroCADAM and CADAM for mainframes from CADAM Systems and I-DEAS from SDRC. IBM sold more than 7,000 seats of mechanical CAD systems in 1993 in Asia.

To sell CADPAC Series to China, Design Automation has installed a sales base in Beijing.

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Table 5-1 lists the major events in the 1994 mechanical CAD/CAM/CAE market, and Table 5-2 shows the market share of the top software vendors for 1993.

AEC

Several buildings have been constructed on the coastal side of China. However, design activity in China involves some risk; so while some Japanese construction companies are establishing design offices in China, others are not.

The Hong Kong government has been involved in building a large airport and associated infrastructure for several years. This project concerns the island of Zhujiang Kou and the surrounding land reclamation. The first stage of the construction is scheduled to be completed in 1997. The infrastructure construction involves a railway and expressways that extend from the center of Hong Kong to this airport.

Many overseas design offices are aiming at the construction market in China. Therefore, architectural CAD/CAM/CAE systems should expand

Table 5-1
1994 Major Events of the Asian Mechanical Market

Company	Month	Event
Andor	August	Alliance with Olivetti
CADAM System	January	Purchased business rights to MicroCADAM from Altium
CADAM System	January	Solid modeling license contract from Ricoh
CADAM System	September	Began selling MicroCADAM in Southeast Asia
Computervision	April	Established CV Technology in China
C. Itoh Techno-Science	August	Began selling AdvanceCAD in Taiwan
C. Itoh Techno-Science	May	Began selling Unigraphics in Japan
Design Automation	May	Began selling CADPAC Series for Windows and Windows NT in China
Fujitsu	February	Delivered 70 sets of ICAD/MX to GM
Intergraph	July	Began selling Microstation for Hewlett-Packard workstations
Nihon Unisys	July	Began selling Caelum for Hewlett-Packard workstations
Nippon Steel	June	Began selling CADAM with Fujitsu
Nippon Steel	May	Sales alliance with Cadre Systems
Nisai	September	Became selling agent for E&S
Nissan	April	CAD-II delivered to Suzuki
Otsuka Syokai	September	Sales alliance with Matra Datavision
PTC	January	PTC expects employee count to increase 2.5 times
Ricoh	May	Alliance with Light Work Design for 3-D CAD technology
Seiko	October	Began selling 3-D CAD systems in Southeast Asia
Ricoh	May	Inauguration of the Designbase User Association

Source: Dataquest (December 1994)

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Table 5-2
1993 Top 10 Vendors of Mechanical Software in Asia

Vendor	1992 Revenue ($M)	1993 Revenue ($M)	Percent Change	1993 Market Share (%)
IBM	99.4	101.6	2.1	12.9
Fujitsu	46.9	67.4	43.8	8.6
Hitachi	54.8	61.8	12.7	7.8
NEC	50.4	58.4	15.8	7.4
SDRC	24.8	48.3	94.5	6.1
Toshiba (No OEM)	41.9	45.3	8.3	5.8
Nihon Unisys	38.0	44.5	17.0	5.7
Computervision	31.0	39.3	26.8	5.0
Autodesk	20.3	25.6	26.0	3.3
Sharp System Products (No OEM)	14.3	22.3	56.4	2.8
Total	683.4	786.8	15.1	100.0

Source: Dataquest (December 1994)

rapidly in the Asian region. The expansion will take place in the low-priced personal computer CAD market. Inexpensive CAD systems are used in a large part of construction enterprises in China.

Large engineering companies in Japan have begun moving nuclear power plant, oil refineries, and the design business of overseas plants such as fertilizer factories to Korea and Southeast Asian countries. The purpose of such moves is to maintain international competitiveness and to reduce design costs (which, in those foreign countries, run about one-fifth of the costs in Japan). As a result, architectural CAD systems have grown rapidly in Asian markets except for Japan.

In the 1990s, there has been a lot of corruption and bribery between construction companies and assemblymen in Japan. Despite this, Dataquest believes that the growth of the architectural CAD systems market in Japan will continue because of new interest in these systems. In October, the Japanese government announced plans to start a large-scale public project in civil engineering in the next 10 years.

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CAD Products

The following is a list of the main CAD products that the Japanese Personal Computer Software Society allows engineers to use in their engineering licensing tests:

- ANDES
- Archi-TREND
- AutoCAD
- CADACE
- CADKEY
- CADPAC
- CADSUPER
- CADWe'll
- Caelum
- CATR
- DensetuCAD
- Design CAD
- DRA-CAD
- EXPERT-CAD
- GMM
- JELLY
- K-CAD
- KING-CAD
- MELCAD
- MicroCADAM
- MICRO Caelum
- MiniCAD
- PC-CAD
- Phi-CAD
- PRICAD
- PROJECT
- YZ
- Zuno-CAD

So far, 11,825 engineers have passed this licensing examination to date, translating into a 26 percent passing rate. Table 5-3 shows the revenue of the top AEC software vendors in 1993.

GIS/Mapping

There has been an increasing need for automobile navigation systems in recent years in Japan. Zenrin has been processing digital map data for the residential quarter. In addition, many electric car makers have entered the car navigation market. The Ministry of Construction, Ministry of Post and Telecommunications, and the public police have established a group to implement a road traffic information system by 1996.

Table 5-3
1993 Top 10 Vendors of AEC Software in Asia

Vendor	1992 Revenue ($M)	1993 Revenue ($M)	Percent Change	1993 Market Share (%)
Fujitsu	35.4	47.3	33.4	21.9
Autodesk	21.9	27.6	26.1	12.8
NEC	13.4	15.6	15.8	7.2
IBM	13.5	13.4	-1.0	6.2
Kozo Keikaku Engineering	11.3	12.8	13.6	6.0
Nihon Unisys	6.2	11.6	87.7	5.4
CPU	7.1	9.6	35.8	4.5
Hitachi	7.3	7.9	8.1	3.7
Toshiba (No OEM)	7.2	7.8	8.4	3.6
Andor	8.2	7.4	-10.0	3.4
Total	173.0	215.5	24.6	100.0

Source: Dataquest (December 1994)

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Tokyo Gas began selling a facility control system for water heating management and gas heating management to local gas companies. The system is centered around a DEC computer, and 50 systems have been sold. Tokyo Gas said that this system is scheduled to be introduced to 260 companies by 1996.

System Box started producing a 3-D mapping system called MapKerne, and in July 1994 it began cooperating with Seiko and Canon to sell this product to a Japanese municipality. This system uses ObjectStore from U.S.-based Object Design. The development of this mapping system is being helped by the Information Processing Association. The standard system price will be about ¥30 million.

In January, NEC began selling to China a map information system called Mapview. Mapview has had sales of about 500 systems in Japan to date.

Meitec is entering China. Meitec has received about ¥100 million in orders in 1994 for its own map information system from the Beijing municipal fire department.

Because of the advances made in personal computing, pen computing, miniaturization of components, and communications, there have been plans for several new map information systems in Japan.

Table 5-4 shows the major events of the GIS market for 1994, and Table 5-5 shows the 1993 revenue of the top GIS vendors.

EDA

The trend in semiconductor chip manufacturing has been to make highly integrated chips. As MCMs are becoming popular, these highly integrated chips are being used in personal computers, especially desktop, laptop, notebook, subnotebook, and handheld computers. Technologies such as fine pattern, surface mount, and chip on board are being used to reduce the weight of PCBs. A PCB is a board equipped with electronic parts on a printed wiring board (PWB). A PCB comprises about 30 to 50 percent of the price of electronic equipment. Because of the increased need for small components with high functionality, the demand for PWB technology and surface-mount technology (SMT) is rising. Dataquest believes that an easy-to-use CAD system is needed for the development of SMT.

Table 5-6 outlines the major market events for the Asian EDA industry, and Table 5-7 shows the 1993 top 10 vendors for EDA in Asia.

The production revenue from PCBs in Japan is shown in Figure 5-3. PCB production revenue was ¥1.56 billion in 1992, and it dropped 7.5 percent to ¥1.44 billion in 1993. Part of this decrease is because of the increased value contained within a chip and the miniaturization of components on the board.

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Table 5-4
1994 Major Events in the Asian GIS Market

Company	Month	Event
Tokyo GAS	April	50 sets of GIS mapping systems delivered in Japan
Meitec	July	GIS orders from the Beijing fire department
System Box	July	Began selling MapKerne
NEC	January	Began selling Mapview in China
Zenrin	January	Alliance with Hitachi Soft for GIS sales
Mitsui Engineering	June	Began selling MapInfo version 3.0 for Japanese Windows

Source: Dataquest (December 1994)

Table 5-5
1993 Top 10 Vendors of GIS Software in Asia

Vendor	1992 Revenue ($M)	1993 Revenue ($M)	Percent Change	1993 Market Share (%)
Fujitsu	12.6	20.2	60.9	18.0
ESRI	7.5	10.9	45.5	9.7
Uchida Yoko	7.9	8.2	4.6	7.3
Hitachi	7.3	8.1	10.9	7.2
Landmark Graphics	5.3	7.1	34.3	6.3
Autodesk	5.6	7.0	25.9	6.3
Toshiba--NO OEM	6.0	6.5	8.2	5.7
GDS	5.8	6.2	7.4	5.5
Mitsubishi Electric	5.4	6.1	12.9	5.4
Intergraph	6.7	4.0	-39.7	3.6
Total	99.99	112.6	12.7	100.0

Source: Dataquest (December 1994)

Table 5-6
1994 Major Events in the Asian EDA Market

Company	Month	Event
MicroCraft	September	Began selling Max EDA software from Massteck
NEC	June	Alliance with Mentor Graphics for Obbligato sales
PADS	June	Rental service of PADSLOOK
Zuken	April	Announced new products: CR-5000 and PDM-5000
Zuken	June	Purchased Racal-Redac

Source: Dataquest (December 1994)

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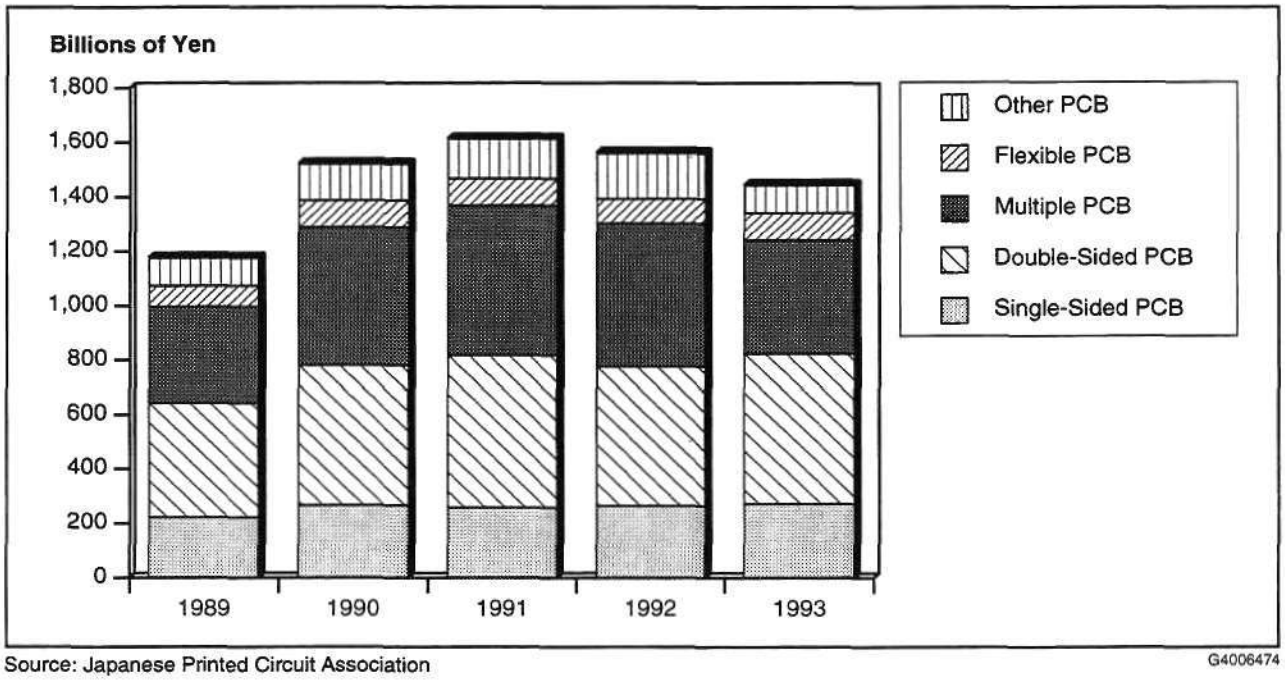
Table 5-7
1993 Top 10 Vendors of EDA Software in Asia

Vendor	1992 Revenue ($M)	1993 Revenue ($M)	Percent Change	1993 Market Share (%)
Cadence	94.9	71.9	-24.3	17.1
Zuken	45.3	45.4	0.2	10.8
Fujitsu	19.4	30.9	59.0	7.4
Mentor Graphics	31.8	28.7	-9.9	6.8
Synopsys	9.7	22.9	135.5	5.5
NEC	18.7	21.6	15.7	5.2
Yokogawa Digital Computer	11.9	15.4	30.0	3.7
CADIX	12.3	14.2	15.2	3.4
Seiko Instruments (No OEM)	17.3	13.4	-22.7	3.2
Wacom	23.3	13.1	-43.6	3.1
Total	396.3	419.5	5.9	100.0

Source: Dataquest (December 1994)

Figure 5-3
Japan's PCB Production Revenue History



Source: Japanese Printed Circuit Association

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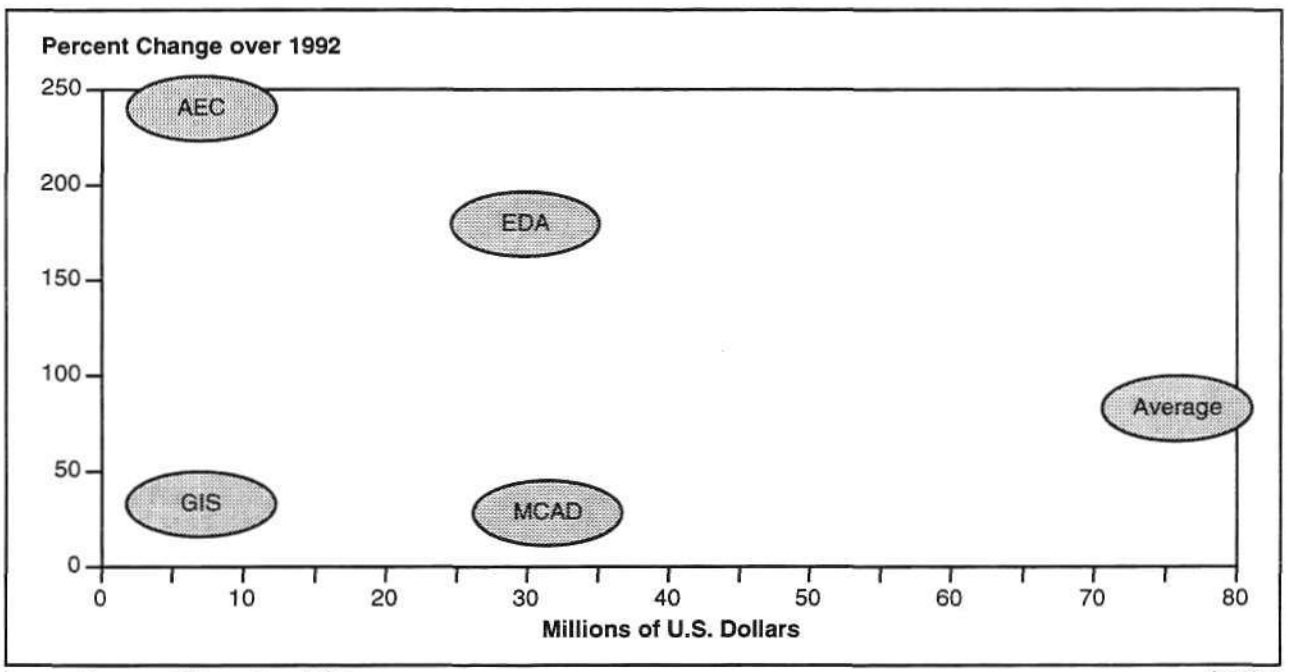
Asian CAD/CAM/CAE/GIS Market by Region

Figures 5-4 through 5-9 show the revenue of the various CAD/CAM/CAE/GIS applications by region for 1993.

Figure 5-4
China—1993 CAD/CAM/CAE/GIS Market Growth Comparison by Application



Source: Dataquest (December 1994)

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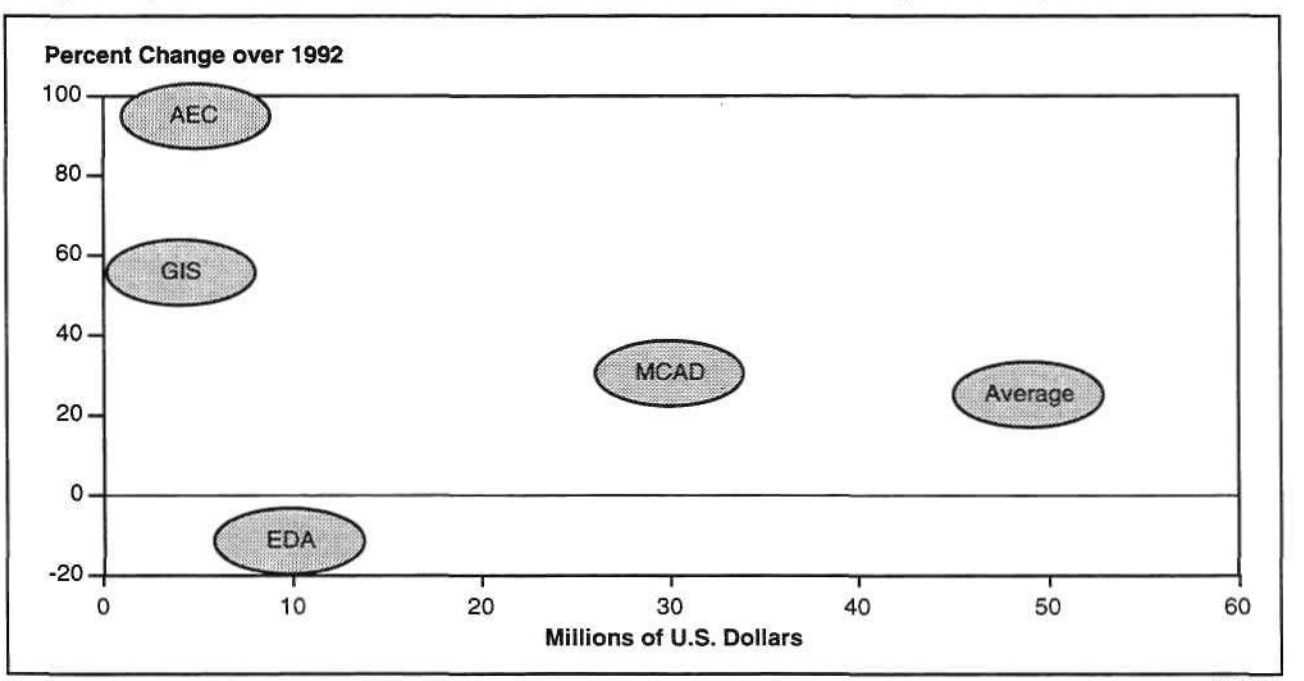
Figure 5-5
Hong Kong—1993 CAD/CAM/CAE/GIS Market Growth Comparison by Application



Source: Dataquest (December 1994)

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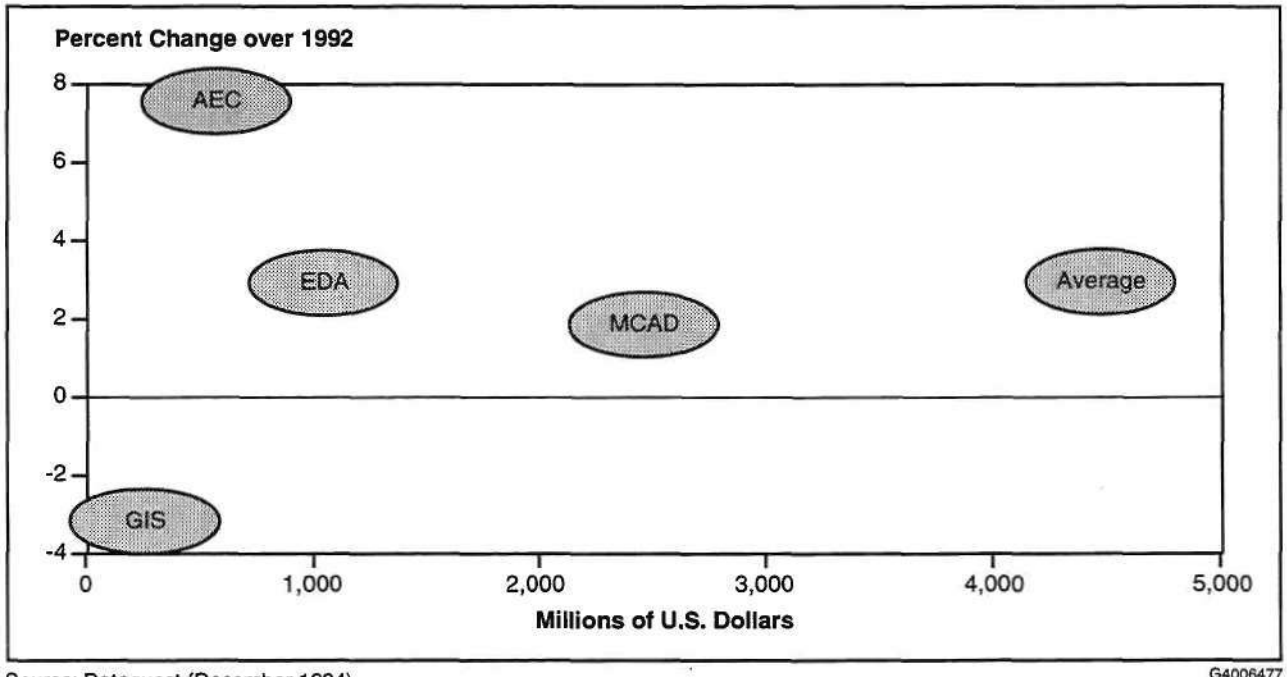
Figure 5-6
Japan—1993 CAD/CAM/CAE/GIS Market Growth Comparison by Application



Source: Dataquest (December 1994)

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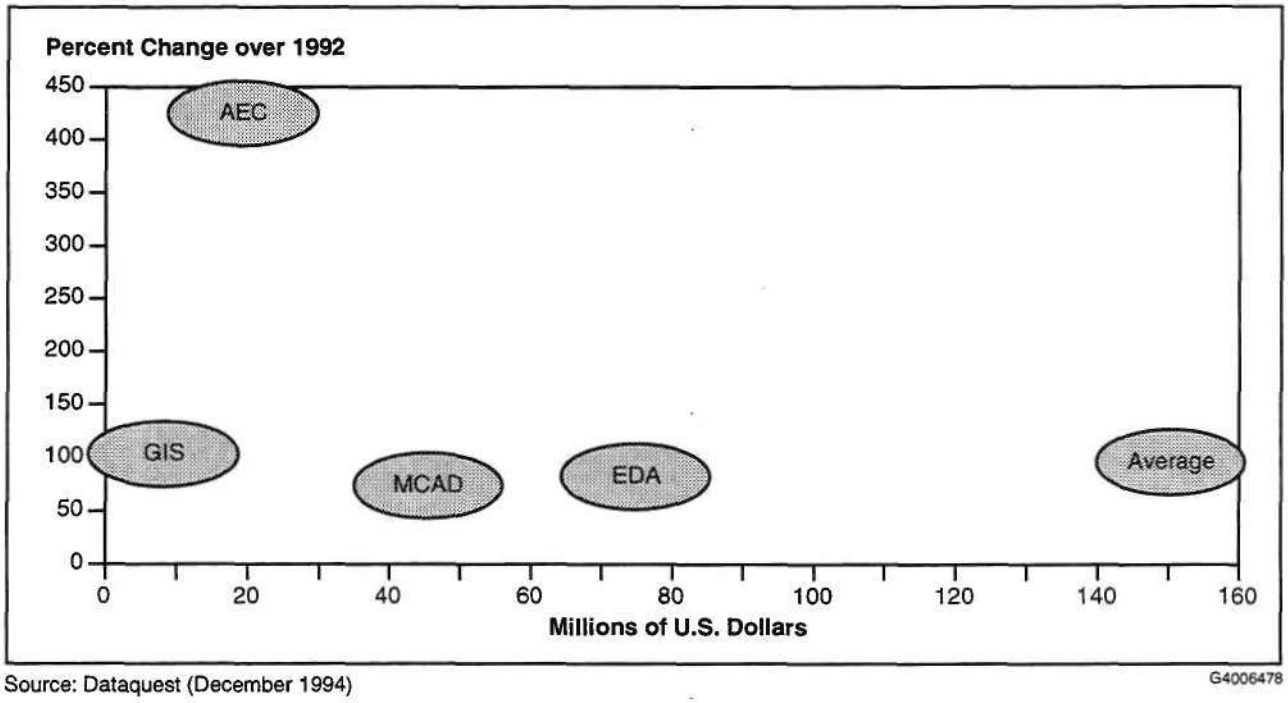
Figure 5-7
Korea—1993 CAD/CAM/CAE/GIS Market Growth Comparison by Application



Source: Dataquest (December 1994)

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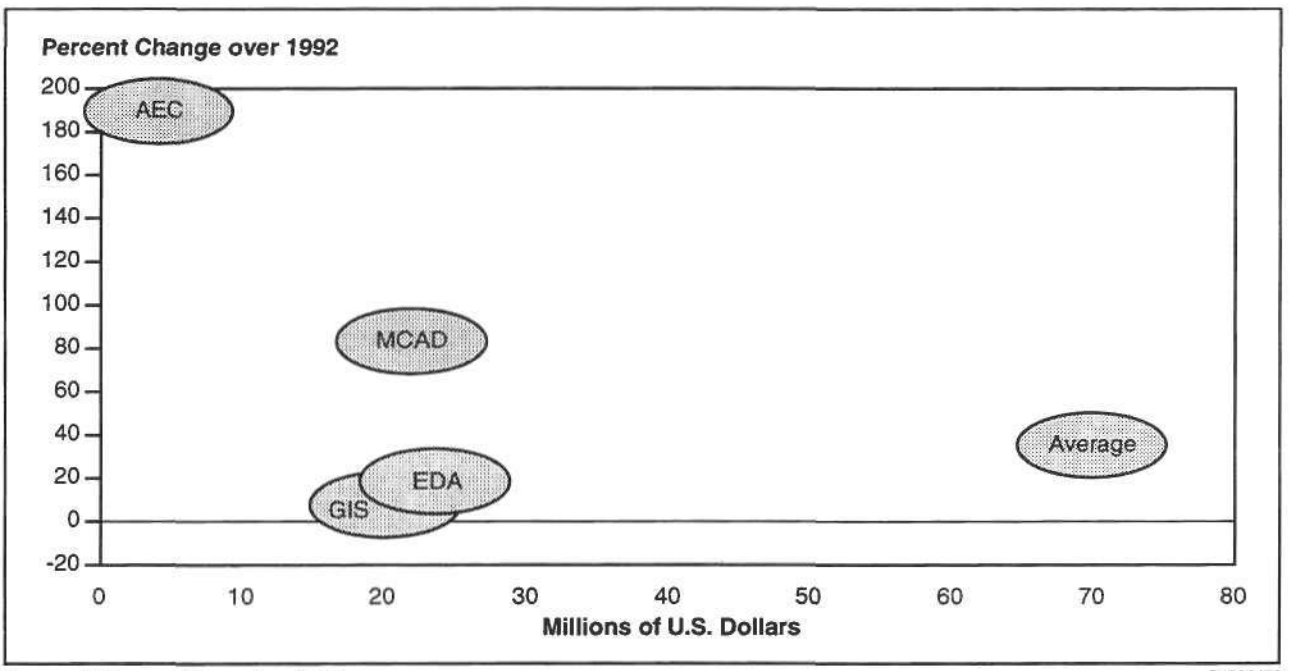
Figure 5-8
Singapore—1993 CAD/CAM/CAE/GIS Market Growth Comparison by Application



Source: Dataquest (December 1994)

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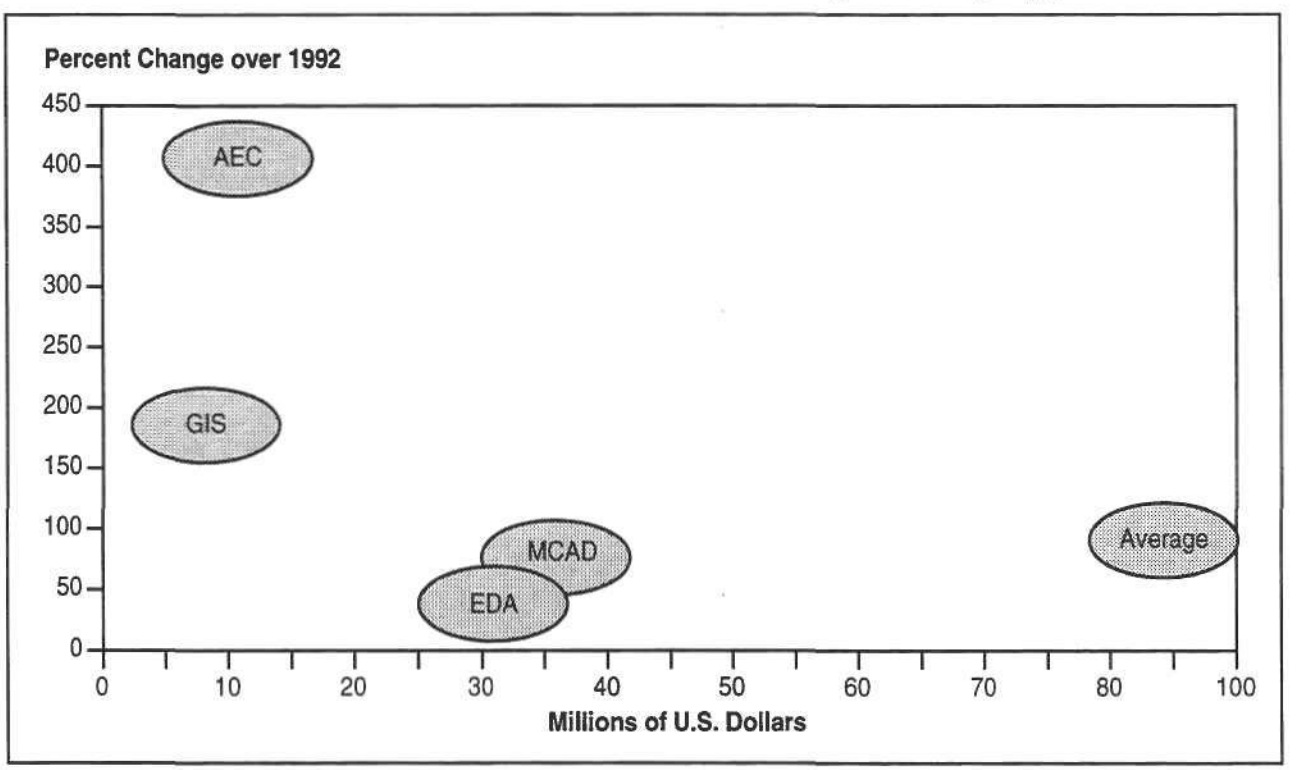
Figure 5-9
Taiwan—1993 CAD/CAM/CAE/GIS Market Growth Comparison by Application



Source: Dataquest (December 1994)

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Appendix A
Market Statistics Tables

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Table A-1
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Fujitsu	523.7	298.0	165.8	18,152	10.8%	11.7%	10.8%	11.1%
NEC	402.9	269.1	97.8	22,773	8.3%	10.6%	6.4%	13.9%
IBM	364.2	177.2	125.9	10,808	7.5%	6.9%	8.2%	6.6%
Nihon Unisys	266.1	156.4	56.1	1,220	5.5%	6.1%	3.7%	.7%
Sun Microsystems	223.7	178.0	0	7,474	4.6%	7.0%	.0%	4.6%
Hewlett-Packard	196.1	134.1	25.0	5,696	4.1%	5.3%	1.6%	3.5%
Hitachi	187.9	88.3	80.8	7,870	3.9%	3.5%	5.3%	4.8%
Toshiba*	179.9	89.9	71.9	4,944	3.7%	3.5%	4.7%	3.0%
Digital	154.5	120.1	2.7	4,691	3.2%	4.7%	.2%	2.9%
Mitsubishi Electric	116.9	91.4	14.6	1,849	2.4%	3.6%	.9%	1.1%
Cadence	111.2	.0	71.9	0	2.3%	.0%	4.7%	0%
Altium*	102.1	38.7	60.2	7,500	2.1%	1.5%	3.9%	4.6%
Seiko*	99.3	34.7	49.7	587	2.1%	1.4%	3.2%	.4%
Hitachi Zosen Info Systems	98.9	83.9	4.8	946	2.0%	3.3%	.3%	.6%
Zuken	96.0	27.7	45.8	545	2.0%	1.1%	3.0%	.3%
Mutoh Industries*	94.4	59.4	26.2	2,401	2.0%	2.3%	1.7%	1.5%
Computervision	90.2	18.8	45.4	870	1.9%	.7%	3.0%	.5%
C. Itoh Techno-Science*	86.0	26.6	52.5	897	1.8%	1.0%	3.4%	.5%
Technodia	78.9	63.6	.8	958	1.6%	2.5%	.1%	.6%

(Continued)

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Table A-1 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sumisho Electronics*	75.6	53.3	19.3	1,475	1.6%	2.1%	1.3%	.9%
Info. Services Int'l. Dentsu*	72.0	5.0	50.4	124	1.5%	.2%	3.3%	.1%
Kozo Keikaku Engineering	71.9	3.6	18.6	134	1.5%	.1%	1.2%	.1%
SDRC	70.8	0	48.3	0	1.5%	0%	3.1%	0%
ARGO GRAPHICS*	66.2	58.6	3.4	1,398	1.4%	2.3%	.2%	.9%
Mentor Graphics	64.7	8.2	28.7	273	1.3%	.3%	1.9%	.2%
Intergraph	64.7	26.9	17.3	946	1.3%	1.1%	1.1%	.6%
Autodesk	64.1	0	64.1	0	1.3%	.0%	4.2%	0%
Sharp*	53.7	25.8	27.9	494	1.1%	1.0%	1.8%	.3%
Silicon Graphics	52.3	52.3	0	1,393	1.1%	2.0%	0%	.9%
Marubeni Hytech*	47.7	7.1	39.7	252	1.0%	.3%	2.6%	.2%
Sony	47.0	47.0	0	2,331	1.0%	1.8%	.0%	1.4%
Hakuto	43.1	25.4	17.6	1,006	.9%	1.0%	1.1%	.6%
CADIX	41.5	17.8	20.3	229	.9%	.7%	1.3%	.1%
Mitsui Engineering	38.7	26.7	7.9	313	.8%	1.0%	.5%	.2%
Kubota Computer	38.2	29.1	6.1	438	.8%	1.1%	.4%	.3%
Uchida Yoko	36.0	21.2	13.1	1,002	.7%	.8%	.9%	.6%

(Continued)

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Table A-1 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Andor	35.9	7.9	26.6	652	.7%	.3%	1.7%	.4%
Synopsys	33.8	0	22.9	0	.7%	0%	1.5%	0%
EDS Unigraphics	31.5	9.2	14.8	397	.7%	.4%	1.0%	.2%
Yokogawa Digital Computer	30.9	12.3	15.4	285	.6%	.5%	1.0%	.2%
GDS	28.3	13.0	12.5	377	.6%	.5%	.8%	.2%
Toyo Information Systems*	27.5	16.4	8.4	309	.6%	.6%	.5%	.2%
Tokyo Electron*	27.0	8.7	12.6	124	.6%	.3%	.8%	.1%
Toshiba Engineering*	27.0	12.1	13.5	482	.6%	.5%	.9%	.3%
Wacom	27.0	5.4	18.8	902	.6%	.2%	1.2%	.6%
Informatix*	25.5	20.4	3.0	188	.5%	.8%	.2%	.1%
Apple Computer	23.9	23.9	0	5,028	.5%	.9%	0%	3.1%
Dassault*	23.7	0	20.6	0	.5%	0%	1.3%	0%
Century Research Center	19.8	10.3	7.4	133	.4%	.4%	.5%	.1%
Parametric Technology	17.9	0	14.7	0	.4%	0%	1.0%	0%
MacNeal-Schwendler	16.8	0	16.4	0	.3%	0%	1.1%	0%

(Continued)

Table A-1 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Landmark Graphics	16.6	3.8	7.1	47	.3%	.1%	.5%	0%
Racal-Redac	16.0	2.3	7.1	96	.3%	.1%	.5%	.1%
INS Engineering	15.4	7.6	7.9	56	.3%	.3%	.5%	0%
Graphtec Engineering	15.3	7.5	7.0	404	.3%	.3%	.5%	.2%
Nihon Itek*	15.3	7.2	6.3	97	.3%	.3%	.4%	.1%
Kanematsu Computer Systems*	15.0	7.3	6.2	218	.3%	.3%	.4%	.1%
Adam Net	14.4	7.1	5.4	19	.3%	.3%	.4%	0%
CPU	14.4	4.8	9.6	343	.3%	.2%	.6%	.2%
Viewlogic Systems	13.5	0	10.2	0	.3%	0%	.7%	0%
ESRI	13.5	0	10.9	0	.3%	0%	.7%	0%
Omron	13.5	6.8	5.4	300	.3%	.3%	.4%	.2%
COMPASS Design Automation	12.7	0	10.2	0	.3%	0%	.7%	0%
Design Automation	11.0	2.2	8.3	375	.2%	.1%	.5%	.2%
OKURA*	10.8	0	10.8	0	.2%	0%	.7%	0%
Pasco*	10.1	3.7	5.5	83	.2%	.1%	.4%	.1%

(Continued)

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Table A-1 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sumitomo Denko Workstation	9.0	9.0	0	978	.2%	.4%	0%	.6%
Quickturn Design Systems	8.9	2.7	4.5	55	.2%	.1%	.3%	0%
Harris EDA	8.9	.8	5.4	34	.2%	0%	.4%	0%
Siemens Nixdorf Info systeme	7.9	2.5	3.1	121	.2%	.1%	.2%	.1%
MARC	7.8	0	7.4	0	.2%	0%	.5%	0%
Ricoh*	6.5	0	5.5	0	.1%	0%	.4%	0%
Zycad	6.2	3.6	.7	90	.1%	.1%	0%	.1%
Delcam International	6.2	2.1	2.7	80	.1%	.1%	.2%	0%
Swanson Analysis	5.7	0	5.0	0	.1%	0%	.3%	0%
Sophia Systems*	5.7	1.2	3.9	59	.1%	0%	.3%	0%
CrossCheck Technology	5.7	0	3.0	0	.1%	0%	.2%	0%
Cisigraph	5.7	1.5	3.0	85	.1%	.1%	.2%	.1%
Control Data Systems	5.5	2.8	1.2	70	.1%	.1%	.1%	0%
Gerber Systems	5.4	2.5	2.3	87	.1%	.1%	.1%	.1%
Alias Research	5.3	0	4.9	0	.1%	0%	.3%	0%
PADS Software	5.2	0	4.6	0	.1%	0%	.3%	0%

(Continued)

Table A-1 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Matra Datavision	5.0	1.7	2.8	75	.1%	.1%	.2%	0%
Graftek	5.0	2.1	1.9	129	.1%	.1%	.1%	.1%
ICAD	4.9	0	4.0	0	.1%	0%	.3%	0%
Logic Modeling Corp.	4.8	0	4.2	0	.1%	0%	.3%	0%
Cascade Design Automation	4.7	0	3.6	0	.1%	0%	.2%	0%
Mechanical Dynamics	4.7	0	3.8	0	.1%	0%	.2%	0%
ADRA Systems	4.4	0	3.5	0	.1%	0%	.2%	0%
Aspen Technology	4.3	0	2.8	0	.1%	0%	.2%	0%
GeoVision Systems	3.5	.3	1.9	7	.1%	0%	.1%	0%
Cimatron	3.4	1.5	1.5	113	.1%	.1%	.1%	.1%
PDA Engineering	3.4	0	3.2	0	.1%	0%	.2%	0%
Silvar-Lisco	3.3	0	2.2	0	.1%	0%	.1%	0%
Microsim	3.3	0	3.1	0	.1%	0%	.2%	0%
Investronica SA	3.2	2.0	.9	108	.1%	.1%	.1%	.1%
Kockums Computer Systems	3.0	.8	1.9	140	.1%	0%	.1%	.1%
CAD Centre	3.0	0	2.2	0	.1%	0%	.1%	0%
Altera	2.9	0	2.5	0	.1%	0%	.2%	0%

(Continued)

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Table A-1 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IEZ	2.9	1.0	1.5	69	.1%	0%	.1%	0%
Applicon	2.8	1.0	1.2	29	.1%	0%	.1%	0%
Meta-Software	2.8	0	1.8	0	.1%	0%	.1%	0%
Contec Microelectronics	2.4	0	2.2	0	.1%	0%	.1%	0%
CAMAX Systems Inc.	2.3	.2	1.5	21	0%	0%	.1%	0%
Cimlinc	2.2	.1	1.1	5	0%	0%	.1%	0%
Summitt	2.2	0	2.0	0	0%	0%	.1%	0%
TSSI Japan	2.2	0	1.6	0	0%	0%	.1%	0%
LSI Logic	2.1	.2	1.6	4	0%	0%	.1%	0%
Straessle Informations-systeme	2.1	.2	1.4	9	0%	0%	.1%	0%
Genasys II	1.9	.2	1.4	9	0%	0%	.1%	0%
MCS	1.9	.1	1.6	11	0%	0%	.1%	0%
Synercom	1.9	0	.8	0	0%	0%	0%	0%
Data I/O	1.8	0	1.8	0	0%	0%	.1%	0%
Analogy	1.7	0	1.3	0	0%	0%	.1%	0%
Ascent Logic Corp	1.6	0	1.3	0	0%	0%	.1%	0%
EPIC Design Technology	1.6	0	1.6	0	0%	0%	.1%	0%

(Continued)

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Table A-1 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
EA Systems	1.5	0	.6	0	0%	0%	0%	0%
IKOS Systems	1.5	1.1	.4	18	0%	0%	0%	0%
Auto-Trol	1.4	.5	.6	17	0%	0%	0%	0%
Anilam Electronics	1.4	.3	1.0	46	0%	0%	.1%	0%
ANACAD EES	1.4	0	1.3	0	0%	0%	.1%	0%
CADKEY	1.4	0	1.3	0	0%	0%	.1%	0%
Radan Computational	1.3	.5	.7	27	0%	0%	0%	0%
Orcad	1.3	0	1.3	0	0%	0%	.1%	0%
Integrated Silicon Systems	1.3	0	1.3	0	0%	0%	.1%	0%
TECHSPERT	1.3	.2	1.1	11	0%	0%	.1%	0%
Xilinx	1.3	0	1.1	0	0%	0%	.1%	0%
Earth Resource Mapping	1.2	0	1.1	0	0%	0%	.1%	0%
Compact Software	1.2	0	.9	0	0%	0%	.1%	0%
BETRONEX	1.1	.1	1.0	20	0%	0%	.1%	0%
Point Control	1.0	0	.8	0	0%	0%	.1%	0%
ArcSys	1.0	0	.9	0	0%	0%	.1%	0%
ERDAS	1.0	.2	.7	18	0%	0%	0%	0%
Neocad	1.0	0	1.0	0	0%	0%	.1%	0%

(Continued)

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Table A-1 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Kanematsu Semiconductor*	.7	0	.5	0	0%	0%	0%	0%
Other Companies	0	0	0	38,167	0%	0%	0%	23.3%
All Companies	4,830.6	2,549.9	1,534.4	163,620	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2,080.7	1,016.6	673.3	90,942	43.1%	39.9%	43.9%	55.6%
All Asian-Based Companies	2,680.4	1,516.1	825.6	71,635	55.5%	59.5%	53.8%	43.8%
All European-Based Companies	69.5	17.3	35.6	1,043	1.4%	.7%	2.3%	.6%
All Hardware Companies	1,010.9	906.8	4.5	96,382	20.9%	35.6%	.3%	58.9%
All Turnkey & Software Companies	3,819.7	1,643.1	1,530.0	67,238	79.1%	64.4%	99.7%	41.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (July 1994)

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Table A-2
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
IBM	280.1	128.4	101.6	5,753	11.0%	9.0%	12.9%	6.9%
NEC	245.8	165.4	58.4	11,515	9.6%	11.6%	7.4%	13.9%
Fujitsu	219.9	128.9	67.4	8,751	8.6%	9.1%	8.6%	10.5%
Nihon Unisys	218.2	129.2	44.5	1,014	8.5%	9.1%	5.7%	1.2%
Hitachi	143.6	67.5	61.8	6,076	5.6%	4.7%	7.8%	7.3%
Toshiba*	125.9	63.0	50.4	4,070	4.9%	4.4%	6.4%	4.9%
Hewlett-Packard	102.4	65.3	14.9	2,430	4.0%	4.6%	1.9%	2.9%
Hitachi Zosen Info Systems	89.8	76.1	4.4	865	3.5%	5.4%	.6%	1.0%
Altium*	82.3	33.5	46.3	5,769	3.2%	2.4%	5.9%	7.0%
Computervision	78.1	16.3	39.3	755	3.1%	1.1%	5.0%	.9%
Info. Services Int'l. Dentsu*	72.0	5.0	50.4	124	2.8%	.4%	6.4%	.1%
Mutoh Industries*	70.8	45.6	19.2	1,906	2.8%	3.2%	2.4%	2.3%
SDRC	70.8	0	48.3	0	2.8%	0%	6.1%	0%
ARGO GRAPHICS*	66.2	58.6	3.4	1,398	2.6%	4.1%	.4%	1.7%
Sumisho Electronics*	65.1	45.9	16.5	1,155	2.5%	3.2%	2.1%	1.4%
Digital	60.6	48.2	0	2,029	2.4%	3.4%	0%	2.4%
Mitsubishi Electric	50.3	39.3	6.3	795	2.0%	2.8%	.8%	1.0%

(Continued)

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Table A-2 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
C. Itoh Techno--Science*	49.9	15.5	30.4	511	2.0%	1.1%	3.9%	.6%
Silicon Graphics	48.6	48.6	0	1,286	1.9%	3.4%	0%	1.5%
Hakuto	43.1	25.4	17.6	1,006	1.7%	1.8%	2.2%	1.2%
Sharp*	43.0	20.7	22.3	398	1.7%	1.5%	2.8%	.5%
Seiko*	40.6	14.2	20.3	241	1.6%	1.0%	2.6%	.3%
Kubota Computer	38.2	29.1	6.1	438	1.5%	2.0%	.8%	.5%
Technodia	37.9	30.3	.4	425	1.5%	2.1%	0%	.5%
EDS Unigraphics	31.5	9.2	14.8	397	1.2%	.6%	1.9%	.5%
Tokyo Electron*	27.0	8.7	12.6	124	1.1%	.6%	1.6%	.1%
Toshiba Engineering*	27.0	12.1	13.5	482	1.1%	.9%	1.7%	.6%
Autodesk	25.6	0	25.6	0	1.0%	0%	3.3%	0%
Andor	23.1	5.1	17.1	421	.9%	.4%	2.2%	.5%
Toyo Information Systems*	23.0	13.7	6.9	258	.9%	1.0%	.9%	.3%
Mitsui Engineering	22.1	15.3	4.5	178	.9%	1.1%	.6%	.2%
Dassault*	22.1	0	19.2	0	.9%	0%	2.4%	0%
Kozo Keikaku Engineering	21.6	1.3	5.8	40	.8%	.1%	.7%	0%
Sun Microsystems	20.4	16.5	0	548	.8%	1.2%	0%	.7%
Marubeni Hytech*	18.6	3.2	15.1	112	.7%	.2%	1.9%	.1%

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Table A-2 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Parametric Technology	17.9	0	14.7	0	.7%	0%	1.9%	0%
MacNeal-Schwendler	16.8	0	16.4	0	.7%	0%	2.1%	0%
Sony	16.6	16.6	0	823	.7%	1.2%	0%	1.0%
Apple Computer	16.0	16.0	0	3,377	.6%	1.1%	0%	4.1%
Graphtec Engineering	15.3	7.5	7.0	404	.6%	.5%	.9%	.5%
Nihon Itek*	12.2	5.8	5.0	78	.5%	.4%	.6%	.1%
Adam Net	11.5	6.6	3.6	14	.5%	.5%	.5%	0%
Omron	11.5	5.7	4.6	255	.4%	.4%	.6%	.3%
Intergraph	10.8	3.8	3.6	127	.4%	.3%	.5%	.2%
Design Automation	8.6	1.8	6.5	295	.3%	.1%	.8%	.4%
CADIX	8.3	3.6	4.1	46	.3%	.3%	.5%	.1%
Wacom	8.1	1.6	5.7	261	.3%	.1%	.7%	.3%
Sumitomo Denko Workstation	7.9	7.9	0	855	.3%	.6%	0%	1.0%
MARC	7.8	.0	7.4	0	.3%	0%	.9%	0%
Ricoh*	6.5	.0	5.5	0	.3%	0%	.7%	0%
Delcam International	6.2	2.1	2.7	80	.2%	.2%	.3%	.1%
Swanson Analysis	5.7	0	5.0	0	.2%	0%	.6%	0%

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Table A-2 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cisigraph	5.7	1.5	3.0	85	.2%	.1%	.4%	.1%
Control Data Systems	5.4	2.7	1.2	65	.2%	.2%	.1%	.1%
Gerber Systems	5.4	2.5	2.3	87	.2%	.2%	.3%	.1%
Alias Research	5.3	0	4.9	0	.2%	0%	.6%	0%
Matra Datavision	5.0	1.7	2.8	75	.2%	.1%	.4%	.1%
Graftek	5.0	2.1	1.9	129	.2%	.1%	.2%	.2%
Mechanical Dynamics	4.7	0	3.8	0	.2%	0%	.5%	0%
ADRA Systems	4.4	0	3.5	0	.2%	0%	.4%	0%
ICAD	4.2	0	3.4	0	.2%	0%	.4%	0%
Cimatron	3.4	1.5	1.5	113	.1%	.1%	.2%	.1%
PDA Engineering	3.4	0	3.2	0	.1%	0%	.4%	0%
Investronica SA	3.2	2.0	.9	108	.1%	.1%	.1%	.1%
Century Research Center	2.9	1.5	1.1	14	.1%	.1%	.1%	0%
Applicon	2.8	1.0	1.2	29	.1%	.1%	.1%	0%
CAMAX Systems Inc.	2.3	.2	1.5	21	.1%	0%	.2%	0%
Cimlinc	2.2	.1	1.1	5	.1%	0%	.1%	0%
Straessle Informations-systeme	2.1	.2	1.4	9	.1%	0%	.2%	0%

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Table A-2 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Uchida Yoko	2.0	1.2	.7	53	.1%	.1%	.1%	.1%
MCS	1.9	.1	1.6	11	.1%	0%	.2%	0%
Anilam Electronics	1.4	.3	1.0	46	.1%	0%	.1%	.1%
CADKEY	1.4	0	1.3	0	.1%	0%	.2%	0%
Radan Computational	1.2	.4	.6	24	0%	0%	.1%	0%
Point Control	1.0	0	.8	0	0%	0%	.1%	0%
Zuken	1.0	.3	.5	6	0%	0%	.1%	0%
Auto-Trol	.8	.3	.3	10	0%	0%	0%	0%
CAD Centre	.5	0	.4	0	0%	0%	.1%	0%
Other Companies	0	0	0	14,202	0%	0%	0%	17.1%
All Companies	2,555.3	1,422.4	786.8	82,972	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	998.8	508.3	326.6	41,832	39.1%	35.7%	41.5%	50.4%
All Asian-Based Companies	1,525.3	904.1	444.3	40,571	59.7%	63.6%	56.5%	48.9%
All European-Based Companies	31.2	10.0	16.0	569	1.2%	.7%	2.0%	.7%
All Hardware Companies	420.4	395.4	0	43,776	16.5%	27.8%	0%	52.8%
All Turnkey & SW Companies	2,134.9	1,027.0	786.8	39,196	83.5%	72.2%	100.0%	47.2%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (July 1994)

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Table A-3
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Fujitsu	151.8	88.1	47.3	5,982	20.7%	21.8%	21.9%	17.3%
NEC	64.5	43.2	15.6	5,325	8.8%	10.7%	7.2%	15.4%
Kozo Keikaku Engineering	50.4	2.3	12.8	93	6.9%	.6%	6.0%	.3%
IBM	49.7	28.9	13.4	2,632	6.8%	7.1%	6.2%	7.6%
Nihon Unisys	47.9	27.2	11.6	206	6.5%	6.7%	5.4%	.6%
Technodia	41.1	33.3	.4	533	5.6%	8.2%	.2%	1.5%
Autodesk	27.6	0	27.6	0	3.8%	0%	12.8%	0%
Informatix*	25.5	20.4	3.0	188	3.5%	5.1%	1.4%	.5%
Intergraph	25.4	10.7	7.0	445	3.5%	2.6%	3.2%	1.3%
Toshiba*	21.6	10.8	8.6	515	2.9%	2.7%	4.0%	1.5%
Mutoh Industries*	18.9	10.9	5.6	383	2.6%	2.7%	2.6%	1.1%
Hitachi	18.4	8.7	7.9	750	2.5%	2.1%	3.7%	2.2%
C. Itoh Techno-Science*	18.1	5.6	11.0	193	2.5%	1.4%	5.1%	.6%
Mitsubishi Electric	17.5	13.7	2.2	277	2.4%	3.4%	1.0%	.8%
Hewlett-Packard	15.6	13.3	0	728	2.1%	3.3%	0%	2.1%
Kanematsu Computer Systems*	15.0	7.3	6.2	218	2.0%	1.8%	2.9%	.6%
Sony	14.9	14.9	0	737	2.0%	3.7%	0%	2.1%
CPU	14.4	4.8	9.6	343	2.0%	1.2%	4.5%	1.0%

(Continued)

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Table A-3 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
GDS	14.2	6.5	6.2	188	1.9%	1.6%	2.9%	.5%
Computervision	12.1	2.5	6.2	115	1.6%	.6%	2.9%	.3%
Andor	10.0	2.2	7.4	182	1.4%	.5%	3.4%	.5%
Century Research Center	9.9	5.2	3.7	69	1.3%	1.3%	1.7%	.2%
Hitachi Zosen Info Systems	9.1	7.7	.4	81	1.2%	1.9%	.2%	.2%
Altium*	7.7	2.0	5.4	667	1.1%	.5%	2.5%	1.9%
INS Engineering	7.5	3.7	3.8	34	1.0%	.9%	1.8%	.1%
Sumisho Electronics*	6.0	4.2	1.6	225	.8%	1.0%	.7%	.6%
Apple Computer	5.7	5.7	0	1,191	.8%	1.4%	0%	3.4%
Uchida Yoko	5.2	3.1	1.9	145	.7%	.8%	.9%	.4%
Digital	5.1	4.3	.0	599	.7%	1.1%	0%	1.7%
Toyo Information Systems*	4.6	2.7	1.4	51	.6%	.7%	.7%	.1%
Sun Microsystems	4.5	3.6	0	170	.6%	.9%	0%	.5%
Aspen Technology	4.3	0	2.8	0	.6%	0%	1.3%	0%
Silicon Graphics	3.5	3.5	0	102	.5%	.9%	0%	.3%
Nihon Itek*	3.1	1.4	1.3	19	.4%	.4%	.6%	.1%
Kockums Computer Systems	3.0	.8	1.9	140	.4%	.2%	.9%	.4%

(Continued)

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Table A-3 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Adam Net	2.9	.4	1.8	6	.4%	.1%	.8%	0%
IEZ	2.9	1.0	1.5	69	.4%	.2%	.7%	.2%
CAD Centre	2.5	0	1.8	0	.3%	0%	.8%	0%
Design Automation	2.3	.5	1.8	80	.3%	.1%	.8%	.2%
Mitsui Engineering	1.9	1.3	.4	15	.3%	.3%	.2%	0%
Dassault*	1.6	0	1.4	0	.2%	0%	.7%	0%
EA Systems	1.5	0	.6	0	.2%	0%	.3%	0%
Sumitomo Denko Workstation	.8	.8	0	83	.1%	.2%	0%	.2%
ICAD	.7	0	.6	0	.1%	0%	.3%	0%
Auto-Trol	.6	.2	.2	8	.1%	.1%	.1%	0%
Other Companies	0	0	0	10,794	0%	0%	0%	31.2%
All Companies	734.0	404.4	215.5	34,588	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	218.5	123.4	67.8	18,678	29.8%	30.5%	31.5%	54.0%
All Asian-Based Companies	505.7	279.1	141.7	15,684	68.9%	69.0%	65.8%	45.3%
All European-Based Companies	9.9	1.9	6.0	226	1.3%	.5%	2.8%	.7%
All Hardware Companies	140.2	135.8	0	22,032	19.1%	33.6%	0%	63.7%

(Continued)

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Table A-3 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
All Turnkey & Software Companies	593.9	268.6	215.5	12,556	80.9%	66.4%	100.0%	36.3%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (July 1994)

Table A-4
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Fujitsu	57.7	29.7	20.2	1,172	16.5%	15.7%	18.0%	11.7%
Mitsubishi Electric	49.1	38.4	6.1	777	14.1%	20.2%	5.4%	7.8%
Uchida Yoko	22.5	13.3	8.2	624	6.4%	7.0%	7.3%	6.2%
Intergraph	20.0	10.7	4.0	323	5.7%	5.6%	3.6%	3.2%
Hitachi	18.9	8.9	8.1	726	5.4%	4.7%	7.2%	7.3%
Toshiba*	18.0	9.0	7.2	200	5.2%	4.7%	6.4%	2.0%

(Continued)

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Table A-4 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Landmark Graphics	16.6	3.8	7.1	47	4.7%	2.0%	6.3%	.5%
Mitsui Engineering	14.7	10.2	3.0	120	4.2%	5.4%	2.7%	1.2%
GDS	14.2	6.5	6.2	189	4.1%	3.4%	5.5%	1.9%
ESRI	13.5	0	10.9	0	3.9%	0%	9.7%	0%
Digital	10.6	8.8	0	406	3.0%	4.6%	0%	4.1%
IBM	10.1	7.4	1.3	788	2.9%	3.9%	1.1%	7.9%
Pasco*	10.1	3.7	5.5	83	2.9%	1.9%	4.9%	.8%
NEC	8.1	5.1	2.3	308	2.3%	2.7%	2.0%	3.1%
INS Engineering	7.9	3.9	4.0	22	2.3%	2.0%	3.6%	.2%
Siemens Nixdorf Info systeme	7.9	2.5	3.1	121	2.3%	1.3%	2.8%	1.2%
Hewlett-Packard	7.5	6.4	0	257	2.2%	3.4%	0%	2.6%
Autodesk	7.0	0	7.0	0	2.0%	0%	6.3%	0%
Mutoh Industries*	4.7	2.9	1.3	112	1.4%	1.5%	1.2%	1.1%
Century Research Center	4.7	2.5	1.8	33	1.3%	1.3%	1.6%	.3%
CADIX	4.2	1.8	2.0	23	1.2%	.9%	1.8%	.2%
Sun Microsystems	3.8	3.1	0	92	1.1%	1.6%	0%	.9%
GeoVision Systems	3.5	.3	1.9	7	1.0%	.1%	1.7%	.1%
C. Itoh Techno-Science*	3.0	.9	1.8	32	.9%	.5%	1.6%	.3%

(Continued)

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Table A-4 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Genasys II	1.9	.2	1.4	9	.6%	.1%	1.2%	.1%
Synercom	1.9	0	.8	0	.5%	0%	.7%	0%
Andor	1.7	.4	1.3	31	.5%	.2%	1.1%	.3%
Earth Resource Mapping	1.2	0	1.1	0	.3%	0%	1.0%	0
ERDAS	1.0	.2	.7	17	.3%	.1%	.6%	.2%
Other Companies	3.3	9.2	0	3,466	1.0%	4.8%	0%	34.7%
All Companies	349.3	189.5	112.6	9,989	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	131.7	62.9	44.7	5,773	37.7%	33.2%	39.7%	57.8%
All Asian-Based Companies	208.3	123.6	64.4	4,083	59.6%	65.2%	57.2%	40.9%
All European-Based Companies	9.2	3.0	3.6	132	2.6%	1.6%	3.2%	1.3%
All Hardware Companies	48.5	44.5	0	5,339	13.9%	23.5%	0%	53.4%
All Turnkey & SW Companies	300.7	145.0	112.6	4,650	86.1%	76.5%	100.0%	46.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (July 1994)

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Table A-5
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	195.1	154.9	0	6,663	16.4%	29.0%	0%	18.5%
Cadence	111.2	0	71.9	0	9.3%	0%	17.1%	0%
Zuken	95.0	27.4	45.4	540	8.0%	5.1%	10.8%	1.5%
Fujitsu	94.3	51.3	30.9	2,247	7.9%	9.6%	7.4%	6.2%
NEC	84.6	55.4	21.6	5,625	7.1%	10.4%	5.2%	15.6%
Digital	78.2	58.8	2.6	1,657	6.6%	11.0%	.6%	4.6%
Hewlett-Packard	70.5	49.1	10.1	2,281	5.9%	9.2%	2.4%	6.3%
Mentor Graphics	64.7	8.2	28.7	273	5.4%	1.5%	6.8%	.8%
Seiko*	58.7	20.5	29.4	346	4.9%	3.8%	7.0%	1.0%
Synopsys	33.8	0	22.9	0	2.8%	0%	5.5%	0%
Yokogawa Digital Computer	30.9	12.3	15.4	285	2.6%	2.3%	3.7%	.8%
Marubeni Hytech*	29.1	4.0	24.7	140	2.4%	.7%	5.9%	.4%
CADIX	29.0	12.5	14.2	160	2.4%	2.3%	3.4%	.4%
IBM	24.3	12.6	9.7	1,636	2.0%	2.4%	2.3%	4.5%
Wacom	18.9	3.8	13.1	641	1.6%	.7%	3.1%	1.8%
Racal-Redac	16.0	2.3	7.1	96	1.3%	.4%	1.7%	.3%
Sony	15.5	15.6	0	770	1.3%	2.9%	0%	2.1%
C. Itoh Techno-Science*	15.1	4.6	9.2	161	1.3%	.9%	2.2%	.4%
Toshiba*	14.4	7.2	5.8	160	1.2%	1.3%	1.4%	.4%
Viewlogic Systems	13.5	0	10.2	0	1.1%	0%	2.4%	0%

(Continued)

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Table A-5 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update (Continued)

Application: Electronic Design Automation
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
COMPASS Design Automation	12.7	0	10.2	0	1.1%	0%	2.4%	0%
Altium*	12.1	3.2	8.5	1,064	1.0%	.6%	2.0%	3.0%
OKURA*	10.8	0	10.8	0	.9%	0%	2.6%	0%
Sharp*	10.7	5.2	5.6	97	.9%	1.0%	1.3%	.3%
Quickturn Design Systems	8.9	2.7	4.5	55	.8%	.5%	1.1%	.2%
Harris EDA	8.9	.8	5.4	34	.7%	.1%	1.3%	.1%
Intergraph	8.5	1.8	2.7	52	.7%	.3%	.6%	.1%
Hitachi	7.1	3.3	3.1	319	.6%	.6%	.7%	.9%
Uchida Yoko	6.3	3.7	2.3	180	.5%	.7%	.5%	.5%
Zycad	6.2	3.6	.7	90	.5%	.7%	.2%	.2%
Sophia Systems*	5.7	1.2	3.9	59	.5%	.2%	.9%	.2%
CrossCheck Technology	5.7	0	3.0	0	.5%	0%	.7%	0%
PADS Software	5.2	0	4.6	0	.4%	0%	1.1%	0%
Logic Modeling Corp.	4.8	0	4.2	0	.4%	0%	1.0%	0%
Cascade Design Automation	4.7	0	3.6	0	.4%	0%	.9%	0%
Sumisho Electronics*	4.5	3.2	1.2	95	.4%	.6%	.3%	.3%
Autodesk	3.9	0	3.9	0	.3%	0%	.9%	0%

(Continued)

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Table A-5 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update (Continued)

Application: Electronic Design Automation
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Silvar-Lisco	3.3	0	2.2	0	.3%	0%	.5%	0%
Microsim	3.3	0	3.1	0	.3%	0%	.7%	0%
Altera	2.9	0	2.5	0	.2%	0%	.6%	0%
Meta-Software	2.8	0	1.8	0	.2%	0%	.4%	0%
Contec Microelectronics	2.4	0	2.2	0	.2%	0%	.5%	0%
Century Research Center	2.3	1.2	.9	16	.2%	.2%	.2%	0%
Apple Computer	2.2	2.2	0	461	.2%	.4%	0%	1.3%
Summitt	2.2	0	2.0	0	.2%	0%	.5%	0%
TSSI Japan	2.2	0	1.6	0	.2%	0%	.4%	0%
LSI Logic	2.1	.2	1.6	4	.2%	0%	.4%	0%
Omron	2.0	1.0	.8	45	.2%	.2%	.2%	.1%
Data I/O	1.8	0	1.8	0	.1%	0%	.4%	0%
Analogy	1.7	0	1.3	0	.1%	0%	.3%	0%
Ascent Logic Corp	1.6	0	1.3	0	.1%	0%	.3%	0%
EPIC Design Technology	1.6	0	1.6	0	.1%	0%	.4%	0%
IKOS Systems	1.5	1.1	.4	18	.1%	.2%	.1%	.1%
ANACAD EES	1.4	0	1.3	0	.1%	0%	.3%	0%
Orcad	1.3	0	1.3	0	.1%	0%	.3%	0%

(Continued)

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Table A-5 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update (Continued)

Application: Electronic Design Automation
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Integrated Silicon Systems	1.3	0	1.3	0	.1%	0%	.3%	0%
TECHSPERT	1.3	.2	1.1	11	.1%	0%	.3%	0%
Xilinx	1.3	0	1.1	0	.1%	0%	.3%	0%
Compact Software	1.2	0	.9	0	.1%	0%	.2%	0%
BETRONEX	1.1	.1	1.0	20	.1%	0%	.2%	.1%
Andor	1.0	.2	.8	19	.1%	0%	.2%	.1%
ArcSys	1.0	0	.9	0	.1%	0%	.2%	0%
Neocad	1.0	0	1.0	0	.1%	0%	.2%	0%
Kanematsu Semiconductor*	.7	0	.5	0	.1%	0%	.1%	0%
Other Companies	0	0	0	9,705	0%	0%	0%	26.9%
All Companies	1,192.0	533.6	419.5	36,071	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	731.7	321.9	234.2	24,659	61.4%	60.3%	55.8%	68.4%
All Asian-Based Companies	441.1	209.2	175.3	11,296	37.0%	39.2%	41.8%	31.3%
All European-Based Companies	19.2	2.4	10.1	117	1.6%	.4%	2.4%	.3%
All Hardware Companies	401.8	331.0	4.5	25,236	33.7%	62.0%	1.1%	70.0%

(Continued)

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Table A-5 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update (Continued)

Application: Electronic Design Automation
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
All Turnkey & Software Companies	790.1	202.6	415.1	10,835	66.3%	38.0%	98.9%	30.0%

* Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (July 1994)

Table A-6
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electornic CAE
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Sun Microsystems	99.1	78.7	0	3,539	16.9%	30.4%	0%	17.2%
Hewlett-Packard	54.0	35.0	10.1	1,672	9.2%	13.5%	4.9%	8.1%
Cadence	53.1	0	34.3	0	9.1%	0%	16.7%	0%
NEC	52.4	34.2	13.5	3,324	8.9%	13.2%	6.6%	16.2%
Digital	43.1	32.6	1.3	1,032	7.3%	12.6%	.6%	5.0%
Mentor Graphics	37.0	4.9	16.3	165	6.3%	1.9%	7.9%	.8%
Fujitsu	36.7	20.2	11.8	848	6.3%	7.8%	5.7%	4.1%

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Table A-6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electornic CAE
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Synopsys	33.8	0	22.9	0	5.8%	0%	11.2%	0%
Seiko*	32.0	11.2	16.0	188	5.5%	4.3%	7.8%	.9%
Marubeni Hytech*	27.6	3.7	23.5	131	4.7%	1.4%	11.5%	.6%
Zuken	25.3	7.3	12.1	144	4.3%	2.8%	5.9%	.7%
Wacom	18.9	3.8	13.1	641	3.2%	1.5%	6.4%	3.1%
Viewlogic Systems	13.5	0	10.2	0	2.3%	0%	5.0%	0%
Sony	11.2	11.2	0	557	1.9%	4.3%	0%	2.7%
C. Itoh Techno-Science*	9.3	2.9	5.7	99	1.6%	1.1%	2.8%	.5%
Quickturn Design Systems	8.9	2.7	4.5	55	1.5%	1.0%	2.2%	.3%
COMPASS Design Automation	7.6	0	6.1	0	1.3%	0%	3.0%	0%
Zycad	6.2	3.6	.7	90	1.1%	1.4%	.4%	.4%
CrossCheck Technology	5.7	0	3.0	0	1.0%	0%	1.5%	0%
IBM	5.6	5.6	0	1,036	1.0%	2.2%	0%	5.0%
Logic Modeling Corp.	4.8	0	4.2	0	.8%	0%	2.0%	0%
Sophia Systems*	4.6	1.0	3.1	49	.8%	.4%	1.5%	.2%
Intergraph	4.5	1.0	1.4	29	.8%	.4%	.7%	.1%
Racal-Redac	3.8	.5	1.7	23	.7%	.2%	.8%	.1%

(Continued)

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Table A-6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electornic CAE
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Harris EDA	3.7	.4	2.3	17	.6%	.1%	1.1%	.1%
Microsim	3.3	0	3.1	0	.6%	0%	1.5%	0%
Autodesk	3.2	0	3.2	0	.5%	0%	1.6%	0%
Altera	2.9	0	2.5	0	.5%	0%	1.2%	0%
Meta-Software	2.8	0	1.8	0	.5%	0%	.9%	0%
Contec Microelectronics	2.4	0	2.2	0	.4%	0%	1.1%	0%
Summitt	2.2	0	2.0	0	.4%	0%	1.0%	0%
Apple Computer	1.9	1.9	.0	402	.3%	.7%	0%	2.0%
LSI Logic	1.9	.1	1.5	4	.3%	.1%	.7%	0%
Data I/O	1.8	0	1.8	0	.3%	0%	.9%	0%
Analogy	1.7	0	1.3	0	.3%	0%	.7%	0%
Ascent Logic Corp	1.6	0	1.3	0	.3%	0%	.6%	0%
EPIC Design Technology	1.6	0	1.6	0	.3%	0%	.8%	0%
IKOS Systems	1.5	1.1	.4	18	.2%	.4%	.2%	.1%
PADS Software	1.4	0	1.3	0	.2%	0%	.6%	0%
ANACAD EES	1.4	0	1.3	0	.2%	0%	.6%	0%
Century Research Center	1.3	.7	.5	9	.2%	.3%	.2%	0%
Xilinx	1.3	0	1.1	0	.2%	0%	.5%	0%

(Continued)

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Table A-6 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: Electornic CAE
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cascade Design Automation	1.1	0	.9	0	.2%	0%	.4%	0%
Neocad	1.0	0	1.0	0	.2%	0%	.5%	0%
Orcad	.9	0	.9	0	.2%	0%	.4%	0%
Kanematsu Semiconductor*	.7	0	.5	0	.1%	0%	.2%	0%
Other Companies	0	0	0	6,467	0%	0%	0%	31.5%
All Companies	586.1	259.0	205.1	20,540	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	435.1	181.1	150.9	14,995	74.2%	69.9%	73.6%	73.0%
All Asian-Based Companies	145.7	77.3	51.0	5,523	24.9%	29.9%	24.9%	26.9%
All European-Based Companies	5.3	.5	3.1	23	.9%	.2%	1.5%	.1%
All Hardware Companies	225.5	184.4	4.5	15,069	38.5%	71.2%	2.2%	73.4%
All Turnkey & Software Companies	360.6	74.6	200.6	5,472	61.5%	28.8%	97.8%	26.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (July 1994)

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Table A-7
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars / Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	58.2	46.2	0	1,760	27.5%	52.9%	0%	53.9%
Cadence	50.7	0	32.8	0	24.0%	0%	45.0%	0%
Seiko*	26.7	9.4	13.4	159	12.6%	10.7%	18.4%	4.8%
Digital	19.3	15.1	0	287	9.1%	17.2%	0%	8.8%
Fujitsu	15.7	9.2	4.7	512	7.4%	10.5%	6.5%	15.7%
Mentor Graphics	14.0	1.6	6.3	54	6.6%	1.9%	8.6%	1.7%
OKURA*	10.8	0	10.8	0	5.1%	0%	14.8%	0%
COMPASS Design Automation	5.1	0	4.1	0	2.4%	0%	5.6%	0%
NEC	4.0	2.5	1.2	114	1.9%	2.9%	1.6%	3.5%
Cascade Design Automation	3.6	0	2.7	0	1.7%	0%	3.8%	0%
Silvar-Lisco	3.3	0	2.2	0	1.6%	0%	3.1%	0%
TSSI Japan	2.2	0	1.6	0	1.0%	0%	2.2%	0%
Hewlett-Packard	1.9	1.6	0	61	.9%	1.8%	0%	1.9%
Intergraph	1.8	.4	.6	8	.9%	.4%	.8%	.2%
Maruberi Hytech*	1.4	.3	1.2	9	.7%	.3%	1.6%	.3%
Integrated Silicon Systems	1.3	0	1.3	0	.6%	0%	1.7%	0%
ArcSys	1.0	0	.9	0	.5%	0%	1.2%	0%
Compact Software	.6	0	.5	0	.3%	0%	.6%	0%
Other Companies	0	.7	0	282	0%	.8%	0%	8.6%

(Continued)

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Table A-7 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
All Companies	211.4	87.4	72.7	3,269	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	162.4	65.9	51.9	2,464	76.8%	75.5%	71.3%	75.4%
All Asian-Based Companies	49.0	21.4	20.9	805	23.2%	24.5%	28.7%	24.6%
All European-Based Companies	0	0	0	0	0%	0%	0%	0%
All Hardware Companies	84.8	68.2	0	2,690	40.1%	78.1%	0%	82.3%
All Turnkey & SW Companies	126.7	19.1	72.7	578	59.9%	21.9%	100.0%	17.7%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (July 1994)

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Table A-8
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	**Total Factory Revenue**	**Hardware Revenue**	**Software Revenue**	**Hardware Units Shipped**	**Total Factory Revenue**	**Hardware Revenue**	**Software Revenue**	**Hardware Units Shipped**
Zuken	69.7	20.1	33.3	396	17.7%	10.7%	23.5%	3.2%
Fujitsu	41.9	21.9	14.4	887	10.6%	11.7%	10.2%	7.2%
Sun Microsystems	37.8	30.0	0	1,364	9.6%	16.0%	0%	11.1%
Yokogawa Digital Computer	30.9	12.3	15.4	285	7.8%	6.6%	10.9%	2.3%
CADIX	29.0	12.5	14.2	160	7.4%	6.7%	10.0%	1.3%
NEC	28.2	18.8	6.9	2,188	7.1%	10.0%	4.9%	17.8%
IBM	18.7	7.0	9.7	600	4.7%	3.7%	6.8%	4.9%
Digital	15.9	11.2	1.3	338	4.0%	6.0%	.9%	2.8%
Hewlett-Packard	14.7	12.5	0	548	3.7%	6.7%	0%	4.5%
Toshiba*	14.4	7.2	5.8	160	3.6%	3.8%	4.1%	1.3%
Mentor Graphics	13.7	1.6	6.2	54	3.5%	.9%	4.3%	.4%
Racal-Redac	12.2	1.8	5.4	73	3.1%	.9%	3.8%	.6%
Altium*	12.1	3.2	8.5	1,064	3.1%	1.7%	6.0%	8.7%
Sharp*	10.7	5.2	5.6	97	2.7%	2.8%	3.9%	.8%
Cadence	7.4	0	4.8	0	1.9%	0%	3.4%	0%
Hitachi	7.1	3.3	3.1	319	1.8%	1.8%	2.2%	2.6%
Uchida Yoko	6.3	3.7	2.3	180	1.6%	2.0%	1.6%	1.5%
C. Itoh Techno-Science*	5.8	1.8	3.5	62	1.5%	.9%	2.5%	.5%
Harris EDA	5.2	.4	3.1	17	1.3%	.2%	2.2%	.1%

(Continued)

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Table A-8 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sumisho Electronics*	4.5	3.2	1.2	95	1.1%	1.7%	.8%	.8%
Sony	3.9	3.9	0	193	1.0%	2.1%	0%	1.6%
PADS Software	3.8	0	3.3	0	1.0%	0%	2.4%	0%
Intergraph	2.2	.4	.7	14	.6%	.2%	.5%	.1%
Omron	2.0	1.0	.8	45	.5%	.5%	.6%	.4%
TECHSPERT	1.3	.2	1.1	11	.3%	.1%	.8%	.1%
Sophia Systems*	1.1	.2	.8	10	.3%	.1%	.6%	.1%
BETRONEX	1.1	.1	1.0	20	.3%	0%	.7%	.2%
Andor	1.0	.2	.8	19	.3%	.1%	.5%	.2%
Century Research Center	1.0	.5	.4	7	.3%	.3%	.3%	.1%
Autodesk	.6	0	.6	0	.2%	0%	.5%	0%
Compact Software	.6	0	.5	0	.1%	0%	.3%	0%
Other Companies	0	2.3	0	2,957	0%	1.2%	0%	24.1%
All Companies	394.4	187.2	141.8	12,262	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	134.2	74.9	31.4	7,200	34.0%	40.0%	22.2%	58.7%
All Asian-Based Companies	246.4	110.5	103.4	4,969	62.5%	59.0%	73.0%	40.5%

(Continued)

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Table A-8 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
All European-Based Companies	13.9	1.9	6.9	93	3.5%	1.0%	4.9%	.8%
All Hardware Companies	91.6	78.4	0	7,477	23.2%	41.9%	0%	61.0%
All Turnkey & Software Companies	302.9	108.8	141.8	4,785	76.8%	58.1%	100.0%	39.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (July 1994)

Table A-9
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Digital	6.6	5.3	0	244	9.5%	21.0%	0%	15.6%
IBM	6.6	3.3	2.1	189	9.5%	13.0%	7.4%	12.0%
Computervision	6.5	1.4	3.3	63	9.4%	5.4%	11.2%	4.0%
EDS Unigraphics	5.4	1.6	2.5	67	7.7%	6.2%	8.6%	4.3%

(Continued)

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Table A-9 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Cadence	5.0	0	3.2	0	7.2%	0%	11.1%	0%
Silicon Graphics	4.4	4.4	0	117	6.3%	17.3%	0%	7.4%
Synopsys	3.0	0	2.0	0	4.3%	0%	7.0%	0%
Viewlogic Systems	2.6	0	2.0	0	3.8%	0%	6.8%	0%
Sun Microsystems	2.5	2.0	0	86	3.6%	7.9%	0%	5.5%
IEZ	2.3	.8	1.2	56	3.3%	3.1%	4.1%	3.5%
Mentor Graphics	2.3	.3	1.0	10	3.3%	1.2%	3.5%	.6%
Intergraph	2.3	.9	.6	34	3.3%	3.7%	2.1%	2.2%
ESRI	2.2	0	1.8	0	3.1%	0%	6.0%	0%
SDRC	2.1	0	1.4	0	3.1%	0%	5.0%	0%
Hewlett-Packard	2.0	1.7	0	76	2.9%	6.7%	0%	4.8%
Altium*	1.5	.6	.9	113	2.2%	2.3%	3.1%	7.2%
Zuken	1.3	.4	.6	7	1.9%	1.5%	2.1%	.5%
MacNeal-Schwendler	1.1	0	1.1	0	1.6%	0%	3.7%	0%
Investronica SA	.6	.4	.2	22	.9%	1.5%	.6%	1.4%
CAD Centre	.5	0	.4	0	.8%	0%	1.4%	0%
Matra Datavision	.5	.2	.3	8	.8%	.7%	1.0%	.5%
Other Companies	6.3	1.8	3.4	464	9.1%	7.3%	11.5%	29.6%
All Companies	69.4	25.2	29.1	1,568	100.0%	100.0%	100.0%	100.0%

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Table A-9 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: China
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
All N.A.-Based Companies	63.1	23.2	26.0	1,463	91.0%	92.1%	89.4%	93.3%
All Asian-Based Companies	1.3	.4	.6	7	1.9%	1.5%	2.1%	.5%
All European-Based Companies	5.0	1.6	2.5	97	7.2%	6.4%	8.5%	6.2%
All Hardware Companies	18.5	16.3	0	1,224	26.7%	64.7%	0%	78.0%
All Turnkey & Software Companies	50.9	8.9	29.1	344	73.3%	35.3%	100.0%	22.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (July 1994)

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Table A-10
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Computervision	6.9	1.4	3.5	66	12.8%	5.6%	19.2%	4.1%
Digital	6.0	4.8	0	199	11.2%	18.8%	0%	12.3%
Silicon Graphics	5.8	5.8	0	155	10.8%	22.9%	0%	9.6%
IBM	5.0	2.3	1.8	125	9.2%	9.1%	10.0%	7.7%
Sun Microsystems	3.6	2.9	0	121	6.7%	11.2%	0%	7.5%
Intergraph	3.5	1.4	1.0	49	6.4%	5.5%	5.4%	3.0%
SDRC	2.8	0	1.9	0	5.3%	0%	10.7%	0%
EDS Unigraphics	2.5	.7	1.2	32	4.7%	2.9%	6.6%	2.0%
Cadence	2.2	0	1.5	0	4.1%	0%	8.0%	0%
Altium*	1.5	.6	.9	113	2.8%	2.3%	5.0%	7.0%
Autodesk	1.5	0	1.5	0	2.8%	0%	8.4%	0%
Hewlett-Packard	1.5	1.3	.0	58	2.8%	5.1%	0%	3.6%
MacNeal-Schwendler	1.2	0	1.2	0	2.2%	0%	6.4%	0%
ESRI	.8	0	.6	0	1.5%	0%	3.5%	0%
Mentor Graphics	.7	.1	.3	3	1.2%	.3%	1.6%	.2%
Investronica SA	.6	.4	.2	22	1.2%	1.5%	.9%	1.3%
Gerber Systems	.5	.3	.2	9	1.0%	1.0%	1.3%	.5%
Matra Datavision	.5	.2	.3	8	1.0%	.7%	1.7%	.5%
Other Companies	4.9	2.8	1.4	640	9.1%	11.0%	7.7%	39.6%
All Companies	53.8	25.4	18.0	1,617	100.0%	100.0%	100.0%	100.0%

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Table A-10 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Hong Kong
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
All N.A.-Based Companies	51.6	24.6	17.1	1,578	95.9%	96.9%	94.8%	97.6%
All Asian-Based Companies	.1	0	0	0	.1%	.1%	.2%	0%
All European-Based Companies	2.1	.8	.9	39	3.9%	3.1%	5.0%	2.4%
All Hardware Companies	20.8	18.5	0	1,364	38.6%	72.7%	0%	84.4%
All Turnkey & Software Companies	33.0	7.0	18.0	253	61.4%	27.3%	100.0%	15.6%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (July 1994)

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Table A-11
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Fujitsu	523.7	298.0	165.8	18,152	11.8%	12.5%	12.1%	12.2%
NEC	402.9	269.1	97.8	22,773	9.1%	11.3%	7.1%	15.3%
IBM	331.5	160.6	115.4	9,756	7.5%	6.7%	8.4%	6.6%
Nihon Unisys	266.1	156.4	56.1	1,220	6.0%	6.6%	4.1%	.8%
Sun Microsystems	199.6	158.9	0	6,656	4.5%	6.7%	0%	4.5%
Hitachi	187.9	88.3	80.8	7,870	4.2%	3.7%	5.9%	5.3%
Hewlett-Packard	184.0	123.8	25.0	5,236	4.2%	5.2%	1.8%	3.5%
Toshiba*	179.9	89.9	71.9	4,944	4.1%	3.8%	5.2%	3.3%
Digital	120.5	93.0	2.7	3,576	2.7%	3.9%	.2%	2.4%
Mitsubishi Electric	116.9	91.4	14.6	1,849	2.6%	3.8%	1.1%	1.2%
Seiko*	98.9	34.6	49.5	587	2.2%	1.5%	3.6%	.4%
Hitachi Zosen Info Systems	98.0	83.1	4.8	937	2.2%	3.5%	.3%	.6%
Altium*	94.4	35.8	55.7	6,934	2.1%	1.5%	4.1%	4.7%
Mutoh Industries*	94.4	59.4	26.2	2,401	2.1%	2.5%	1.9%	1.6%
Zuken	87.6	25.2	41.8	497	2.0%	1.1%	3.0%	.3%
C. Itoh Techno-Science*	86.0	26.6	52.5	897	1.9%	1.1%	3.8%	.6%
Technodia	78.9	63.6	.8	958	1.8%	2.7%	.1%	.6%
Cadence	77.3	0	49.9	0	1.7%	0%	3.6%	0%
Sumisho Electronics*	75.6	53.3	19.3	1,475	1.7%	2.2%	1.4%	1.0%

(Continued)

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Table A-11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Info. Services Int'l. Dentsu*	72.0	5.0	50.4	124	1.6%	.2%	3.7%	.1%
Kozo Keikaku Engineering	71.9	3.6	18.6	134	1.6%	.1%	1.4%	.1%
ARGO GRAPHICS*	66.2	58.6	3.4	1,398	1.5%	2.5%	.2%	.9%
Computervision	57.7	12.0	29.1	557	1.3%	.5%	2.1%	.4%
SDRC	55.2	0	37.7	0	1.2%	0%	2.7%	0%
Sharp*	53.7	25.8	27.9	494	1.2%	1.1%	2.0%	.3%
Intergraph	49.7	20.7	13.2	726	1.1%	.9%	1.0%	.5%
Mentor Graphics	48.6	6.1	21.5	205	1.1%	.3%	1.6%	.1%
Marubeni Hytech*	47.7	7.1	39.7	252	1.1%	.3%	2.9%	.2%
Sony	47.0	47.0	0	2,331	1.1%	2.0%	0%	1.6%
Hakuto	43.1	25.4	17.6	1,006	1.0%	1.1%	1.3%	.7%
Autodesk	42.4	0	42.4	0	1.0%	0%	3.1%	0%
CADIX	41.5	17.8	20.3	229	.9%	.7%	1.5%	.2%
Mitsui Engineering	38.7	26.7	7.9	313	.9%	1.1%	.6%	.2%
Kubota Computer	38.2	29.1	6.1	438	.9%	1.2%	.4%	.3%
Uchida Yoko	36.0	21.2	13.1	1,002	.8%	.9%	1.0%	.7%
Andor	35.9	7.9	26.6	652	.8%	.3%	1.9%	.4%
Silicon Graphics	31.7	31.7	0	845	.7%	1.3%	0%	.6%

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Table A-11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Yokogawa Digital Computer	30.9	12.3	15.4	285	.7%	.5%	1.1%	.2%
Synopsys	30.8	0	20.8	0	.7%	0%	1.5%	0%
GDS	28.3	13.0	12.5	377	.6%	.5%	.9%	.3%
Toyo Information Systems*	27.5	16.4	8.4	309	.6%	.7%	.6%	.2%
Tokyo Electron*	27.0	8.7	12.6	124	.6%	.4%	.9%	.1%
Wacom	27.0	5.4	18.8	902	.6%	.2%	1.4%	.6%
Toshiba Engineering*	26.7	12.0	13.4	477	.6%	.5%	1.0%	.3%
Informatix*	25.3	20.3	3.0	187	.6%	.9%	.2%	.1%
EDS Unigraphics	20.5	6.0	9.6	258	.5%	.2%	.7%	.2%
Century Research Center	19.8	10.3	7.4	133	.4%	.4%	.5%	.1%
INS Engineering	15.4	7.6	7.9	56	.3%	.3%	.6%	0%
Graphtec Engineering	15.3	7.5	7.0	404	.3%	.3%	.5%	.3%
Nihon Itek*	15.3	7.2	6.3	97	.3%	.3%	.5%	.1%
Kanematsu Computer Systems*	15.0	7.3	6.2	218	.3%	.3%	.5%	.1%
MacNeal-Schwendler	14.5	0	14.2	0	.3%	0%	1.0%	0%

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Table A-11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Adam Net	14.4	7.1	5.4	19	.3%	.3%	.4%	0%
CPU	14.4	4.8	9.6	343	.3%	.2%	.7%	.2%
Racal-Redac	14.1	2.0	6.2	85	.3%	.1%	.5%	.1%
Omron	13.5	6.8	5.4	300	.3%	.3%	.4%	.2%
OKURA*	10.8	0	10.8	0	.2%	0%	.8%	0%
Pasco*	10.1	3.7	5.5	83	.2%	.2%	.4%	.1%
Design Automation	9.7	2.0	7.3	331	.2%	.1%	.5%	.2%
Viewlogic Systems	9.2	0	6.9	0	.2%	0%	.5%	0%
Sumitomo Denko Workstation	9.0	9.0	0	978	.2%	.4%	0%	.7%
COMPASS Design Automation	7.0	0	5.7	0	.2%	0%	.4%	0%
Ricoh*	6.5	0	5.5	0	.1%	0%	.4%	0%
Sophia Systems*	5.7	1.2	3.9	59	.1%	0%	.3%	0%
CrossCheck Technology	5.7	0	3.0	0	.1%	0%	.2%	0%
Quickturn Design Systems	5.4	1.6	2.7	33	.1%	.1%	.2%	0%
Cisigraph	5.1	1.4	2.7	77	.1%	.1%	.2%	.1%
Swanson Analysis	4.6	0	4.0	0	.1%	0%	.3%	0%
Zycad	4.2	2.4	.5	60	.1%	.1%	0%	0%
Gerber Systems	4.0	1.9	1.7	65	.1%	.1%	.1%	0%

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Table A-11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
ICAD	3.9	0	3.2	0	.1%	0%	.2%	0%
ESRI	3.8	0	3.1	0	.1%	0%	.2%	0%
ADRA Systems	3.6	0	2.8	0	.1%	0%	.2%	0%
Silvar-Lisco	2.7	0	1.8	0	.1%	0%	.1%	0%
Contec Microelectronics	2.4	0	2.2	0	.1%	0%	.2%	0%
Matra Datavision	2.4	.8	1.3	36	.1%	0%	.1%	0%
TSSI Japan	2.2	0	1.6	0	0%	0%	.1%	0%
Applicon	2.1	.7	.9	21	0%	0%	.1%	0%
CAD Centre	2.0	.0	1.5	0	0%	0%	.1%	0%
Delcam International	1.6	.6	.7	21	0%	0%	.1%	0%
CAMAX Systems Inc.	1.5	.1	.9	13	0%	0%	.1%	0%
TECHSPERT	1.3	.2	1.1	11	0%	0%	.1%	0%
Kanematsu Semiconductor*	.7	0	.5	0	0%	0%	0%	0%
ArcSys	.6	0	.5	0	0%	0%	0%	0%
Other Companies	0	0	.0	35,067	0%	0%	0%	23.6%
All Companies	4,425.5	2,383.7	1,371.3	148,857	100.0%	100.0%	100.0%	100.0%

(Continued)

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Table A-11 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Japan
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	1,729.5	866.3	537.6	77,103	39.1%	36.3%	39.2%	51.8%
All Asian-Based Companies	2,669.6	1,512.5	820.5	71,530	60.3%	63.5%	59.8%	48.1%
All European-Based Companies	26.4	4.9	13.3	223	.6%	.2%	1.0%	.1%
All Hardware Companies	879.0	787.2	2.7	83,249	19.9%	33.0%	.2%	55.9%
All Turnkey & SW Companies	3,546.5	1,596.6	1,368.6	65,608	80.1%	67.0%	99.8%	44.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (July 1994)

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Table A-12
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cadence	18.9	0	12.2	0	14.0%	0%	21.6%	0%
Computervision	10.8	2.3	5.4	105	8.0%	4.4%	9.6%	1.9%
Sun Microsystems	10.6	8.4	0	358	7.8%	16.1%	0%	6.6%
IBM	10.3	5.6	2.9	366	7.6%	10.8%	5.1%	6.7%
Digital	10.2	8.1	0	337	7.6%	15.6%	0%	6.2%
Autodesk	9.5	0	9.5	0	7.1%	0%	16.9%	0%
Zuken	6.2	1.8	3.0	35	4.6%	3.4%	5.3%	.6%
COMPASS Design Automation	4.7	0	3.8	0	3.5%	0%	6.7%	0%
Intergraph	4.6	1.9	1.2	68	3.4%	3.7%	2.2%	1.2%
Silicon Graphics	4.5	4.5	0	118	3.3%	8.6%	0%	2.2%
Hewlett-Packard	4.1	3.5	0	156	3.0%	6.6%	0%	2.9%
SDRC	3.5	0	2.4	0	2.6%	0%	4.3%	0%
Delcam International	2.1	.7	.9	27	1.5%	1.4%	1.6%	.5%
Quickturn Design Systems	1.8	.5	.9	11	1.3%	1.0%	1.6%	.2%
Altium*	1.5	.6	.9	113	1.1%	1.1%	1.6%	2.1%
ESRI	1.5	0	1.2	0	1.1%	0%	2.1%	0%
Design Automation	1.3	.3	1.0	44	.9%	.5%	1.7%	.8%
Mentor Graphics	1.1	.1	.5	5	.8%	.3%	.9%	.1%

(Continued)

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Table A-12 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Korea
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
EDS Unigraphics	1.0	.3	.4	12	.7%	.5%	.8%	.2%
Viewlogic Systems	.9	0	.6	0	.6%	0%	1.1%	0%
ADRA Systems	.8	0	.7	0	.6%	0%	1.2%	0%
Investronica SA	.6	.4	.2	22	.5%	.8%	.3%	.4%
Matra Datavision	.5	.2	.3	8	.4%	.3%	.5%	.1%
Silvar-Lisco	.5	0	.4	0	.4%	0%	.6%	0%
CAD Centre	.5	0	.4	0	.4%	0%	.6%	0%
Other Companies	19.6	12.2	5.8	3,637	14.5%	23.5%	10.3%	66.8%
All Companies	134.9	52.0	56.5	5,441	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	122.6	48.4	50.4	5,294	90.9%	93.1%	89.1%	97.3%
All Asian-Based Companies	7.7	2.2	4.1	83	5.7%	4.1%	7.2%	1.5%
All European-Based Companies	4.6	1.4	2.1	64	3.4%	2.8%	3.8%	1.2%
All Hardware Companies	45.7	39.2	.9	5,000	33.8%	75.4%	1.6%	91.9%
All Turnkey & SW Companies	89.3	12.8	55.7	441	66.2%	24.6%	98.4%	8.1%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (July 1994)

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Table A-13
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Mentor Graphics	11.1	1.4	4.9	47	18.3%	7.1%	19.0%	2.7%
Siemens Nixdorf Info systeme	7.1	2.3	2.8	109	11.7%	11.7%	10.9%	6.3%
IBM	4.5	2.2	1.6	154	7.4%	11.0%	6.2%	8.9%
SDRC	3.5	0	2.4	0	5.9%	0%	9.3%	0%
ESRI	3.4	0	2.7	0	5.6%	0%	10.5%	0%
Computervision	3.2	.7	1.6	31	5.3%	3.4%	6.2%	1.8%
Sun Microsystems	2.5	2.0	0	86	4.1%	10.1%	0%	5.0%
Digital	2.2	1.8	0	79	3.7%	9.3%	0%	4.6%
Silicon Graphics	2.2	2.2	0	58	3.6%	11.0%	0%	3.4%
Hewlett-Packard	1.6	1.4	0	62	2.7%	7.1%	0%	3.6%
Altium*	1.5	.6	.9	113	2.5%	3.0%	3.5%	6.6%
Intergraph	1.3	.5	.4	20	2.2%	2.8%	1.4%	1.1%
EDS Unigraphics	1.3	.4	.6	16	2.1%	1.9%	2.3%	.9%
Autodesk	1.2	0	1.2	0	2.0%	0%	4.6%	0%
Viewlogic Systems	.9	0	.6	0	1.4%	0%	2.5%	0%
Zuken	.7	.2	.4	4	1.2%	1.1%	1.4%	.2%
Investronica SA	.6	.4	.2	22	1.0%	2.0%	.7%	1.3%
IEZ	.6	.2	.3	14	.9%	1.0%	1.2%	.8%
Matra Datavision	.5	.2	.3	8	.9%	.9%	1.2%	.5%
Other Companies	8.3	2.8	3.9	881	13.8%	14.2%	15.2%	51.2%
All Companies	60.4	19.6	25.9	1,720	100.0%	100.0%	100.0%	100.0%

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Table A-13 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Singapore
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
All N.A.-Based Companies	49.9	16.2	21.5	1,555	82.7%	82.4%	83.0%	90.4%
All Asian-Based Companies	.7	.2	.4	4	1.2%	1.1%	1.4%	.2%
All European-Based Companies	9.8	3.3	4.1	161	16.2%	16.6%	15.6%	9.3%
All Hardware Companies	12.6	11.3	0	1,395	20.8%	57.6%	0%	81.1%
All Turnkey & SW Companies	47.8	8.3	25.9	325	79.2%	42.4%	100.0%	18.9%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (July 1994)

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Table A-14
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Autodesk	9.2	0	9.2	0	10.8%	0%	28.0%	0%
Digital	9.0	7.1	0	256	10.5%	18.7%	0%	5.8%
Cadence	7.8	0	5.0	0	9.1%	0%	15.2%	0%
IBM	6.4	3.3	2.1	218	7.5%	8.6%	6.2%	4.9%
Computervision	5.1	1.1	2.6	49	5.9%	2.8%	7.8%	1.1%
Sun Microsystems	4.9	3.9	0	169	5.8%	10.4%	0%	3.8%
Silicon Graphics	3.8	3.8	0	101	4.4%	10.0%	0%	2.3%
SDRC	3.5	0	2.4	0	4.1%	0%	7.3%	0%
Intergraph	3.4	1.4	.9	49	3.9%	3.7%	2.8%	1.1%
Hewlett-Packard	2.9	2.5	0	109	3.4%	6.5%	0%	2.5%
ESRI	1.9	0	1.5	0	2.2%	0%	4.6%	0%
Quickturn Design Systems	1.8	.5	.9	11	2.1%	1.4%	2.7%	.2%
Delcam International	1.6	.5	.7	20	1.8%	1.4%	2.0%	.5%
Altium*	1.5	.6	.9	113	1.8%	1.5%	2.7%	2.6%
Mentor Graphics	1.0	.1	.5	4	1.1%	.3%	1.4%	.1%
EDS Unigraphics	1.0	.3	.4	12	1.1%	.7%	1.3%	.3%
COMPASS Design Automation	.9	0	.8	0	1.1%	0%	2.3%	0%
Hitachi Zosen Info Systems	.9	.8	0	9	1.1%	2.0%	.1%	.2%

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Table A-14 (Continued)
1993 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
Platform: All Platforms
Region: Taiwan
Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Hardware Units Shipped
Zycad	.8	.5	.1	12	1.0%	1.3%	.3%	.3%
Gerber Systems	.8	.4	.3	13	.9%	1.0%	1.0%	.3%
Investronica SA	.6	.4	.2	22	.7%	1.0%	.5%	.5%
Matra Datavision	.5	.2	.3	8	.6%	.5%	.9%	.2%
Other Companies	14.6	10.2	3.3	3,230	17.0%	27.0%	10.0%	73.1%
All Companies	85.7	37.8	33.0	4,416	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	81.2	35.7	31.4	4,350	94.7%	94.6%	95.2%	98.5%
All Asian-Based Companies	1.0	.8	.1	9	1.2%	2.1%	.3%	.2%
All European-Based Companies	3.5	1.3	1.5	57	4.1%	3.3%	4.5%	1.3%
All Hardware Companies	34.3	29.4	.9	4,150	40.0%	77.9%	2.7%	94.0%
All Turnkey & SW Companies	51.4	8.4	32.1	266	60.0%	22.1%	97.3%	6.0%

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals.
Source: Dataquest (July 1994)

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Program: CAD/CAM/CAE/GIS Asia/Pacific
Product Code: CCAM-AP-MT-9301
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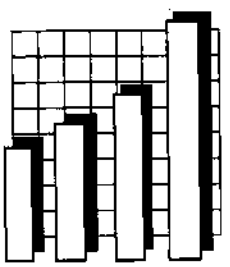

MarketTrends
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Chapter 1
Report Overview

Report Organization

This report presents the results of Dataquest's research in the 1992 Asian CAD/CAM/CAE/GIS market and provides a comprehensive market analysis. The report is organized as follows:

- Executive Summary—An overview of the major findings of the report
- Trends Analysis—The major trends and issues driving the market are defined, discussed, and analyzed.
- Market Analysis Methodology—Methodology and definitions used to examine CAD/CAM/CAE/GIS market performance are presented.
- Market Review—Market results of 1992 are analyzed by region and by application.

Methodology

Market and trends analyses are based upon many years of industry experience in the CAD/CAM/CAE/GIS group. We use the results of primary research to define, measure, and estimate the significant parameters of the market. Vendor and end-user-based surveys are conducted to gain further insight into significant market dynamics. First-hand discussions with end users, investors, and vendors are used to verify assumptions and to check analysis results.

Research Analyst: Tamio Fukuda

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Chapter 2
Executive Summary

Highlights

In 1992, the Asian CAD/CAM/CAE/GIS market reached $4.255 billion. Asian-based vendors represent 50.5 percent of the Asian CAD/CAM/CAE/GIS market, with North America, Europe, and Rest of the World comprising the rest of the total.

Dataquest has observed the following major trends and issues, as follows:

- Economy—The general recessionary climate throughout much of Asia during 1992 depressed capital investment in all the major Asian industries
- End-user industries—The major Asian end-user industries are undergoing significant changes that will affect CAD/CAM/CAE/GIS sales into the various industries in one way or another
- Networking—Most end users prefer to use a workstation or low-cost personal computer as their computing platform for CAD/CAM/CAE/GIS applications. There is a growing trend toward having these stations networked.

Market Analysis

Market highlights are as follows:

- Overall, the Asian CAD/CAM/CAE/GIS market grew 1.6 percent in 1992, reaching $4.255 billion in total factory revenue.
- The software segment grew 5.4 percent, reaching $1.305 billion.
- The hardware segment decreased 1.1 percent, dropping to $2.4 billion.
- A view of the Asian CAD/CAM/CAE/GIS market by platform shows the importance of the technical workstation in this market. More than 56 percent of the total Asian factory revenue, or $2.395 billion, is represented by technical workstations.
- The largest regional market in 1992 was Japan, with $3.993 billion, representing 93.9 percent of the total Asian CAD/CAM/CAE/GIS market (see Table 2-1).
- The largest application sector in Asia is the mechanical segment, which has $2.240 billion, or 52.6 percent of the total Asian CAD/CAM/CAE/GIS market.
- The fastest-growing application segment in 1992 was electronic CAE, with 6.5 percent growth during 1992.

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Table 2-1
1992 Asian CAD/CAM/CAE/GIS Revenue Distribution by Region

Country	Total Factory Revenue (U.S.$M)	Share of Asian Market (%)
China	40.8	1.0
Hong Kong	55.0	1.3
Japan	3,993.1	93.9
Korea	84.6	2.0
Singapore	27.5	0.6
Taiwan	53.6	1.3
Total	4,254.6	100.0

Notes: Columns may not add to totals shown because of rounding
Source: Dataquest (December 1993)

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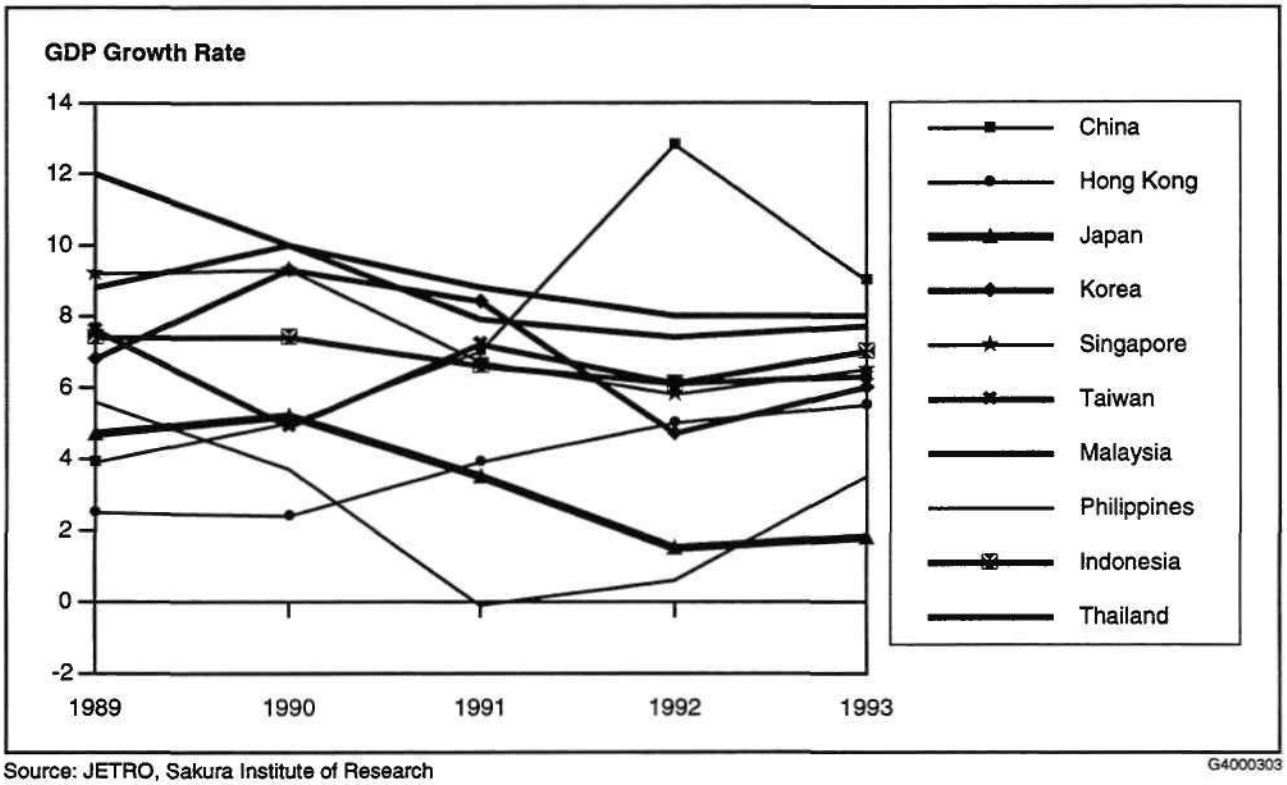
Chapter 3
Economics of the Asian Region

In the 1980s, the size of trade in the Asian region increased because of high growth in the Asian newly industrialized economies (NIEs) and the Association of Southeast Asian Nations (ASEAN). It is believed that the comparative advantages of the Asian region changed significantly in the latter half of the 1980s. The major factors that contributed to this change were the rise of labor costs in Japan and the Asian NIEs because of exchange rate adjustments and the tighter labor supply/demand relationship, progress in the international division of labor through stepped-up foreign direct investment, and full-scale efforts by ASEAN to promote export-oriented industrialization. Figure 3-1 shows gross domestic product growth rates.

Dollar Exchange Rate

The stronger Japan, Singapore, and Hong Kong exchange rates against the U.S. dollar (see Table 3-1 and Figure 3-2) highlight the effect that fluctuations in the dollar exchange rate had on the results of the Asian CAD/CAM/CAE/GIS vendors.

Figure 3-1
Asian GDP Growth Rates



Source: JETRO, Sakura Institute of Research

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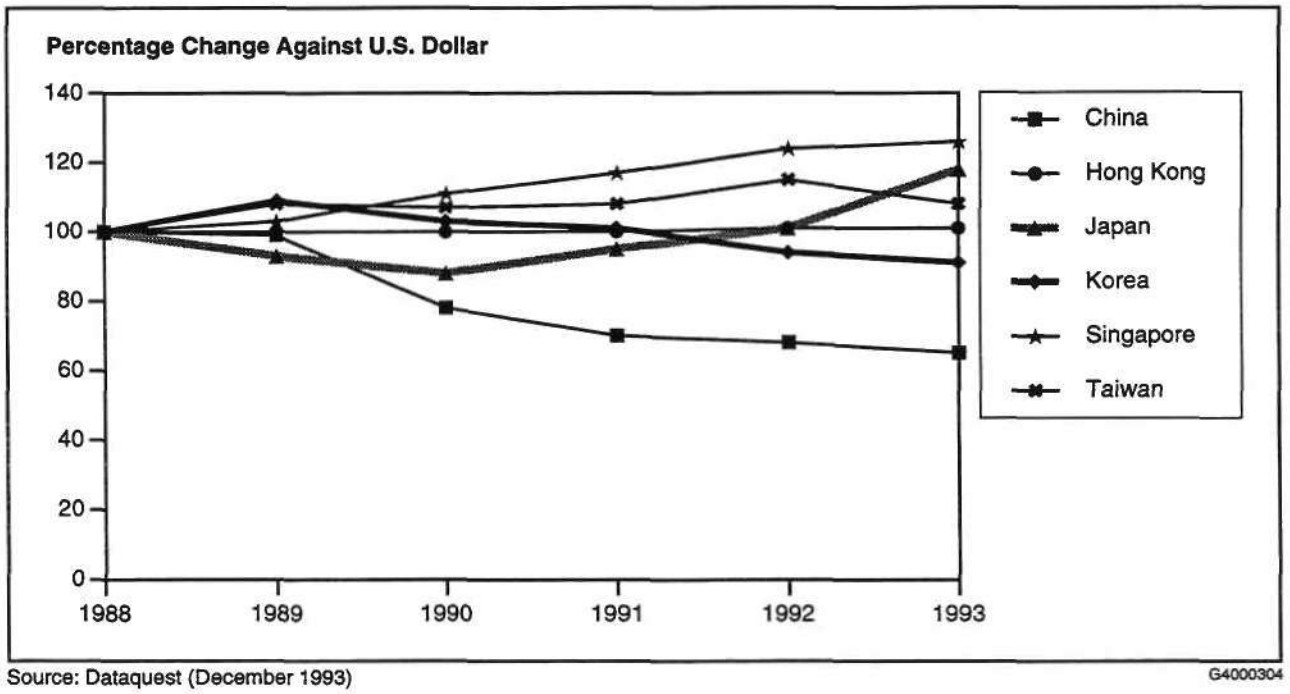
Table 3-1
Exchange Rate by Region

Country	Units	1988	1989	1990	1991	1992	1993 (Estimated)
United States	U.S.$/U.S.$	1.00	1.00	1.00	1.00	1.00	1.00
China	Renminbi/U.S.$	3.7314	3.7690	4.7955	5.3348	5.5082	5.7814
Hong Kong	HK$/U.S.$	7.8071	7.8009	7.7901	7.7711	7.7401	7.7259
Japan	Yen/U.S.$	128.14	138.00	144.82	134.68	126.45	108.57
Korea	Won/U.S.$	734.77	674.35	710.51	730.90	782.63	807.90
Singapore	Singapore$/U.S.$	2.0130	1.9508	1.8128	1.7276	1.6285	1.5962
Taiwan	Taiwan$/U.S.$	28.64	26.42	26.89	26.50	24.93	26.62

Source: Dataquest (December 1993)

Figure 3-2
1988 to 1993 Exchange Rate Trace



Source: Dataquest (December 1993) G4000304

Figure 3-3 shows the geographic area and population distributions of the countries that make up the Asian region. China comprises 95 percent of the total Asian area and makes up 84 percent of the Asian population. Table 3-2 gives overall economic information for the Asian countries, and Table 3-3 shows the number of direct investments made by Japanese companies from 1971 to 1992. Figure 3-4 illustrates Asia's poverty levels and population changes.

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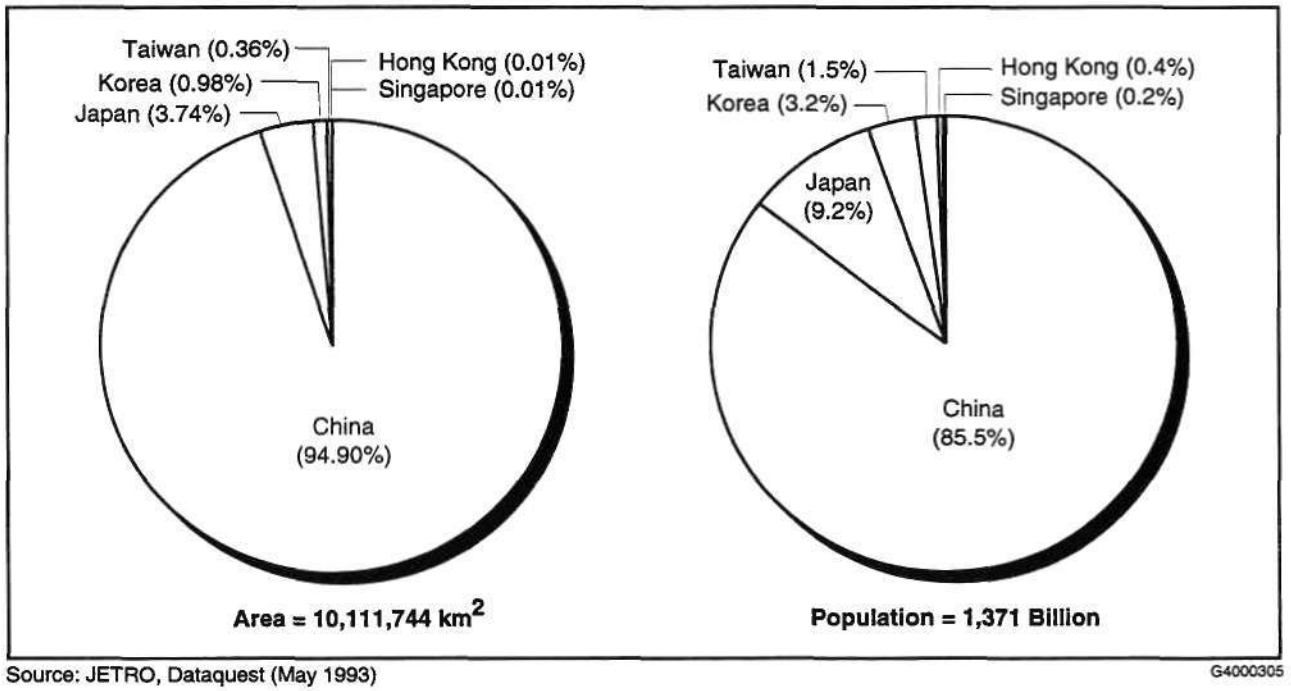
Figure 3-3
Area and Population Distribution of Asia



Source: JETRO, Dataquest (May 1993)

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Table 3-2
Asian Statistics

	Units	China	Hong Kong	Japan	Korea	Singapore	Taiwan	Malaysia	Philippines	Indonesia	Thailand
Population	Millions	1,172	6	125	44	3	21	19	63	188	58
Area	km²	9,596,961	1,075	377,801	99,274	633	36,000	329,749	300,000	1,948,732	513,115
1992 GNP	(U.S.$B)	434.1	95.9	3,703.8	294.5	46.8	210.9	55.2	53.7	111.0	103.8
1992 Per Capita GNP	(U.S.$)	370	16,507	29,790	6,749	16,582	10,215	2,965	854	591	1,796
1992 Unemployment	(%)	2.3	1.5	2.1	2.3	1.9	1.5	4.3	10.5	NA	3.1
1992 Real GDP Growth Rate	(%)	12.8	5.0	1.5	4.7	5.8	6.1	8.0	0.6	6.1	7.4
1992 Exports	(U.S.$B)	891	1,195	3,396	766	634	815	407	107	328	321
1992 Imports	(U.S.$B)	823	1,234	2,330	818	721	720	398	166	273	400
Balance of Trade	(U.S.$B)	68	-39	1,066	-51	-87	95	9	-60	55	-79

NA = Not available
Source: Sakura Institute of Research, IFS, DOT, Dataquest (October 1993)

Table 3-3
Number of Direct Investments (Divestments) Made by Japanese Companies

	China	Hong Kong	Japan	Korea	Singapore	Taiwan	Malaysia	Philippines	Indonesia	Thailand
1990	165	244	-5,863	54	139	102	169	58	155	377
1991	246	178	-4,564	48	103	87	136	42	148	258
1992	490	154	-3,741	28	100	48	111	45	122	130
1971 to 1992	1,595	4,075	-71,541	1,923	2,762	2,535	1,756	937	2,143	2,853

Source: IFS, DOT, Dataquest (October 1993)

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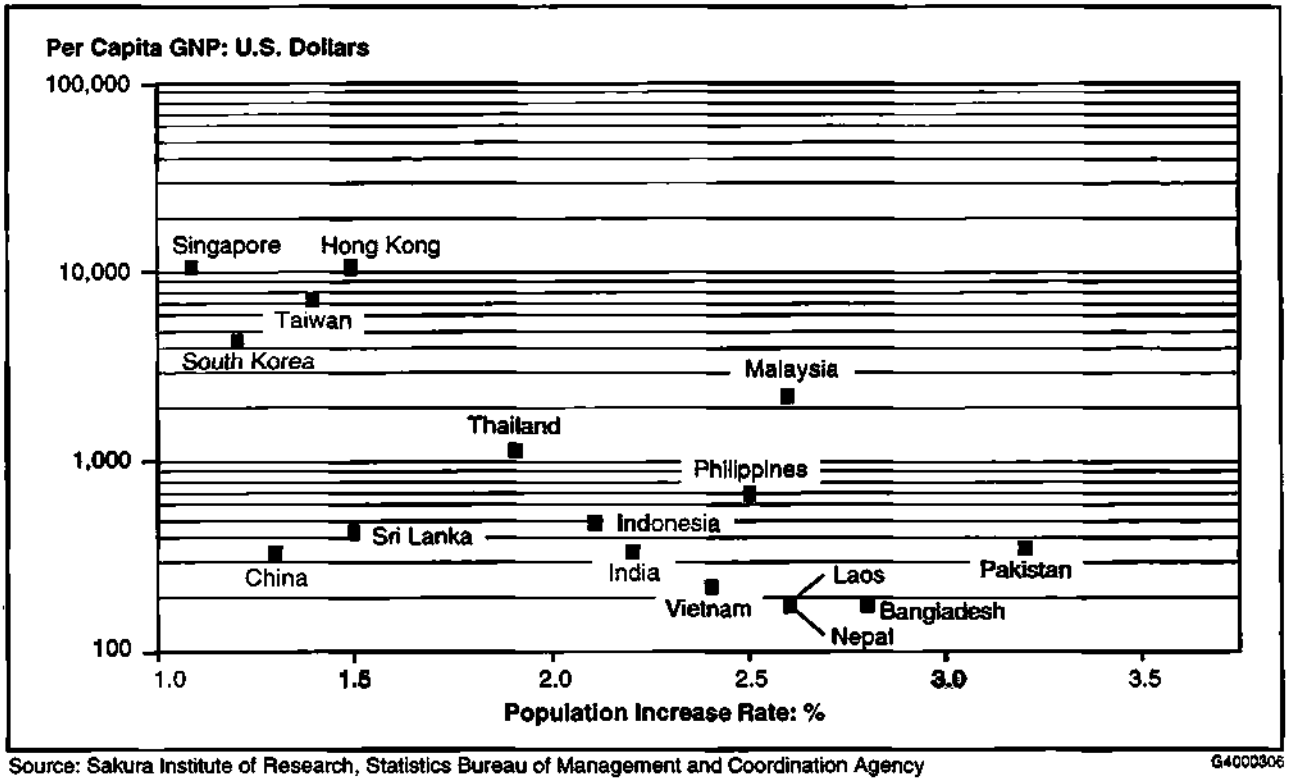
Figure 3-4
Population and Poverty in Asia



Source: Sakura Institute of Research, Statistics Bureau of Management and Coordination Agency G4000306

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Chapter 4
Market Analysis Methodology

Methodology

Every year, Dataquest's CAD/CAM/CAE/GIS group conducts two vendor surveys to define the market performance for the previous year. In the fourth quarter, the process begins with direct contact of more than 400 vendors worldwide (see Figure 4-1). This information gives the market share analysis published in February. Additional survey work is completed during the first and second quarters that refines and updates the earlier analysis. The result is a market share update publication in July. The information described resides in a multidimensional database that contains the following information:

- 326 CAD/CAM/CAE/GIS companies
- 4 major applications
- 94 subapplications
- 27 operating systems
- 18 countries/regions
- History from 1984

Definitions

Regions

The regions covered in the database are defined as follows:

- North-America—Includes the United States, Canada, and Mexico
- Europe—Includes Benelux (Belgium, Luxembourg, Netherlands), France, Germany, Italy, Scandinavia (Denmark, Finland, Norway, and Sweden), Spain, United Kingdom, and the rest of Europe (Switzerland, eastern Europe, and all other European countries and principalities)
- Asia—Includes Japan, Singapore, Taiwan, Korea, China, Hong Kong, Malaysia, Thailand, the Philippines, and Indonesia
- Rest of world—All other countries including Australia, New Zealand, Oceania, Africa, India, Central America, South America, and the Middle East

Applications

Applications are as follows:

- Mechanical—This segment includes computer-aided applications used to design, analyze, document, and manufacture discrete parts, components, and assemblies.

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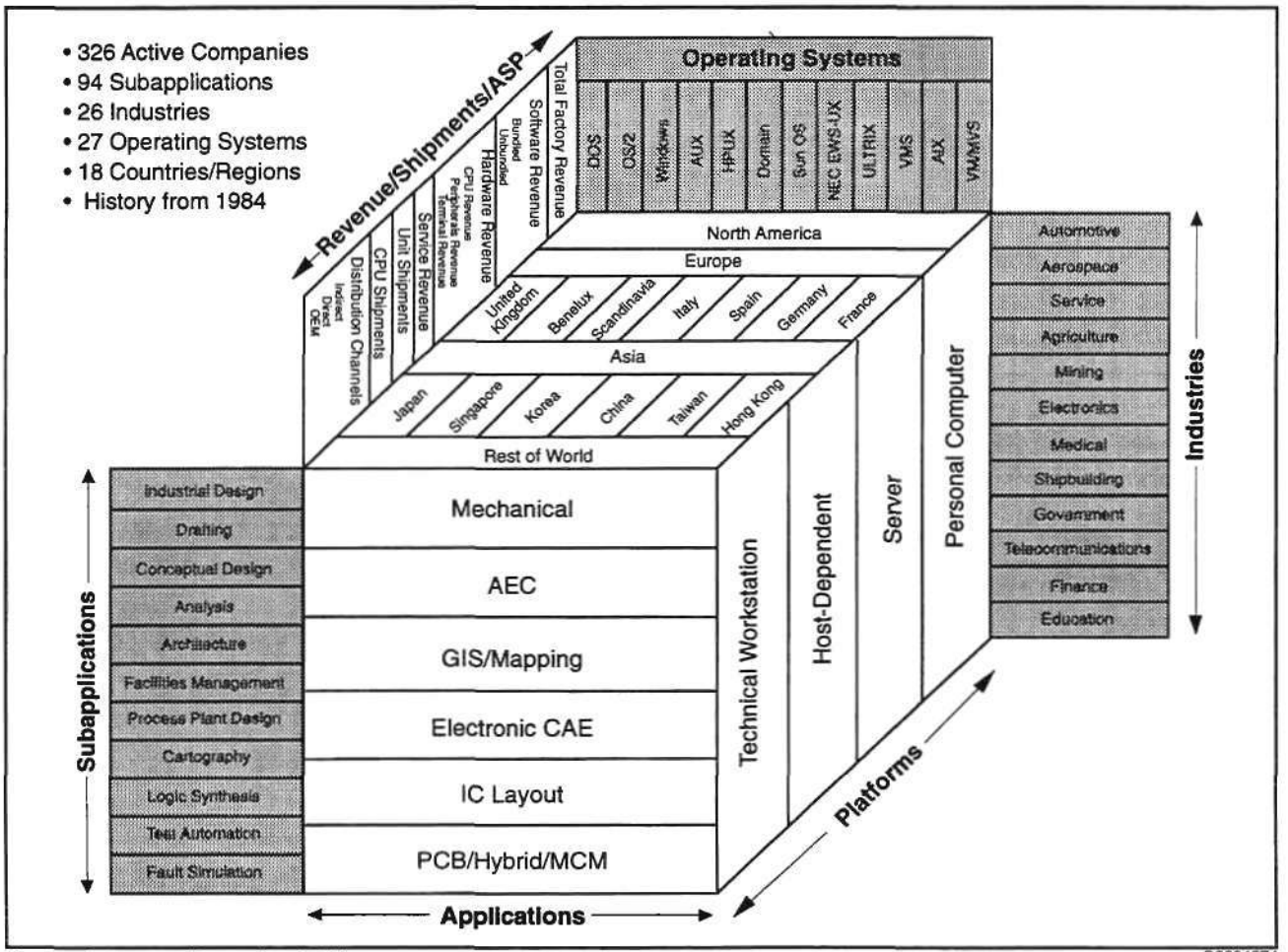
Figure 4-1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (December 1993)

- AEC (architectural, engineering, and construction)—This segment covers the use of computer-aided tools used by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of discrete entities.
- GIS (geographic information systems)—This computer-based technology includes hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.
- EDA (electronic design automation)—This segment covers computer-based tools used to automate the process of designing an electronic product, including the end-user applications of electronic CAE, IC layout, and printed circuit board (PCB)/hybrid/multichip module (MCM).

Computing Platforms

The computing platforms used for CAD/CAM/CAE/GIS include everything from notebooks to super computers. The Dataquest CAD/CAM/CAE/GIS database uses four platform designations—technical

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workstations, host-dependent systems, servers, and personal computers—to track the market as follows:

- Technical workstations operate as a single-user computer with a large range of performance options; these include a virtual multitasking operating system (UNIX, VMS, DOMAIN) and built-in functions for networking and high-performance graphics.
- Host-dependent systems are a shared logic device with external workstations/terminals that are dependent on the host for operation.
- Servers can be used for a variety of services that operate transparently for the user. Functions include file storage, database access, and computer capability.
- Personal computers are defined as single-user computers that have features found in technical workstations (such as a virtual operating system, networking, and high performance graphics) but are optional rather than integrated by the manufacturer. Overall performance characteristics are generally positioned lower than a workstation.

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Chapter 5
The 1992 Asian CAD/CAM/CAE/GIS Market

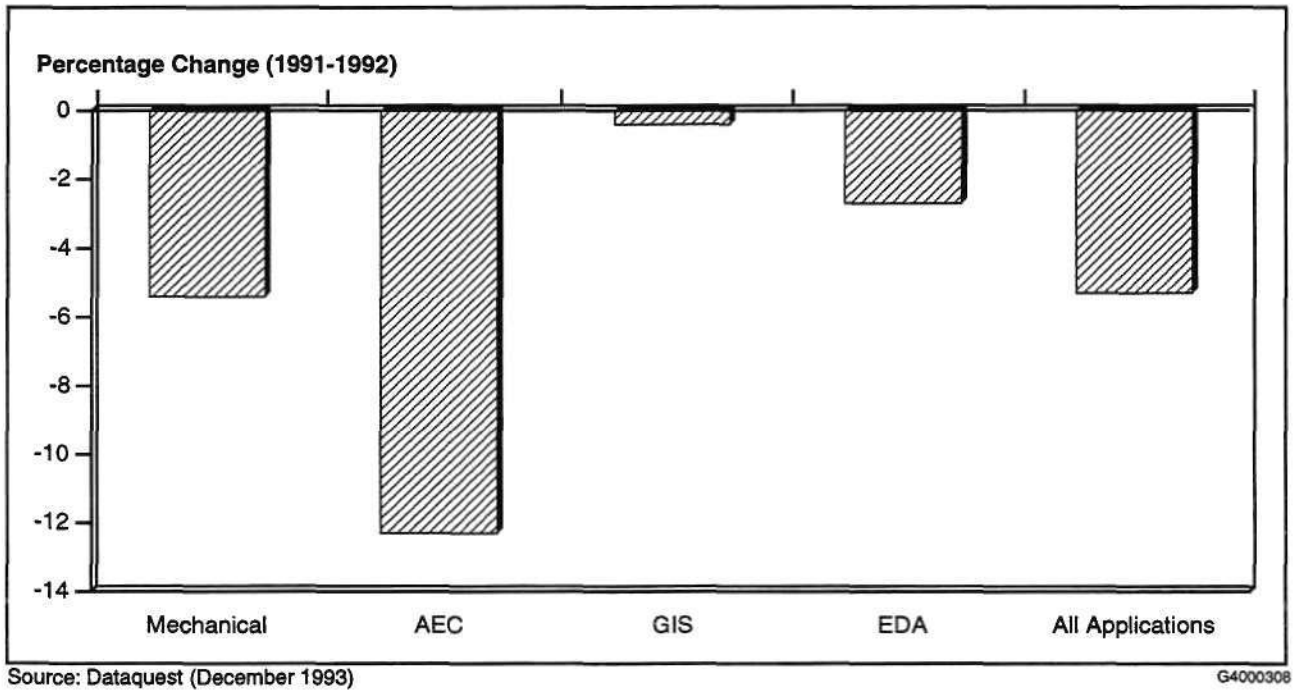
Overall, the Asian CAD/CAM/CAE/GIS market grew 1.6 percent in 1992, reaching $4.255 billion for total factory revenue. The software segment grew 5.4 percent, reaching $1.305 billion. The GIS software market experienced the most growth, posting a 23.5 percent increase over 1991 to $93.3 million in 1992.

In certain situations, monetary conversions may play an important role in gauging the growth of a geographic region. In particular, the exchange rates in yen have had a noticeable impact in the Japanese CAD/CAM/CAE/GIS market. In U.S. dollars, the Japanese CAD/CAM/CAE/GIS market increased 1.6 percent. However, the Dataquest conversion factor for yen changed from ¥134.68/U.S.$ in 1991 to ¥126.45/U.S.$ in 1992. The effect of this currency change is that in yen, the Japanese CAD/CAM/CAE/GIS market decreased 5.3 percent. Figure 5-1 shows the overall Japanese CAD/CAM/CAE/GIS market change in yen. With 93.9 percent of the Asian CAD/CAM market in Japan, the impact of the Japanese exchange rate affects all the Asian revenue figures.

Revenue Distribution

Total CAD/CAM/CAE/GIS factory revenue for the Asian market in 1992 was $4.255 billion (see Figure 5-2). Of this amount, North American vendors shipped 48.1 percent, European vendors shipped 1.4 percent, and

Figure 5-1
1991 to 1992 Percentage Change in Japanese CAD/CAM/CAE/GIS Market in Yen



Source: Dataquest (December 1993)

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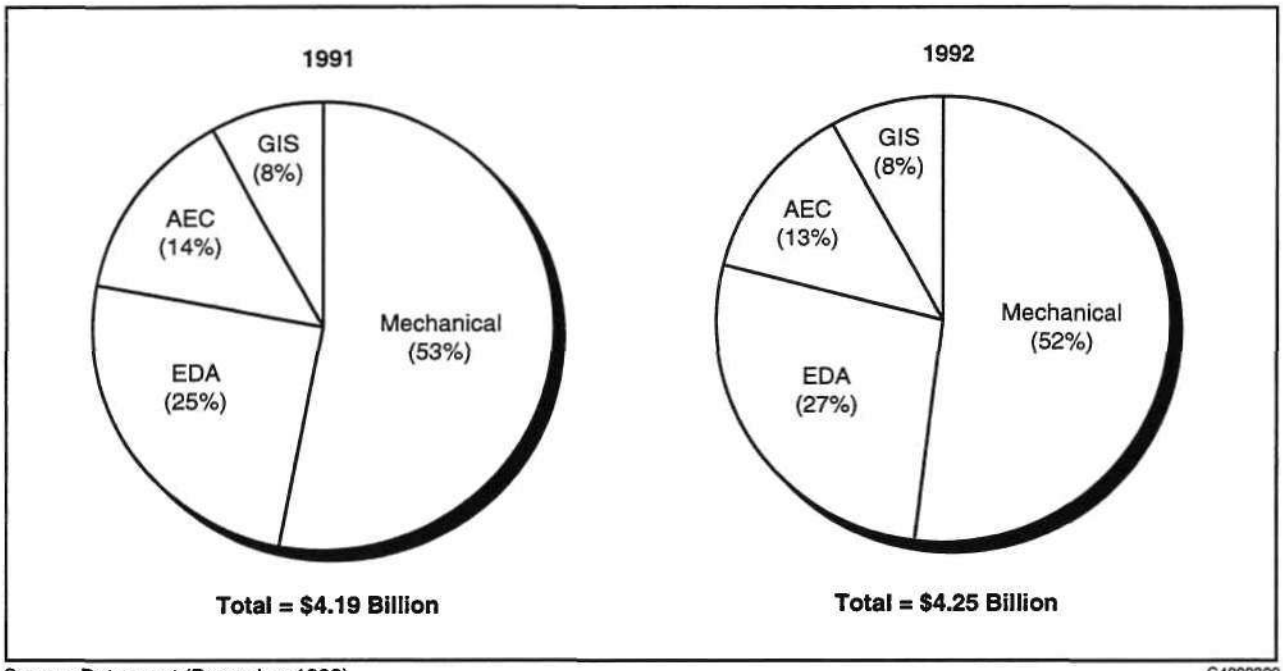
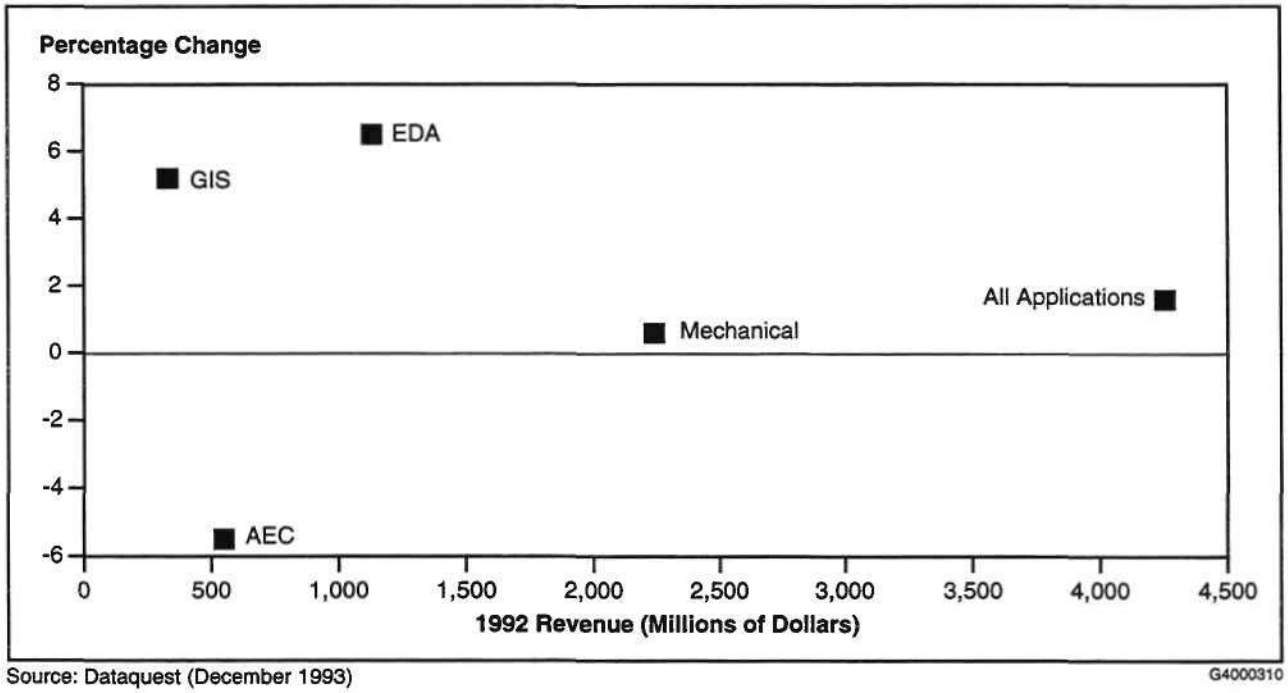
Asian vendors shipped the remaining 50.5 percent. Figure 5-3 shows 1992 revenue growth by application.

Figure 5-2
1991 and 1992 Asian Revenue Distribution, by Application



Source: Dataquest (December 1993) G4000309

Figure 5-3
Asian Revenue Growth, by Application



Source: Dataquest (December 1993) G4000310

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As a group, the Asian top 10 gained little ground in 1992. Their 41.2 percent share of the total market in 1991 rose to 42.2 percent in 1992, representing slightly more than $1.795 billion. This small growth could be in part because of the state of the economy in several Asian regions where some large manufacturers have cut budgets or deferred investment in information technology into 1993.

Asian Industry

The competitiveness of Asian NIEs and Japan exports is declining because of the rising cost of domestic production stemming from a variety of internal factors such as a labor shortage, wage increases, skyrocketing land prices, and pollution problems. Nevertheless, Japan still maintains a high degree of competitiveness in capital and technology-intensive products of higher added-value. However, in the case of popular, lower value-added products, imports increased as a result of outward foreign direct investment and OEM production by Japanese companies.

Many Japanese consumer companies have established factories in Indonesia, Thailand, and Malaysia, countries that can supply a large labor force. In the future, Asian factories will be found mostly in the ASEAN countries (Singapore, Malaysia, Indonesia, Thailand, and Brunei) and China.

Country Level Analysis

The following are brief analyses of the CAD/CAM/CAE/GIS market in Asia, by application. Because the drivers for each application differ, depending on the regional economic and cultural differences, it is more meaningful to analyze the market on a regional level.

China

Country Statistics

Tables 5-1 and 5-2 contain country statistical information for China, and Figure 5-4 gives China's 1992 revenue growth by application.

Economy

The population of China was approximately 1.172 billion in 1992. Because of the country's large population and land mass, the Chinese market comprises a very attractive long-term investment for Taiwanese, Hong Kong,

Table 5-1
China Country Statistics

Population (B)	1.172
Area km^2	9,596,961
1992 GNP (U.S.$B)	434.1
1992 Per Capita GNP (U.S.$)	370
1992 Unemployment (%)	2.3

Source: Sakura Institute of Research, JETRO

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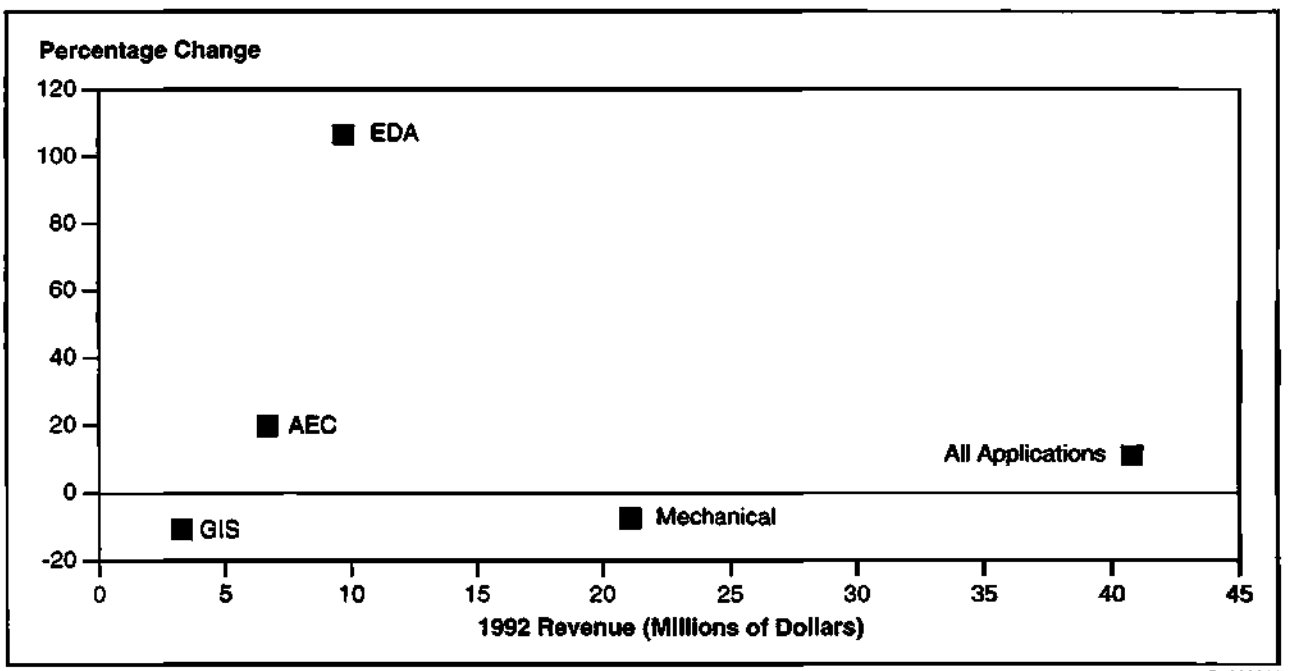
Table 5-2
1990 to 1993 China Real GDP Growth Rate and Annual Average Exchange Rate

	1990	1991	1992	1993 (Estimated)
Real GDP Growth (%)	5.0	7.0	12.8	9.0
Exchange Rate (Renminbi/U.S.$)	4.7955	5.3348	5.5082	5.7814
Change (%)	27.2	11.2	3.3	5.0

Source: Dataquest (December 1993)

Figure 5-4
1992 China Revenue Growth, by Application



Source: Dataquest (December 1993) G4000311

and Japanese industries. The Chinese government has a plan, begun in 1993, to introduce CAD/CAM systems to Chinese companies.

China also holds a great opportunity for the automobile industry. If China had the same level of penetration for automobiles as Japan, the size of the market would total to about 600 million cars.

CAD/CAM/CAE/GIS Applications

The top software vendors in China for 1992 were Cadence, Mentor Graphics, IBM, Intergraph, and Computervision.

- Mechanical—The mechanical market in China was valued at approximately $21 million in 1992, a decline of nearly 8 percent over 1991. Software revenue in 1992 reached nearly $3 million, declining more than 15 percent from 1991 levels.
- AEC—In 1992, the AEC market reached nearly $7 million, growing 19 percent over 1991.

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- GIS—The market for GIS CAD applications during 1992 in China dropped by more than 11 percent to slightly more than $3 million in total factory revenue. But software revenue in the GIS CAD market grew almost 20 percent to nearly $1 million.
- EDA—The market for EDA CAD applications represented the fastest-growing segment in Asia. This application grew 107 percent to nearly $10 million in total revenue and more than 200 percent to between $1 million and $2 million in software revenue. Recently, a few electronics companies established factories in China, and Zuken and a few other CAD vendors established branch offices in China.

Hong Kong

Country Statistics

Table 5-3 and Table 5-4 give country level statistics for Hong Kong. Figure 5-5 shows 1992 Hong Kong revenue growth by application.

Table 5-3
Hong Kong Country Statistics

Population (M)	6
Area km^2	1,075
1992 GNP (U.S.$B)	95.9
1992 Per Capita GNP (U.S.$)	16,582
1992 Unemployment (%)	1.8

Source: Sakura Institute of Research, JETRO

Table 5-4
1990 to 1993 Hong Kong Real GDP Growth Rate and Annual Average Exchange Rate

	1990	1991	1992	1993 (Estimated)
Real GDP Growth (%)	2.4	3.9	5.0	5.5
Exchange Rate (H.K.$/U.S.$)	7.7901	7.7711	7.7401	7.7259
Change (%)	-0.1	-0.2	-0.4	-0.2

Source: Sakura Institute of Research, Dataquest (December 1993)

Economy

The future of Hong Kong is one of the important issues to consider when examining the Asia/Pacific region's overall economic health. The growth of Hong Kong is not limited to Hong Kong alone. It will become the gateway between China and the rest of the world.

China's GDP growth rate has been steadily increasing since 1989. Although GDP growth in 1989 and 1990 were 2.5 percent and 2.4 percent, respectively, the years 1991 and 1992 resulted in higher growth rates of 3.9 percent and 5.0 percent, respectively. This relatively higher growth came from successful trade with China. Hong Kong will prosper as a window of trade for China as well as a potential funds market.

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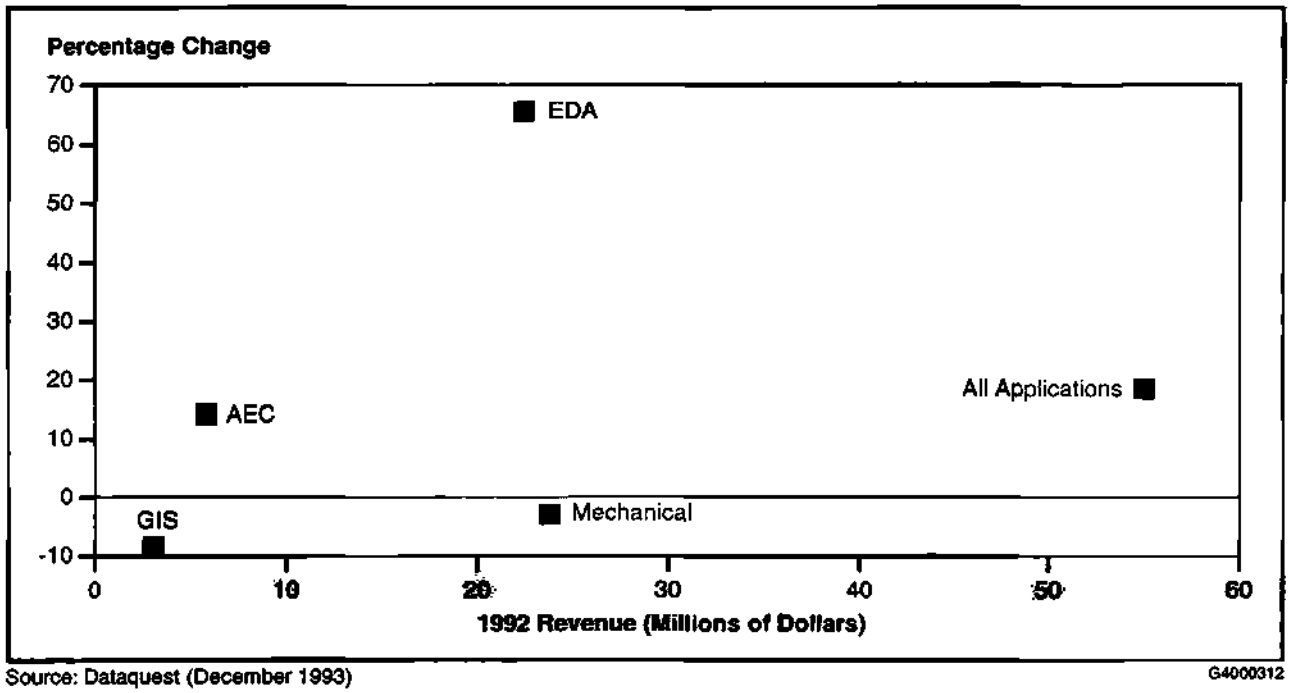
Figure 5-5
1992 Hong Kong Revenue Growth, by Application



Source: Dataquest (December 1993) G4000312

CAD/CAM/CAE/GIS Applications

- Mechanical—The mechanical CAD segment in Hong Kong declined 3 percent in total revenue, dropping to $24 million. Although software revenue showed slight growth of 5 percent and hardware revenue remained essentially the same, service revenue dropped nearly 15 percent.
- AEC—The 1992 AEC market in Hong Kong reached close to $6 million, growing more than 14 percent from 1991. Hardware revenue led the growth in this area.
- GIS—The GIS segment decreased more than 8 percent in 1992, to slightly more than $3 million in total revenue, with hardware revenue declining by 26 percent from 1991 levels.
- EDA—The EDA market in Hong Kong surpassed $22 million in 1992, growing more than 65 percent from 1991. Hardware grew 91 percent and software grew 52 percent.

Japan

Country Statistics

Tables 5-5 and 5-6 contain country statistics for Japan, and Figure 5-6 displays Japan's revenue growth by application.

Economy

Because the exchange rate for yen per dollar is exceeding ¥108 these days, obtaining net revenue based on exporting information is very difficult for most Japanese companies. Because of the appreciated yen, the pricing

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Table 5-5
Japan Country Statistics

Population (M)	125
Area km^2	377,801
1992 GNP (U.S.$B)	3,703.80
1992 Per Capita GNP (U.S.$)	29,790
1992 Unemployment (%)	2.1

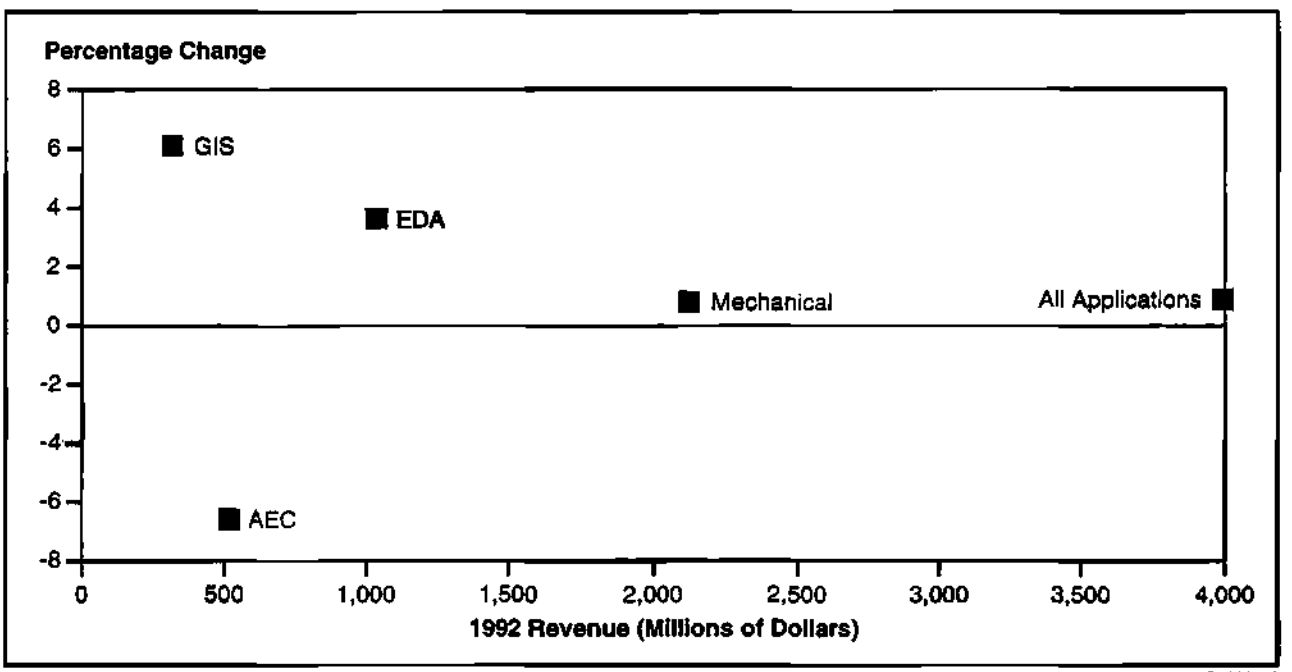
Source: Sakura Institute of Research, JETRO

Table 5-6
1990 to 1993 Japan Real GDP Growth Rate and Annual Average Exchange Rate

	1990	1991	1992	1993 (Estimated)
Real GDP Growth (%)	5.2	3.5	1.5	1.8
Exchange Rate (Yen/U.S.$)	144.71	134.68	126.45	108.57
Change (%)	4.9	-6.9	-6.1	-14.1

Source: Sakura Institute of Research, Dataquest (December 1993)

Figure 5-6
1992 Japan Revenue Growth, by Application



Source: Dataquest (December 1993) G4000313

position of Japanese products became weak in every country in 1992. Also, as Japanese companies invested money for capital investment and increased employee counts during more bubbly economic times, fixed expenses have increased. In opposition to the traditional long-term employment system, Japanese companies have started to decrease their headcounts.

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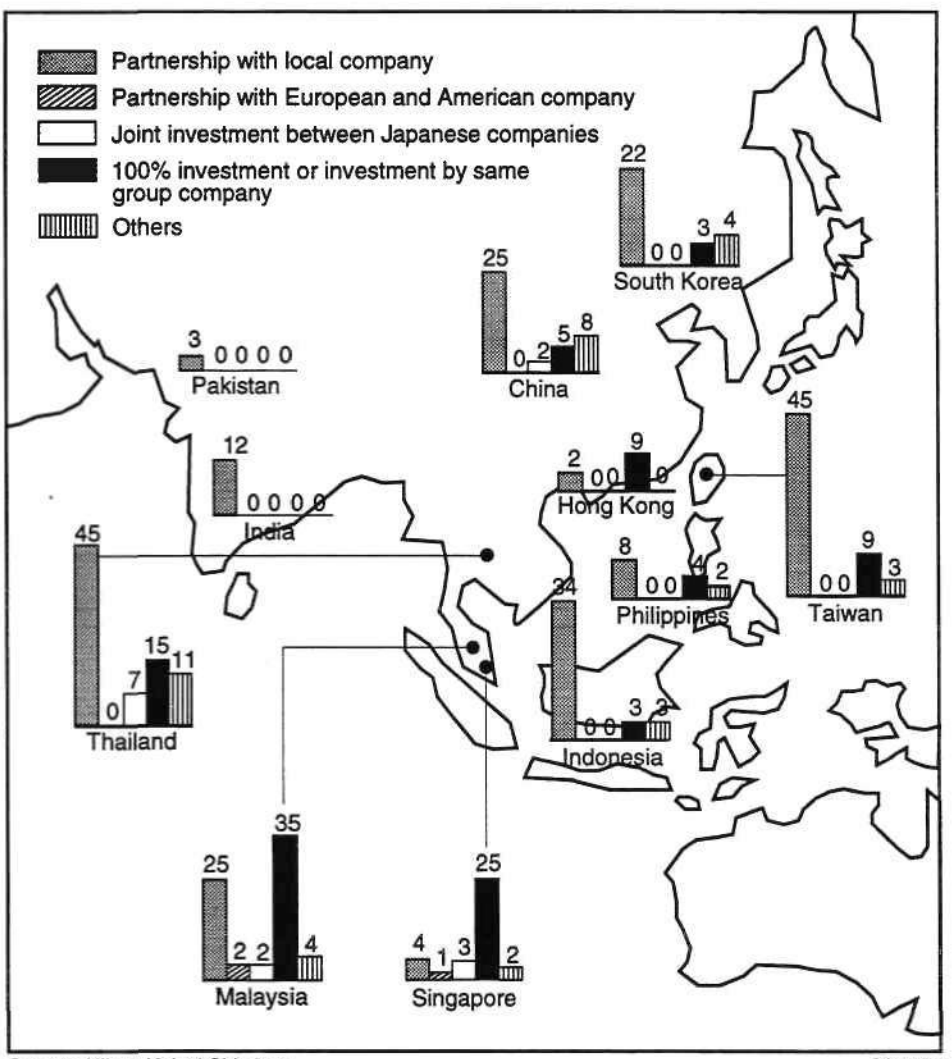
Home electronics companies have shifted their manufacturing sites to NIEs and ASEAN rapidly. Products with higher levels of integration are often produced in Japan, whereas commodity goods with lower levels of integrated technology are often produced in other Asian regions. This is one reason why Japan still maintains a high degree of competitiveness in capital- and technology-intensive products of higher added value. In the case of popular-type products of lower added value, imports increased as a result of outward direct foreign investment and OEM production by Japanese companies.

Figure 5-7 shows the distribution of Japanese manufacturing companies in Asia. Because of the stronger yen since 1985, overseas production of Japanese consumer electronic products including color televisions and VCRs has been increasing. Offshore production of color televisions has already exceeded domestic output. The latest trend is to shift manufacturing plants to China where the labor cost is one-fiftieth the cost of labor in Japan and the quality is similar.

Figure 5-7
Distribution of Japanese Manufacturing Companies in Asia



Source: Nihon Keizai Shimbun G4000314

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CAD/CAM/CAE/GIS Applications

- Mechanical—The mechanical CAD segment in Japan grew 0.8 percent in total revenue, reaching $2.124 billion in 1992. In particular, mechanical software revenue grew 2.7 percent during 1991 to $621 million whereas hardware revenue declined 0.6 percent to $1.245 billion. The leading mechanical software vendors were Hitachi (9 percent market share), NEC (8 percent), Fujitsu (8 percent), Info Services International. Dentsu (6 percent), IBM (6 percent), SDRC (6 percent), and C. Itoh Techno-Science (6 percent).
- AEC—The Japanese AEC market fell to $518 million in 1992, dropping 6.6 percent in total revenue. The software segment remained nearly stagnant, growing only 0.1 percent during 1991 to $156 million. The leading AEC software vendors were Fujitsu (23 percent market share), NEC (8 percent), CPU (6 percent), Hitachi (5 percent), Mutoh Industries (4 percent), and Intergraph (4 percent).
- GIS—The market for GIS CAD applications in Japan increased 6.1 percent to $316 million total revenue during 1992. Software revenue in the GIS CAD market grew 23.2 percent to $90 million. The leading software vendors in this segment were Fujitsu (14 percent market share), Uchida Yoko (9 percent), Hitachi (8 percent), EDS (7 percent), Intergraph (6 percent), Mitsubishi Electric (6 percent), and Pasco (5 percent).
- EDA—The Japanese market for EDA applications in Japan increased 3.6 percent to $1.036 billion in total factory revenue in 1992, with software revenue growing 6.9 percent to $388 million. The leading EDA software vendors were Cadence (26 percent market share), Zuken (13 percent), Mentor Graphics (7 percent) ,Wacom (6 percent), Seiko(6 percent), and Marubeni Hyteck (5 percent).

Please note that there is more data provided by companies in Japan for their market share than for the other Asia/Pacific countries.

Korea

Country Statistics

Tables 5-7 and 5-8 show statistical information for Korea. Figure 5-8 shows Korean revenue growth by application for 1992.

Table 5-7
Korea Country Statistics

Population (M)	44
Area km^2	99,274
1992 GNP (U.S.$B)	294.50
1992 Per Capita GNP (U.S.$)	6,749
1992 Unemployment (%)	2.3

Source: Sakura Institute of Research, JETRO

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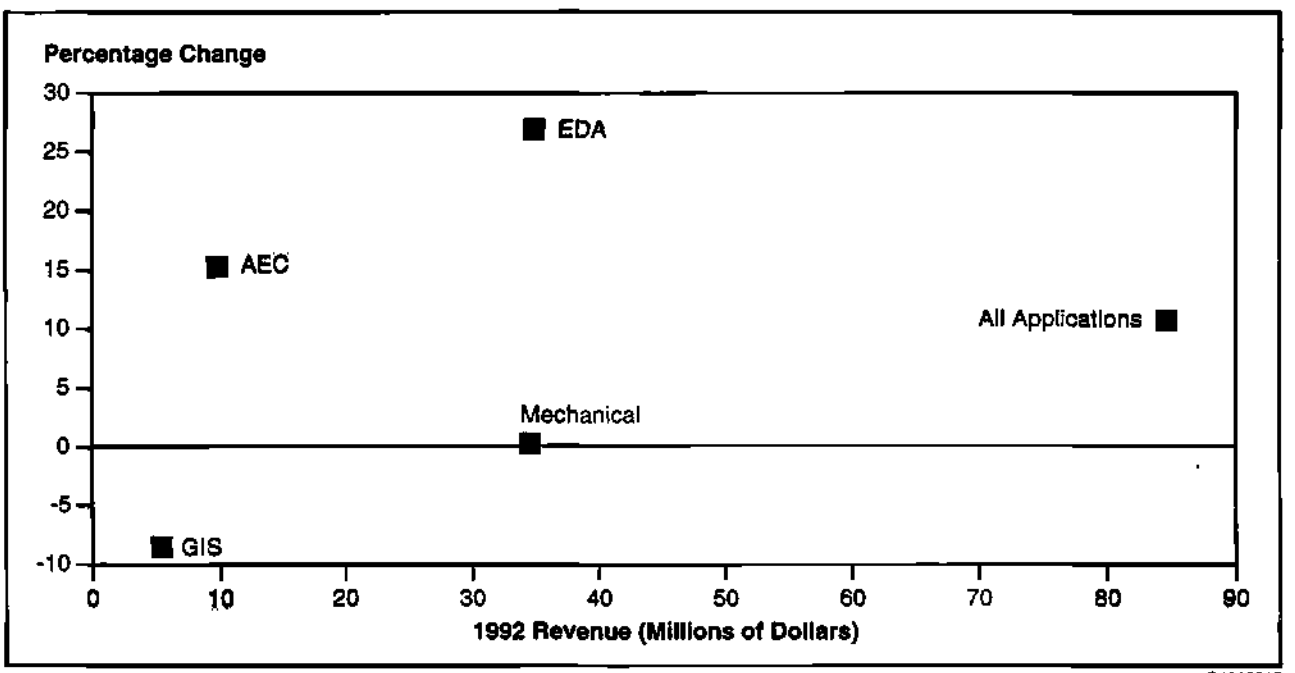
Table 5-8
1990 to 1993 Korea Real GDP Growth Rate and Annual Average Exchange Rate

	1990	1991	1992	1993 (Estimated)
Real GDP Growth (%)	9.3	8.4	4.7	6.0
Exchange Rate (Won/U.S.$)	710.51	730.90	782.63	807.90
Change (%)	5.4	2.9	7.1	3.2

Source: Sakura Institute of Research, Dataquest (December 1993)

Figure 5-8
1992 Korea Revenue Growth, by Application



Source: Dataquest (December 1993) G4000315

Economy

Historically, Korea has benefited from cheap and plentiful labor until the 1990s. Korean products lost their competitiveness because of a massive influx of cheaper products from ASEAN countries and China into the international market. It is strategically important to Korea to increase the added value of its industrial products, as is the case for Japan. The Korean government plans to invest a total of 3.7 trillion won between 1992 to 2001 for the development of 11 high technologies (known as G7 products). These G7 projects include "ultra very large scale integration," "broad integrated services digital network (B-ISDN)," "high vision TV," "new medicines and new agricultural chemicals," and "high-technology production systems." Korea has the smallest per capita gross national product of NIEs countries at $6,749. The government plans to raise GNP to $14,076 by 1998. Korean unemployment was 3.2 percent in June 1993; as a result, 10,769 companies went bankrupt in 1992.

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CAD/CAM/CAE/GIS Applications

- Mechanical—The mechanical CAD market in Korea was valued at $35 million in 1992, an increase of 0.2 percent during 1991. Mechanical hardware revenue grew 3.5 percent in 1992, reaching $25 million.
- AEC—The AEC market grew to $10 million, growing more than 15 percent from 1991. Software revenue grew 19 percent and hardware revenue grew nearly 24 percent over 1991 levels.
- GIS—The GIS market in 1992 reached about $5.4 million, dropping nearly 9 percent from 1991, with GIS hardware revenue dropping by almost 24 percent.
- EDA—Korea represents the second largest market for EDA sales in Asia, turning in $35 million in total revenue in 1992. This represents a growth of 27 percent over 1991 levels.

Singapore

Country Statistics

Tables 5-9 and 5-10 contain country statistical information for Singapore. Figure 5-9 shows 1992 Singapore revenue growth by application.

Table 5-9
Singapore Country Statistics

Population (M)	3
Area km^2	633
1992 GNP (U.S.$B)	46.80
1992 Per Capita GNP (U.S.$)	16,582
1992 Unemployment (%)	1.9

Source: Sakura Institute of Research, JETRO

Table 5-10
1990 to 1993 Singapore Real GDP Growth Rate and Annual Average Exchange Rate

	1990	1991	1992	1993 (Estimated)
Real GDP Growth (%)	8.3	6.7	5.8	6.5
Exchange Rate (Singapore$/U.S.$)	1.8128	1.7276	1.6285	1.5962
Change (%)	-7.1	-4.7	-5.7	-2.0

Source: Sakura Institute of Research, Dataquest (December 1993)

Economy

Singapore is probably the most advanced among the ASEAN countries in the field of vocational training. Because the government has encouraged efforts to shift to capital and knowledge-intensive industries, it has stepped up the development of human resources geared toward industrial advancement. Manufacturing of lower-value-added products is shifting to Malaysia and Thailand, and trading between Southeast Asia and Singapore grows larger every year. The future of Singapore is a key issue

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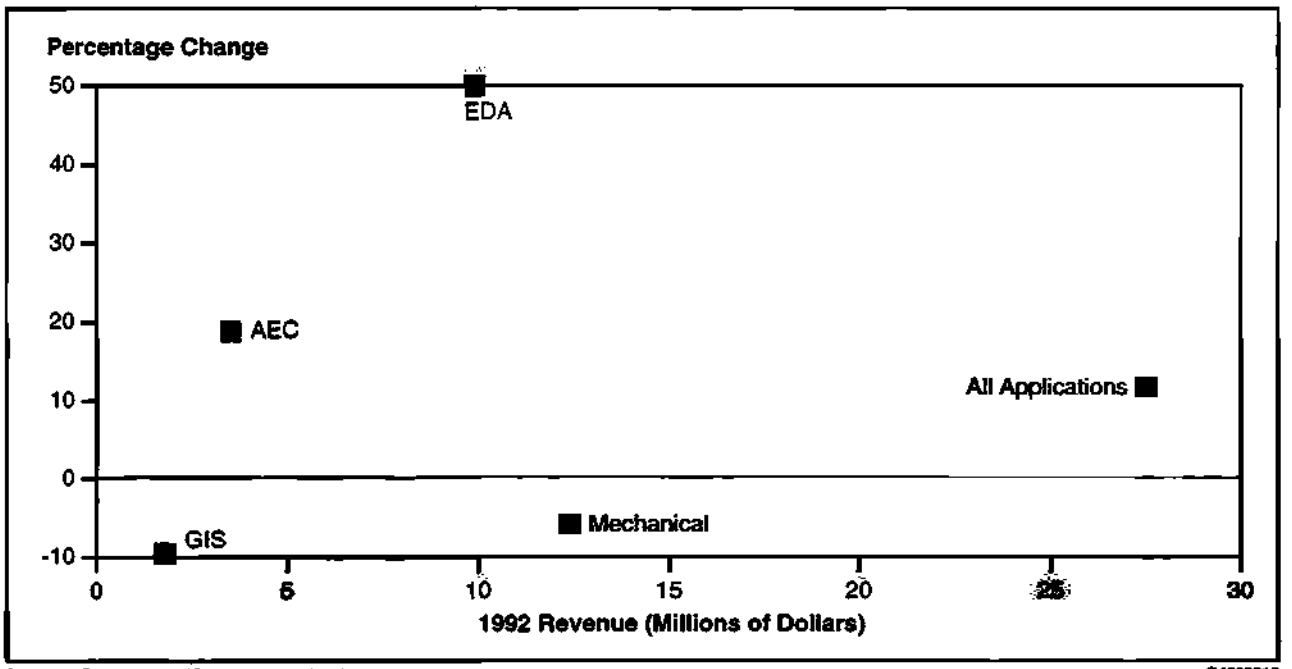
Figure 5-9
1992 Singapore Revenue Growth, by Application



Source: Dataquest (December 1993) G4000316

when considering the Southeast Asian economy because Singapore stands at the geographic center of southern Asia.

CAD/CAM/CAE/GIS Applications

- Mechanical—Revenue for the mechanical CAD market was $12.4 million in 1992, a decline of 6 percent over 1991. Mechanical software revenue fell in 1992 by nearly 14 percent.
- AEC—The AEC market grew nearly 19 percent in 1992, reaching more than $3 million. Software revenue grew by 13 percent and hardware revenue by 30 percent.
- GIS—The market for GIS application during 1992 in Singapore dropped nearly 10 percent in total factory revenue to less than $2 million.
- EDA—EDA applications grew 50 percent to almost $10 million in total revenue and reached nearly $3 million in software revenue.

Taiwan

Country Statistics

Tables 5-11 and 5-12 show the statistical information for Taiwan. Figure 5-10 shows the 1992 Taiwan revenue growth by application.

Economy

Taiwan's total population was about 21 million in 1992, which includes a workforce of about 8.3 million. The Taiwanese economy experienced great growth in the 1980s caused in part by the movement away from blue-collar jobs to white-collar positions. However, the competitiveness of

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Table 5-11
Taiwan Country Statistics

Population (M)	21
Area km^2	36,000
1992 GNP (U.S.$B)	210.90
1992 Per Capita GNP (U.S.$)	10,215
1992 Unemployment (%)	1.5

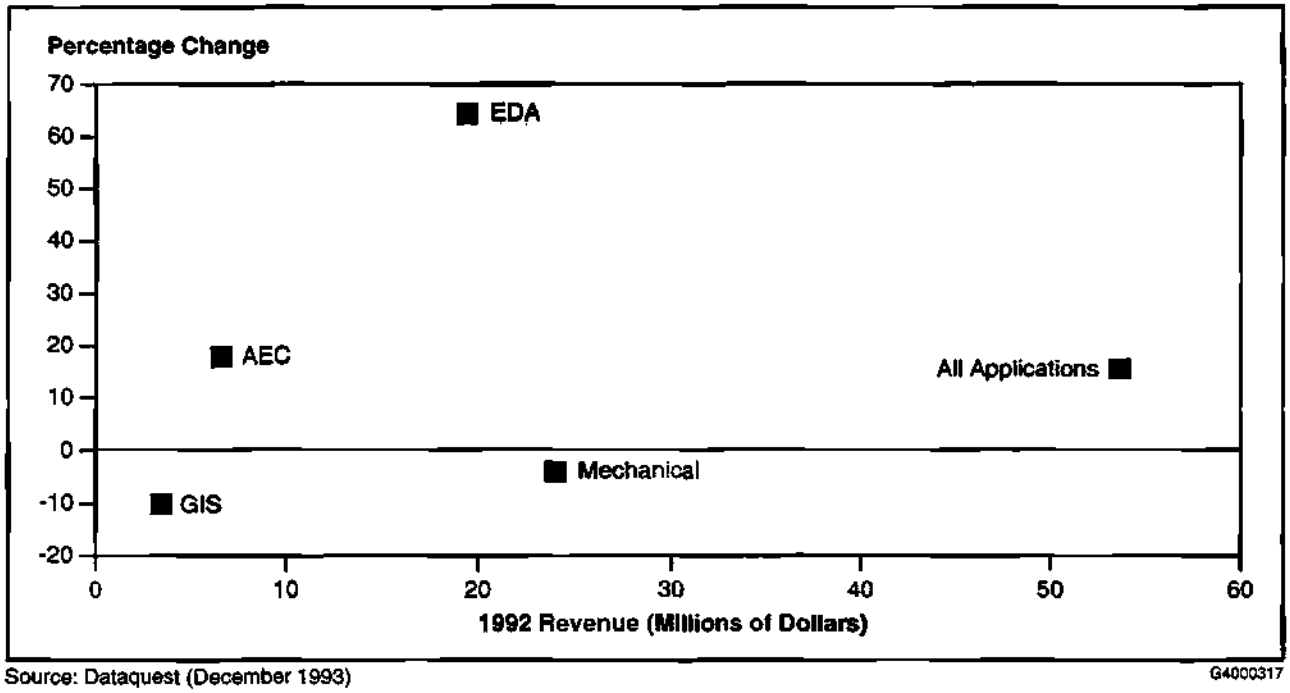
Source: Sakura Institute of Research, JETRO

Table 5-12
1990 to 1993 Taiwan Real GDP Growth Rate and Annual Average Exchange Rate

	1990	1991	1992	1993 (Estimated)
Real GDP Growth (%)	4.9	7.2	6.1	6.3
Exchange Rate (Taiwan$/U.S.$)	26.89	26.50	24.93	26.62
Change (%)	1.8	-1.4	-5.9	6.8

Source: Sakura Institute of Research, Dataquest (December 1993)

Figure 5-10
1992 Taiwan Revenue Growth, by Application



Source: Dataquest (December 1993) G4000317

Taiwanese products is declining because of the rising cost of domestic production stemming from a variety of internal factors, such as a labor shortage, wage increases, and skyrocketing land prices.

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Taiwan's exports to China are increasing. In 1988, several Taiwanese industries launched companies in China in an effort to lower production costs.

In 1985, the annual exchange rate was U.S.$1 to $40.42 Taiwan; as of December 1993, the exchange rate is U.S.$1 to $26.62 Taiwan. The Taiwan dollar growth was 52.1 percent against U.S. dollar during 1985 to 1993, giving Taiwan an export advantage. This is one of the most important reasons why the Taiwan economy grew.

CAD/CAM/CAE/GIS Applications

The Taiwan CAD/CAM/CAE/GIS market grew from $46 million in 1991 to $54 million in 1992. We estimate an 8 percent CAGR from 1993 to 1997, with the market reaching $64 million by 1997.

- Mechanical—The market for mechanical CAD applications during 1992 in Taiwan dropped 4 percent to $24 million in total factory revenue. Software revenue in the mechanical CAD market dropped 12 percent to $3 million.
- AEC—The market for AEC was more than $6 million during 1992. Overall factory revenue growth was up by nearly 17 percent and the software market was up 10 percent.
- GIS—Taiwan's GIS market was valued at $3.5 million in 1992, which is a decline of 10 percent from 1991. Because of the lack of labor capacity, capital investment for infrastructure is being delayed. The most critical example of this delay is the Taiwan highway construction plan. Dataquest estimates that the GIS market size for Taiwan will reach $6 million in 1997.
- EDA—The Taiwan EDA market in 1992 reached more than $19 million, growing 65 percent from 1991.

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Appendix A
1992 CAD/CAM/CAE/GIS Market Statistics

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Table 1
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
IBM	477.4	277.0	132.1	27,945	11.2	11.5	10.1	17.6
Fujitsu	442.0	282.9	114.9	8,751	10.4	11.8	8.8	5.5
NEC	348.0	238.9	81.3	22,400	8.2	10.0	6.2	14.1
Sun Microsystems	259.6	224.6	0	12,696	6.1	9.4	0	8.0
Nihon Unisys	228.3	141.6	38.8	2,220	5.4	5.9	3.0	1.4
Hitachi	174.0	83.5	73.1	4,675	4.1	3.5	5.6	2.9
Hewlett-Packard	171.8	129.1	16.4	5,983	4.0	5.4	1.3	3.8
Cadence	127.5	0	112.2	0	3.0	0	8.6	0
Mutoh Industries*	120.3	72.2	36.1	1,900	2.8	3.0	2.8	1.2
Toshiba*	118.8	59.4	47.5	3,440	2.8	2.5	3.6	2.2
Altium*	114.0	28.5	81.2	5,700	2.7	1.2	6.2	3.6
Zuken	99.4	27.3	52.2	608	2.3	1.1	4.0	0.4
Mitsubishi Electric	95.0	74.0	12.0	1,722	2.2	3.1	0.9	1.1
Seiko*	88.0	35.7	44.0	660	2.1	1.5	3.4	0.4
C. Itoh Techno-Science*	81.4	30.9	44.0	1,850	1.9	1.3	3.4	1.2
Intergraph	78.7	29.2	23.9	994	1.8	1.2	1.8	0.6
Hitachi Zosen Info Systems	77.6	66.2	3.6	800	1.8	2.8	0.3	0.5
Digital	77.1	52.9	1.0	1,377	1.8	2.2	0.1	0.9
Computervision	76.9	26.1	25.6	403	1.8	1.1	2.0	0.3
Mentor Graphics	71.9	10.2	33.4	292	1.7	0.4	2.6	0.2

(Continued)

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Table 1 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
Sumisho Electronics*	69.9	63.9	4.9	1,350	1.6	2.7	0.4	0.8
ARGO GRAPHICS*	61.3	54.6	3.1	1,286	1.4	2.3	0.2	0.8
Info. Services Int'l. Dentsu*	56.5	3.5	40.2	125	1.3	0.1	3.1	0.1
Autodesk	54.8	0	54.8	0	1.3	0	4.2	0
Sharp*	49.7	25.8	23.9	470	1.2	1.1	1.8	0.3
Marubeni Hytech*	46.0	8.5	36.7	240	1.1	0.4	2.8	0.2
SDRC	44.9	0	35.9	0	1.1	0	2.8	0
Sony	44.4	44.4	0	1,587	1.0	1.9	0	1.0
EDS Unigraphics	44.3	18.8	18.1	688	1.0	0.8	1.4	0.4
Silicon Graphics	43.5	41.3	0	1,249	1.0	1.7	0	0.8
Wacom	42.5	8.6	29.5	788	1.0	0.4	2.3	0.5
Hakuto	39.9	24.0	16.0	850	0.9	1.0	1.2	0.5
Mitsui Engineering	39.7	27.8	7.9	264	0.9	1.2	0.6	0.2
Uchida Yoko	37.9	22.9	13.5	900	0.9	1.0	1.0	0.6
CADIX	33.6	13.4	16.8	247	0.8	0.6	1.3	0.2
Tokyo Electron*	32.3	10.7	14.5	220	0.8	0.4	1.1	0.1
Dassault*	31.6	0	26.9	0	0.7	0	2.1	0
Apple Computer	30.7	30.7	0	5,581	0.7	1.3	0	3.5
Informatix*	25.3	20.7	2.5	179	0.6	0.9	0.2	0.1
Toyo Information Systems*	24.8	15.1	7.2	265	0.6	0.6	0.6	0.2

(Continued)

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Table 1 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
Century Research Center	22.5	11.9	8.3	119	0.5	0.5	0.6	0.1
Kanematsu Computer Systems*	18.5	14.2	4.3	360	0.4	0.6	0.3	0.2
Racal-Redac	17.5	0	14.8	2	0.4	0	1.1	0
Omron	16.0	9.6	6.4	394	0.4	0.4	0.5	0.2
Andor	15.7	3.9	11.1	121	0.4	0.2	0.9	0.1
Graphtec Engineering	15.4	7.7	6.9	331	0.4	0.3	0.5	0.2
INS Engineering	14.3	7.2	7.2	48	0.3	0.3	0.5	0
Synopsys	14.2	0	10.3	0	0.3	0	0.8	0
MacNeal-Schwendler	13.9	0	13.9	0	0.3	0	1.1	0
Nihon Itek*	13.3	7.2	5.1	91	0.3	0.3	0.4	0.1
Design Automation	12.7	2.5	9.5	267	0.3	0.1	0.7	0.2
Sumitomo Denko Workstation	12.7	12.7	0	654	0.3	0.5	0	0.4
Control Data Systems	12.5	6.1	2.1	181	0.3	0.3	0.2	0.1
COMPASS Design Automation	11.4	0.2	8.5	9	0.3	0	0.7	0
CPU	10.5	0	9.5	0	0.2	0	0.7	0
Parametric Technology	10.0	0	8.1	0	0.2	0	0.6	0
Viewlogic Systems	9.5	0	7.5	0	0.2	0	0.6	0
Pasco*	9.3	3.5	4.9	77	0.2	0.1	0.4	0
Siemens Nixdorf Info systeme	9.1	4.6	3.0	80	0.2	0.2	0.2	0.1
Landmark Graphics	8.2	4.1	1.9	42	0.2	0.2	0.1	0

(Continued)

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Table 1 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue (%)	Hardware Revenue (%)	Software Revenue (%)	Hardware Units Shipped (%)
Harris EDA	8.2	0.9	4.7	35	0.2	0	0.4	0
Sophia Systems*	8.1	2.0	5.3	250	0.2	0.1	0.4	0.2
Swanson Analysis	7.9	0	7.6	0	0.2	0	0.6	0
MARC	7.2	0	7.2	0	0.2	0	0.5	0
Cisigraph	6.7	2.6	1.7	43	0.2	0.1	0.1	0
Zycad	6.3	3.8	0.8	48	0.1	0.2	0.1	0
Alias Research	6.2	0	5.7	0	0.1	0	0.4	0
ESRI	6.0	0	5.1	0	0.1	0	0.4	0
GeoVision Systems	5.9	0.5	3.1	11	0.1	0	0.2	0
Applicon	5.2	2.2	2.4	69	0.1	0.1	0.2	0
EEsof	4.9	0	4.2	3	0.1	0	0.3	0
Matra Datavision	4.9	1.6	2.5	41	0.1	0.1	0.2	0
Silvar-Lisco	4.8	0	2.6	0	0.1	0	0.2	0
Ricoh*	4.7	0	4.0	0	0.1	0	0.3	0
Kubota Computer	4.6	3.4	0.8	300	0.1	0.1	0.1	0.2
Unisys	4.4	2.3	1.6	101	0.1	0.1	0.1	0.1
CrossCheck Technology	4.3	0	2.2	0	0.1	0	0.2	0
ADRA Systems	3.9	0.2	2.9	13	0.1	0	0.2	0
Quickturn Systems	3.8	3.5	0.3	30	0.1	0.1	0	0
Fides Ind. Auto	3.6	1.1	1.6	21	0.1	0	0.1	0

(Continued)

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Table 1 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
ICAD	3.4	0	2.7	0	0.1	0	0.2	0
Cascade Design Automation	3.2	0	2.4	0	0.1	0	0.2	0
Mechanical Dynamics	3.2	0	2.5	0	0.1	0	0.2	0
Cimatron	3.0	1.4	1.4	99	0.1	0.1	0.1	0.1
Data I/O	2.7	0	2.7	0	0.1	0	0.2	0
Framasoft	2.7	0	1.6	0	0.1	0	0.1	0
PADS Software	2.7	0	2.3	0	0.1	0	0.2	0
Cimlinc	2.7	0	1.9	56	0.1	0	0.1	0
Contec Microelectronics	2.5	0	2.3	0	0.1	0	0.2	0
Comdisco Systems	2.4	0	2.1	0	0.1	0	0.2	0
Logic Modeling Corp.	2.4	0	1.9	0	0.1	0	0.1	0
Aries Tech	2.2	0	1.9	0	0.1	0	0.1	0
Meta-Software	2.1	0	1.4	0	0	0	0.1	0
Synercom	2.1	0	1.1	0	0	0	0.1	0
ACTEL	1.9	0	1.6	0	0	0	0.1	0
Test Systems Strategies	1.9	0	1.7	0	0	0	0.1	0
CAMAX Systems Inc.	1.8	0.3	1.1	32	0	0	0.1	0
PDA Engineering	1.8	0	1.7	0	0	0	0.1	0
Auto-Trol	1.8	0.7	0.7	22	0	0	0.1	0
CAD Centre	1.8	0	1.4	0	0	0	0.1	0

(Continued)

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Table 1 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
LSI Logic	1.7	0.2	1.3	4	0	0	0.1	0
Ikos Systems	1.7	1.3	0.4	20	0	0.1	0	0
Kanematsu Semiconductor*	1.6	0	1.1	0	0	0	0.1	0
Xilinx	1.6	0	1.4	0	0	0	0.1	0
SPATIAL Technology	1.6	0	1.6	0	0	0	0.1	0
Anilam Electronics	1.5	0.5	1.0	18	0	0	0.1	0
ISICAD	1.5	0.4	0.8	9	0	0	0.1	0
MCS	1.4	0	1.3	0	0	0	0.1	0
Microsim	1.4	0	1.3	0	0	0	0.1	0
Altera	1.3	0	1.1	0	0	0	0.1	0
Kockums Computer Systems	1.3	0.3	0.7	32	0	0	0.1	0
PiE Design	1.3	1.1	0.1	8	0	0	0	0
Analogy	1.2	0	1.0	0	0	0	0.1	0
Enghouse Systems Ltd.	1.2	0	1.0	1	0	0	0.1	0
Point Control	1.2	0	0.9	0	0	0	0.1	0
CADKEY	1.0	0	1.0	0	0	0	0.1	0
ERDAS	1.0	0.3	0.7	17	0	0	0.1	0
BETRONEX	1.0	0.1	0.9	18	0	0	0.1	0

(Continued)

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Table 1 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue (%)	Hardware Revenue (%)	Software Revenue (%)	Hardware Units Shipped (%)
Other Companies	0	0	0	34,213	0	0	0	21.5
All Companies	4,254.6	2,400.0	1,304.6	158,994	100.0	100.0	100.0	100.0
All N.A.-Based Companies	2,046.4	1,109.6	621.0	105,080	48.1	46.2	47.6	66.1
All Asian-Based Companies	2,150.1	1,276.5	649.7	53,511	50.5	53.2	49.8	33.7
All European-Based Companies	58.1	13.8	33.9	404	1.4	0.6	2.6	0.3
All Hardware Companies	949.7	859.2	0.7	99,688	22.3	35.8	0.1	62.7
All Turnkey & SW Companies	3,304.9	1,540.7	1,303.9	59,306	77.7	64.2	99.9	37.3
Other Companies	0	0	0	34,213	0	0	0	21.5
All Companies	4,254.6	2,400.0	1,304.6	158,994	100.0	100.0	100.0	100.0
All N.A.-Based Companies	2,046.4	1,109.6	621.0	105,080	48.1	46.2	47.6	66.1
All Asian-Based Companies	2,150.1	1,276.5	649.7	53,511	50.5	53.2	49.8	33.7
All European-Based Companies	58.1	13.8	33.9	404	1.4	0.6	2.6	0.3
All Hardware Companies	949.7	859.2	0.7	99,688	22.3	35.8	0.1	62.7
All Turnkey & SW Companies	3,304.9	1,540.7	1,303.9	59,306	77.7	64.2	99.9	37.3

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals
Source: Dataquest (December 1993)

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Table 2
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
IBM	360.5	195.6	110.0	15,967	16.1	14.7	17.3	19.0
NEC	212.3	146.9	48.5	10,994	9.5	11.0	7.6	13.1
Nihon Unisys	196.3	121.7	33.4	1,901	8.8	9.2	5.2	2.3
Fujitsu	181.2	116.0	47.1	3,588	8.1	8.7	7.4	4.3
Hitachi	130.5	62.6	54.8	3,506	5.8	4.7	8.6	4.2
Hewlett-Packard	114.4	80.3	16.4	3,564	5.1	6.0	2.6	4.2
Altium*	94.3	23.4	67.4	4,674	4.2	1.8	10.6	5.6
Mutoh Industries*	91.4	54.9	27.4	1,505	4.1	4.1	4.3	1.8
Toshiba*	83.2	41.6	33.3	2,832	3.7	3.1	5.2	3.4
Hitachi Zosen Info Systems	69.8	59.6	3.3	719	3.1	4.5	0.5	0.9
C. Itoh Techno-Science*	65.9	25.1	35.6	1,499	2.9	1.9	5.6	1.8
ARGO GRAPHICS*	61.3	54.6	3.1	1,286	2.7	4.1	0.5	1.5
Sumisho Electronics*	58.7	54.0	3.8	1,057	2.6	4.1	0.6	1.3
Computervision	58.1	19.7	19.3	305	2.6	1.5	3.0	0.4
Info. Services Int'l. Dentsu*	56.5	3.5	40.2	125	2.5	0.3	6.3	0.1
SDRC	44.9	0	35.9	0	2.0	0	5.6	0
Mitsubishi Electric	40.9	31.7	5.2	738	1.8	2.4	0.8	0.9
Hakuto	39.9	24.0	16.0	850	1.8	1.8	2.5	1.0
Seiko*	38.2	15.3	19.1	289	1.7	1.1	3.0	0.3
Silicon Graphics	37.7	35.8	0	1,085	1.7	2.7	0	1.3
Tokyo Electron*	32.3	10.7	14.5	220	1.4	0.8	2.3	0.3

(Continued)

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Table 2 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
Sun Microsystems	32.1	27.6	0	1,495	1.4	2.1	0	1.8
Sharp*	29.7	15.4	14.3	286	1.3	1.2	2.2	0.3
Dassault*	29.4	0	25.0	0	1.3	0	3.9	0
Digital	29.1	20.6	0	716	1.3	1.5	0	0.9
Sony	25.3	25.3	0	905	1.1	1.9	0	1.1
Mitsui Engineering	22.6	15.8	4.5	151	1.0	1.2	0.7	0.2
Autodesk	21.9	0	21.9	0	1.0	0	3.4	0
Marubeni Hytech*	21.2	4.5	16.3	125	0.9	0.3	2.6	0.1
EDS Unigraphics	20.9	6.1	9.8	265	0.9	0.5	1.5	0.3
Toyo Information Systems*	20.6	12.5	6.0	219	0.9	0.9	0.9	0.3
Apple Computer	20.2	20.2	0	3,663	0.9	1.5	0	4.4
Graphtec Engineering	15.4	7.7	6.9	331	0.7	0.6	1.1	0.4
Omron	14.4	8.6	5.8	355	0.6	0.7	0.9	0.4
MacNeal-Schwendler	13.9	0	13.9	0	0.6	0	2.2	0
Intergraph	12.1	4.7	4.3	177	0.5	0.4	0.7	0.2
Control Data Systems	11.2	5.4	1.9	151	0.5	0.4	0.3	0.2
Sumitomo Denko Workstation	11.1	11.1	0	569	0.5	0.8	0	0.7
Nihon Itek*	10.6	5.7	4.0	73	0.5	0.4	0.6	0.1
Andor	10.4	2.6	7.4	80	0.5	0.2	1.2	0.1
Design Automation	10.2	2.0	7.6	214	0.5	0.2	1.2	0.3
Parametric Technology	10.0	0	8.1	0	0.4	0	1.3	0

(Continued)

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Table 2 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
Wacom	8.9	1.8	6.2	161	0.4	0.1	1.0	0.2
Swanson Analysis	7.9	0	7.6	0	0.4	0	1.2	0
MARC	7.2	0	7.2	0	0.3	0	1.1	0
Cisigraph	6.7	2.6	1.7	43	0.3	0.2	0.3	0.1
Alias Research	6.2	0	5.7	0	0.3	0	0.9	0
Applicon	5.2	2.2	2.4	69	0.2	0.2	0.4	0.1
Matra Datavision	4.9	1.6	2.5	41	0.2	0.1	0.4	0
Ricoh*	4.7	0	4.0	0	0.2	0	0.6	0
Unisys	4.4	2.3	1.6	101	0.2	0.2	0.2	0.1
Kubota Computer	4.1	3.0	0.7	264	0.2	0.2	0.1	0.3
ADRA Systems	3.9	0.2	2.9	13	0.2	0	0.5	0
Fides Ind. Auto	3.6	1.1	1.6	21	0.2	0.1	0.2	0
Century Research Center	3.4	1.8	1.3	12	0.2	0.1	0.2	0
ICAD	3.4	0	2.7	0	0.2	0	0.4	0
CADIX	3.4	1.3	1.7	25	0.1	0.1	0.3	0
Mechanical Dynamics	3.2	0	2.5	0	0.1	0	0.4	0
Cimatron	3.0	1.4	1.4	99	0.1	0.1	0.2	0.1
Framasoft	2.7	0	1.6	0	0.1	0	0.3	0
Cimlinc	2.4	0	1.7	56	0.1	0	0.3	0.1
Aries Tech	2.2	0	1.9	0	0.1	0	0.3	0
Uchida Yoko	1.9	1.1	0.7	45	0.1	0.1	0.1	0.1

(Continued)

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Table 2 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
CAMAX Systems Inc.	1.8	0.3	1.1	32	0.1	0	0.2	0
PDA Engineering	1.8	0	1.7	0	0.1	0	0.3	0
SPATIAL Technology	1.6	0	1.6	0	0.1	0	0.2	0
Anilam Electronics	1.5	0.5	1.0	18	0.1	0	0.2	0
MCS	1.4	0	1.3	0	0.1	0	0.2	0
Point Control	1.2	0	0.9	0	0.1	0	0.1	0
CADKEY	1.0	0	1.0	0	0	0	0.2	0
Zuken	1.0	0.3	0.5	6	0	0	0.1	0
Auto-Trol	0.9	0.3	0.3	11	0	0	0.1	0
ISICAD	0.7	0.2	0.3	5	0	0	0.1	0
CAD Centre	0.5	0	0.4	0	0	0	0.1	0
Other Companies	0	0	0	16,635	0	0	0	19.8
All Companies	2,239.6	1,329.1	635.8	84,132	100.0	100.0	100.0	100.0
All N.A.-Based Companies	996.2	567.9	288.5	54,277	44.5	42.7	45.4	64.5
All Asian-Based Companies	1,218.5	753.7	335.8	29,602	54.4	56.7	52.8	35.2
All European-Based Companies	24.9	7.6	11.6	253	1.1	0.6	1.8	0.3
All Hardware Companies	418.8	388.4	0.4	50,532	18.7	29.2	0.1	60.1
All Turnkey & SW Companies	1,820.8	940.7	635.5	33,601	81.3	70.8	99.9	39.9

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals
Source: Dataquest (December 1993)

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Table 3
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: AEC
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue (%)	Hardware Revenue (%)	Software Revenue (%)	Hardware Units Shipped (%)
Fujitsu	137.0	87.7	35.6	2,713	24.9	26.6	22.1	10.5
IBM	58.4	36.7	13.7	4,301	10.6	11.1	8.5	16.7
NEC	55.7	39.5	11.7	5,386	10.1	12.0	7.3	20.9
Nihon Unisys	32.0	19.8	5.4	319	5.8	6.0	3.4	1.2
Intergraph	25.6	10.5	8.0	344	4.6	3.2	5.0	1.3
Informatix*	25.3	20.7	2.5	179	4.6	6.3	1.6	0.7
Autodesk	23.6	0	23.6	0	4.3	0	14.6	0
Mutoh Industries*	21.7	13.0	6.5	287	3.9	3.9	4.0	1.1
Kanematsu Computer Systems*	18.5	14.2	4.3	360	3.4	4.3	2.7	1.4
Hitachi	17.4	8.3	7.3	468	3.2	2.5	4.5	1.8
Computervision	14.9	5.0	5.0	78	2.7	1.5	3.1	0.3
Mitsubishi Electric	14.3	11.2	1.7	261	2.6	3.4	1.1	1.0
Toshiba*	14.3	7.1	5.7	358	2.6	2.2	3.5	1.4
Altium*	11.1	2.6	8.1	513	2.0	0.8	5.0	2.0
Century Research Center	10.8	5.7	4.0	60	2.0	1.7	2.5	0.2
CPU	10.5	0	9.5	0	1.9	0	5.9	0
Hewlett-Packard	8.0	6.8	0	452	1.5	2.1	0	1.8
Hitachi Zosen Info Systems	7.8	6.7	0.3	81	1.4	2.0	0.2	0.3
C. Itoh Techno-Science*	7.5	2.9	4.0	170	1.4	0.9	2.5	0.7
INS Engineering	7.2	3.6	3.6	30	1.3	1.1	2.2	0.1
EDS Unigraphics	7.1	3.8	2.5	127	1.3	1.2	1.6	0.5

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Table 3 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: AEC
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
Sumisho Electronics*	5.6	4.8	0.8	200	1.0	1.5	0.5	0.8
Sony	5.3	5.3	0	190	1.0	1.6	0	0.7
Uchida Yoko	5.3	3.2	1.9	126	1.0	1.0	1.2	0.5
Seiko*	5.3	2.6	2.6	136	1.0	0.8	1.6	0.5
Apple Computer	4.9	4.9	0	894	0.9	1.5	0	3.5
Andor	4.2	1.1	3.0	32	0.8	0.3	1.9	0.1
Toyo Information Systems*	4.2	2.6	1.2	46	0.8	0.8	0.8	0.2
Silicon Graphics	4.1	3.9	0	118	0.7	1.2	0	0.5
Nihon Itek*	2.7	1.4	1.0	18	0.5	0.4	0.6	0.1
Digital	2.6	1.8	0	66	0.5	0.6	0	0.3
Design Automation	2.5	0.5	1.9	53	0.5	0.2	1.2	0.2
Dassault*	2.2	0	1.9	0	0.4	0	1.2	0
Mitsui Engineering	2.0	1.4	0.4	13	0.4	0.4	0.2	0.1
Sun Microsystems	1.7	1.5	0	83	0.3	0.4	0	0.3
Kockums Computer Systems	1.3	0.3	0.7	32	0.2	0.1	0.4	0.1
CAD Centre	1.3	0	1.0	0	0.2	0	0.6	0
Sumitomo Denko Workstation	1.0	1.0	0	53	0.2	0.3	0	0.2
Auto-Trol	0.9	0.3	0.3	11	0.2	0.1	0.2	0
ISICAD	0.7	0.2	0.4	4	0.1	0.1	0.3	0
Kubota Computer	0.6	0.4	0.1	36	0.1	0.1	0.1	0.1
Control Data Systems	0.5	0.2	0.1	7	0.1	0.1	0	0

(Continued)

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Table 3 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: AEC
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
ERDAS	0	0	0	1	0	0	0	0
Other Companies	0	0	0	7,168	0	0	0	27.8
All Companies	550.3	329.2	161.0	25,773	100.0	100.0	100.0	100.0
All N.A.-Based Companies	197.7	114.0	59.1	15,235	35.9	34.6	36.7	59.1
All Asian-Based Companies	348.8	214.8	99.4	10,498	63.4	65.3	61.7	40.7
All European-Based Companies	3.8	0.4	2.5	40	0.7	0.1	1.6	0.2
All Hardware Companies	87.8	83.3	0	14,553	16.0	25.3	0	56.5
All Turnkey & SW Companies	462.5	245.9	161.0	11,220	84.0	74.7	100.0	43.5

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals
Source: Dataquest (December 1993)

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Table 4
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
Fujitsu	48.6	31.1	12.6	963	14.6	15.9	13.6	8.5
Mitsubishi Electric	39.9	31.1	5.0	724	12.0	15.9	5.4	6.4
Intergraph	29.6	10.7	7.1	361	8.9	5.5	7.6	3.2
Uchida Yoko	22.0	13.3	7.9	522	6.6	6.8	8.4	4.6
IBM	19.6	15.9	1.8	2,627	5.9	8.1	1.9	23.1
Hitachi	17.4	8.3	7.3	468	5.2	4.3	7.8	4.1
EDS Unigraphics	16.4	8.9	5.8	296	4.9	4.6	6.3	2.6
Mitsui Engineering	15.1	10.6	3.0	100	4.5	5.4	3.2	0.9
Toshiba*	11.9	5.9	4.8	139	3.6	3.0	5.1	1.2
Pasco*	9.3	3.5	4.9	77	2.8	1.8	5.3	0.7
Siemens Nixdorf Info systeme	9.1	4.6	3.0	80	2.7	2.4	3.3	0.7
Landmark Graphics	8.2	4.1	1.9	42	2.5	2.1	2.0	0.4
Mutoh Industries*	7.2	4.3	2.2	108	2.2	2.2	2.3	1.0
INS Engineering	7.2	3.6	3.6	18	2.1	1.8	3.8	0.2
NEC	7.0	4.0	2.4	310	2.1	2.1	2.6	2.7
CADIX	6.7	2.7	3.4	49	2.0	1.4	3.6	0.4
Hewlett-Packard	6.5	5.5	0	229	1.9	2.8	0	2.0
ESRI	6.0	0	5.1	0	1.8	0	5.4	0
Autodesk	6.0	0	6.0	0	1.8	0	6.5	0
GeoVision Systems	5.9	0.5	3.1	11	1.8	0.2	3.3	0.1
Century Research Center	5.0	2.6	1.8	28	1.5	1.3	2.0	0.2

(Continued)

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Table 4 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue (%)	Hardware Revenue (%)	Software Revenue (%)	Hardware Units Shipped (%)
Digital	4.5	3.1	0	103	1.3	1.6	0	0.9
Sun Microsystems	4.4	3.8	0	209	1.3	1.9	0	1.8
Synercom	2.1	0	1.1	0	0.6	0	1.2	0
Sony	1.8	1.8	0	63	0.5	0.9	0	0.6
Enghouse Systems Ltd.	1.2	0	1.0	1	0.3	0	1.1	0
ERDAS	1.0	0.3	0.6	16	0.3	0.1	0.7	0.1
Control Data Systems	0.9	0.5	0.2	23	0.3	0.3	0.2	0.2
Andor	0.6	0.2	0.4	5	0.2	0.1	0.5	0
Other Companies	11.9	14.5	0	3,777	3.6	7.4	0	33.3
All Companies	332.7	195.5	93.3	11,352	100.0	100.0	100.0	100.0
All N.A.-Based Companies	136.3	73.2	36.9	7,823	41.0	37.5	39.5	68.9
All Asian-Based Companies	186.1	117.2	53.0	3,441	56.0	60.0	56.8	30.3
All European-Based Companies	10.2	5.1	3.5	89	3.1	2.6	3.7	0.8
All Hardware Companies	50.9	46.6	0	7,034	15.3	23.9	0	62.0
All Turnkey & SW Companies	281.7	148.8	93.2	4,319	84.7	76.1	100.0	38.0

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals
Source: Dataquest (December 1993)

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Table 5
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
Sun Microsystems	221.4	191.7	0	10,909	19.6	35.1	0	28.9
Cadence	127.5	0	112.2	0	11.3	0	27.1	0
Zuken	98.4	27.0	51.7	602	8.7	4.9	12.5	1.6
Fujitsu	75.1	48.1	19.6	1,488	6.6	8.8	4.7	3.9
NEC	73.1	48.5	18.8	5,710	6.5	8.9	4.5	15.1
Mentor Graphics	71.9	10.2	33.4	292	6.3	1.9	8.1	0.8
Seiko*	44.5	17.8	22.2	235	3.9	3.3	5.4	0.6
Hewlett-Packard	42.9	36.5	0	1,738	3.8	6.7	0	4.6
Digital	40.9	27.3	1.0	491	3.6	5.0	0.3	1.3
IBM	38.9	28.8	6.6	5,050	3.4	5.3	1.6	13.4
Wacom	33.6	6.8	23.3	627	3.0	1.2	5.6	1.7
Marubeni Hytech*	24.8	4.1	20.4	115	2.2	0.7	4.9	0.3
CADIX	23.5	9.4	11.8	173	2.1	1.7	2.8	0.5
Sharp*	20.0	10.4	9.6	184	1.8	1.9	2.3	0.5
Racal-Redac	17.5	0	14.8	2	1.5	0	3.6	0
Synopsys	14.2	0	10.3	0	1.3	0	2.5	0
Sony	12.0	12.0	0	428	1.1	2.2	0	1.1
COMPASS Design Automation	11.4	0.2	8.5	9	1.0	0	2.1	0
Intergraph	11.3	3.3	4.6	112	1.0	0.6	1.1	0.3
Toshiba*	9.5	4.8	3.8	111	0.8	0.9	0.9	0.3
Viewlogic Systems	9.5	0	7.5	0	0.8	0	1.8	0

(Continued)

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Table 5 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue (%)	Hardware Revenue (%)	Software Revenue (%)	Hardware Units Shipped (%)
Uchida Yoko	8.7	5.3	3.1	207	0.8	1.0	0.8	0.5
Hitachi	8.7	4.2	3.7	234	0.8	0.8	0.9	0.6
Altium*	8.6	2.6	5.7	513	0.8	0.5	1.4	1.4
Harris EDA	8.2	0.9	4.7	35	0.7	0.2	1.1	0.1
Sophia Systems*	8.1	2.0	5.3	250	0.7	0.4	1.3	0.7
C. Itoh Techno-Science*	8.0	3.0	4.3	181	0.7	0.6	1.0	0.5
Zycad	6.3	3.8	0.8	48	0.6	0.7	0.2	0.1
Apple Computer	5.6	5.6	0	1,024	0.5	1.0	0	2.7
Sumisho Electronics*	5.6	5.2	0.3	94	0.5	0.9	0.1	0.2
EEsof	4.9	0	4.2	3	0.4	0	1.0	0
Silvar-Lisco	4.8	0	2.6	0	0.4	0	0.6	0
CrossCheck Technology	4.3	0	2.2	0	0.4	0	0.5	0
Computervision	3.9	1.3	1.3	21	0.3	0.2	0.3	0.1
Quickturn Systems	3.8	3.5	0.3	30	0.3	0.6	0.1	0.1
Century Research Center	3.4	1.8	1.3	19	0.3	0.3	0.3	0
Autodesk	3.3	0	3.3	0	0.3	0	0.8	0
Cascade Design Automation	3.2	0	2.4	0	0.3	0	0.6	0
Data I/O	2.7	0	2.7	0	0.2	0	0.7	0
PADS Software	2.7	0	2.3	0	0.2	0	0.6	0
Contec Microelectronics	2.5	0	2.3	0	0.2	0	0.5	0
Comdisco Systems	2.4	0	2.1	0	0.2	0	0.5	0

(Continued)

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Table 5 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
Logic Modeling Corp.	2.4	0	1.9	0	0.2	0	0.5	0
Meta-Software	2.1	0	1.4	0	0.2	0	0.3	0
ACTEL	1.9	0	1.6	0	0.2	0	0.4	0
Test Systems Strategies	1.9	0	1.7	0	0.2	0	0.4	0
LSI Logic	1.7	0.2	1.3	4	0.2	0	0.3	0
Silicon Graphics	1.7	1.6	0	47	0.1	0.3	0	0.1
Ikos Systems	1.7	1.3	0.4	20	0.1	0.2	0.1	0.1
Kanematsu Semiconductor*	1.6	0	1.1	0	0.1	0	0.3	0
Omron	1.6	1.0	0.6	39	0.1	0.2	0.2	0.1
Xilinx	1.6	0	1.4	0	0.1	0	0.3	0
Microsim	1.4	0	1.3	0	0.1	0	0.3	0
Altera	1.3	0	1.1	0	0.1	0	0.3	0
PiE Design	1.3	1.1	0.1	8	0.1	0.2	0	0
Analogy	1.2	0	1.0	0	0.1	0	0.2	0
BETRONEX	1.0	0.1	0.9	18	0.1	0	0.2	0
Sumitomo Denko Workstation	0.6	0.6	0	33	0.1	0.1	0	0.1
Andor	0.5	0.1	0.3	3	0	0	0.1	0
Cimlinc	0.3	0	0.2	0	0	0	0	0

(Continued)

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Table 5 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
Other Companies	0	14.4	0	6,633	0	2.6	0	17.6
All Companies	1,132.0	546.2	414.5	37,736	100.0	100.0	100.0	100.0
All N.A.-Based Companies	716.2	354.6	236.6	27,745	63.3	64.9	57.1	73.5
All Asian-Based Companies	396.6	190.9	161.6	9,970	35.0	34.9	39.0	26.4
All European-Based Companies	19.2	0.8	16.4	22	1.7	0.1	3.9	0.1
All Hardware Companies	392.2	340.9	0.3	27,570	34.6	62.4	0.1	73.1
All Turnkey & SW Companies	739.8	205.3	414.2	10,166	65.4	37.6	99.9	26.9

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals
Source: Dataquest (December 1993)

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Table 6
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: China
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
IBM	9.8	7.5	1.0	981	24.0	26.6	16.8	29.4
Computervision	4.4	1.5	1.5	23	10.8	5.3	25.6	0.7
Silicon Graphics	3.7	3.5	0	106	9.0	12.5	0	3.2
Digital	3.5	2.4	0	72	8.6	8.7	0	2.2
Intergraph	2.7	1.0	0.8	34	6.5	3.5	14.0	1.0
Sun Microsystems	2.6	2.2	0	127	6.4	8.0	0	3.8
Mentor Graphics	2.2	0.3	1.0	9	5.3	1.1	17.5	0.3
Hewlett-Packard	2.0	1.7	0	91	4.8	5.9	0	2.7
Applicon	0.3	0.1	0.1	3	0.6	0.4	2.1	0.1
COMPASS Design Automation	0.1	0	0.1	0	0.3	0	1.6	0
Cisigraph	0.1	0	0	0	0.2	0.1	0.4	0
ACTEL	0	0	0	0	0.1	0	0.7	0
Other Companies	9.6	7.8	1.2	1,888	23.4	27.9	21.2	56.6
All Companies	40.8	28.0	5.7	3,335	100.0	100.0	100.0	100.0
All N.A.-Based Companies	40.7	28.0	5.7	3,335	99.8	99.9	99.6	100.0
All Asian-Based Companies	0	0	0	0	0	0	0	0
All European-Based Companies	0.1	0	0	0	0.2	0.1	0.4	0
All Hardware Companies	17.7	15.4	0	1,353	43.4	55.0	0	40.6
All Turnkey & SW Companies	14.5	5.8	4.5	129	35.6	20.5	78.8	3.9

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals
Source: Dataquest (December 1993)

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Table 7
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Hong Kong
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
IBM	7.6	6.2	0.5	958	13.9	19.9	3.5	27.5
Cadence	5.7	0	5.0	0	10.4	0	35.2	0
Computervision	5.4	1.9	1.8	29	9.9	5.9	12.7	0.8
Sun Microsystems*	5.2	4.5	0	254	9.4	14.4	0	7.3
Silicon Graphics	4.9	4.6	0	140	8.9	14.8	0	4.0
Intergraph	4.1	1.6	1.3	53	7.5	5.0	9.0	1.5
Mentor Graphics	3.3	0.5	1.5	13	6.0	1.5	10.6	0.4
Digital	3.1	2.1	0	61	5.7	6.9	0	1.7
Hewlett-Packard	2.0	1.7	0	91	3.6	5.3	0	2.6
COMPASS Design Automation	0.8	0	0.6	1	1.4	0.1	4.3	0
Applicon	0.3	0.1	0.1	3	0.5	0.4	0.8	0.1
Zuken	0.2	0.1	0.1	1	0.3	0.2	0.6	0
Cisigraph	0.1	0	0	0	0.1	0.1	0.1	0
ACTEL	0.1	0	0.1	0	0.1	0	0.3	0
Other Companies	12.3	8.0	3.3	1,880	22.3	25.7	22.7	53.9
All Companies	55.0	31.2	14.3	3,484	100.0	100.0	100.0	100.0
All N.A.-Based Companies	54.8	31.1	14.2	3,482	99.5	99.8	99.2	100.0
All Asian-Based Companies	0.2	0.1	0.1	1	0.3	0.2	0.6	0
All European-Based Companies	0.1	0	0	0	0.1	0.1	0.1	0
All Hardware Companies	21.1	18.5	0	1,506	38.4	59.3	0	43.2
All Turnkey & SW Companies	22.6	5.6	11.1	133	41.1	18.1	77.3	3.8

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals
Source: Dataquest (December 1993)

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Table 8
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
Fujitsu	442.0	282.9	114.9	8,751	11.1	12.7	9.2	6.3
NEC	348.0	238.9	81.3	22,400	8.7	10.7	6.5	16.1
IBM	341.5	237.7	46.5	22,461	8.6	10.6	3.7	16.1
Sun Microsystems	231.1	199.9	0	11,299	5.8	9.0	0	8.1
Nihon Unisys	228.3	141.6	38.8	2,220	5.7	6.3	3.1	1.6
Hitachi	174.0	83.5	73.1	4,675	4.4	3.7	5.8	3.4
Hewlett-Packard	158.1	117.5	16.4	5,346	4.0	5.3	1.3	3.8
Mutoh Industries*	120.3	72.2	36.1	1,900	3.0	3.2	2.9	1.4
Toshiba*	118.8	59.4	47.5	3,440	3.0	2.7	3.8	2.5
Cadence	116.1	0	102.1	0	2.9	0	8.1	0
Zuken	96.9	26.6	50.9	593	2.4	1.2	4.1	0.4
Mitsubishi Electric	95.0	74.0	12.0	1,722	2.4	3.3	1.0	1.2
Seiko*	87.4	35.5	43.7	660	2.2	1.6	3.5	0.5
C. Itoh Techno-Science*	81.4	30.9	44.0	1,850	2.0	1.4	3.5	1.3
Hitachi Zosen Info Systems	76.8	65.6	3.6	792	1.9	2.9	0.3	0.6
Sumisho Electronics*	69.9	63.9	4.9	1,350	1.8	2.9	0.4	1.0
ARGO GRAPHICS*	61.3	54.6	3.1	1,286	1.5	2.4	0.2	0.9
Intergraph	60.8	22.5	18.5	763	1.5	1.0	1.5	0.5
Digital	57.7	40.4	0	1,037	1.4	1.8	0	0.7
Mentor Graphics	57.5	8.2	26.7	234	1.4	0.4	2.1	0.2
Computervision	55.9	19.0	18.6	293	1.4	0.9	1.5	0.2

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Table 8 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue (%)	Hardware Revenue (%)	Software Revenue (%)	Hardware Units Shipped (%)
Info. Services Int'l. Dentsu*	56.5	3.5	40.2	125	1.4	0.2	3.2	0.1
Sharp*	49.7	25.8	23.9	470	1.2	1.2	1.9	0.3
Marubeni Hytech*	46.0	8.5	36.7	240	1.2	0.4	2.9	0.2
SDRC	44.9	0	35.9	0	1.1	0	2.9	0
Sony	44.4	44.4	0	1,587	1.1	2.0	0	1.1
EDS Unigraphics	44.3	18.8	18.1	688	1.1	0.8	1.4	0.5
Wacom	42.5	8.6	29.5	788	1.1	0.4	2.4	0.6
Hakuto	39.9	24.0	16.0	850	1.0	1.1	1.3	0.6
Mitsui Engineering	39.7	27.8	7.9	264	1.0	1.2	0.6	0.2
Uchida Yoko	37.9	22.9	13.5	900	0.9	1.0	1.1	0.6
CADIX	33.6	13.4	16.8	247	0.8	0.6	1.3	0.2
Tokyo Electron*	32.3	10.7	14.5	220	0.8	0.5	1.2	0.2
Silicon Graphics	26.3	25.0	0	756	0.7	1.1	0	0.5
Informatix*	25.0	20.5	2.5	177	0.6	0.9	0.2	0.1
Toyo Information Systems*	24.8	15.1	7.2	265	0.6	0.7	0.6	0.2
Century Research Center	22.5	11.9	8.3	119	0.6	0.5	0.7	0.1
Kanematsu Computer Systems*	18.5	14.2	4.3	360	0.5	0.6	0.3	0.3
Racal-Redac	17.5	0	14.8	2	0.4	0	1.2	0
Omron	16.0	9.6	6.4	394	0.4	0.4	0.5	0.3
Andor	15.7	3.9	11.1	121	0.4	0.2	0.9	0.1
Graphtec Engineering	15.4	7.7	6.9	331	0.4	0.3	0.6	0.2

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Table 8 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
INS Engineering	14.3	7.2	7.2	48	0.4	0.3	0.6	0
Nihon Itek*	13.3	7.2	5.1	91	0.3	0.3	0.4	0.1
Sumitomo Denko Workstation	12.7	12.7	0	654	0.3	0.6	0	0.5
Design Automation	12.5	2.5	9.3	262	0.3	0.1	0.7	0.2
CPU	10.5	0	9.5	0	0.3	0	0.8	0
Pasco*	9.3	3.5	4.9	77	0.2	0.2	0.4	0.1
COMPASS Design Automation	8.7	0.1	6.6	7	0.2	0	0.5	0
Sophia Systems*	8.1	2.0	5.3	250	0.2	0.1	0.4	0.2
Cisigraph	6.3	2.5	1.6	40	0.2	0.1	0.1	0
Silvar-Lisco	4.8	0	2.6	0	0.1	0	0.2	0
Ricoh*	4.7	0	4.0	0	0.1	0	0.3	0
Kubota Computer	4.6	3.4	0.8	300	0.1	0.2	0.1	0.2
Applicon	3.9	1.7	1.8	52	0.1	0.1	0.1	0
CAD Centre	1.8	0	1.4	0	0	0	0.1	0
Kanematsu Semiconductor*	1.6	0	1.1	0	0	0	0.1	0
ACTEL	1.6	0	1.4	0	0	0	0.1	0
ISICAD	1.5	0.4	0.8	9	0	0	0.1	0

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Table 8 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
Other Companies	100.9	0	94.4	35,745	2.5	0	7.5	25.6
All Companies	3,993.1	2,233.2	1,255.2	139,510	100.0	100.0	100.0	100.0
All N.A.-Based Companies	1,820.9	955.5	589.2	85,985	45.6	42.8	46.9	61.6
All Asian-Based Companies	2,146.6	1,275.2	648.2	53,482	53.8	57.1	51.6	38.3
All European-Based Companies	25.6	2.5	17.8	42	0.6	0.1	1.4	0
All Hardware Companies	657.2	583.0	0	42,202	16.5	26.1	0	30.3
All Turnkey & SW Companies	2,825.3	1,477.0	962.0	57,626	70.8	66.1	76.6	41.3

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals
Source: Dataquest (December 1993)

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Table 9
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Korea
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue (%)	Hardware Revenue (%)	Software Revenue (%)	Hardware Units Shipped (%)
IBM	16.3	12.6	1.4	1,747	19.2	23.3	8.6	27.4
Sun Microsystems	13.0	11.2	0	635	15.3	20.7	0	10.0
Cadence	5.7	0	5.0	0	6.8	0	30.2	0
Digital	5.5	3.9	0	102	6.5	7.1	0	1.6
Intergraph	5.5	2.0	1.6	70	6.5	3.8	9.8	1.1
Computervision	5.0	1.7	1.7	26	5.9	3.1	9.9	0.4
Hewlett-Packard	4.9	4.2	0	227	5.8	7.6	0	3.6
Silicon Graphics	3.6	3.5	0	104	4.3	6.4	0	1.6
Mentor Graphics	2.5	0.4	1.1	10	2.9	0.6	6.8	0.2
Zuken	1.6	0.5	0.9	10	1.9	0.8	5.1	0.2
COMPASS Design Automation	0.6	0	0.4	0	0.7	0	2.5	0
Seiko*	0.6	0.2	0.3	0	0.7	0.4	1.6	0
Applicon	0.3	0.1	0.1	3	0.3	0.2	0.7	0.1
Design Automation	0.3	0.1	0.2	5	0.3	0.1	1.1	0.1
ACTEL	0.1	0	0.1	0	0.1	0	0.4	0
Cisigraph	0.1	0	0	0	0.1	0	0.1	0

(Continued)

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Table 9 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Korea
UNITS: Millions of U.S. Dollars/Actual Units

					Market Share			
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue (%)	Hardware Revenue (%)	Software Revenue (%)	Hardware Units Shipped (%)
Other Companies	19.3	14.0	3.9	3,423	22.8	25.8	23.1	53.8
All Companies	84.6	54.3	16.7	6,364	100.0	100.0	100.0	100.0
All N.A.-Based Companies	82.7	53.8	15.6	6,348	97.7	99.0	93.6	99.8
All Asian-Based Companies	1.9	0.5	1.1	15	2.2	0.9	6.3	0.2
All European-Based Companies	0.1	0	0	0	0.1	0	0.1	0
All Hardware Companies	37.9	32.9	0	2,796	44.8	60.6	0	43.9
All Turnkey & SW Companies	28.9	9.1	12.6	215	34.1	16.7	75.3	3.4

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals
Source: Dataquest (December 1993)

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Table 10
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Singapore
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
IBM	5.3	4.1	0.5	535	19.2	23.5	10.0	27.0
Mentor Graphics	3.0	0.4	1.4	12	11.0	2.4	28.2	0.6
Sun Microsystems	2.6	2.2	0	127	9.5	13.0	0	6.4
Computervision	2.1	0.7	0.7	11	7.7	4.1	14.2	0.6
Hewlett-Packard	2.0	1.7	0	91	7.1	9.7	0	4.6
Silicon Graphics	1.8	1.7	0	52	6.6	10.0	0	2.6
Intergraph	1.6	0.6	0.5	21	5.7	3.5	9.6	1.0
Digital	1.3	0.8	0	25	4.6	4.9	0	1.3
COMPASS Design Automation	0.6	0	0.4	0	2.1	0.1	8.4	0
Zuken	0.4	0.1	0.2	2	1.4	0.6	4.0	0.1
Applicon	0.3	0.1	0.1	3	0.9	0.6	2.4	0.2
ACTEL	0.1	0	0.1	0	0.3	0	1.2	0
Cisigraph	0.1	0	0	0	0.3	0.1	0.4	0
Other Companies	6.5	4.7	1.1	1,102	23.6	27.4	21.6	55.6
All Companies	27.5	17.2	5.0	1,983	100.0	100.0	100.0	100.0
All N.A.-Based Companies	27.0	17.1	4.8	1,980	98.3	99.2	95.6	99.9
All Asian-Based Companies	0.4	0.1	0.2	2	1.4	0.6	4.0	0.1
All European-Based Companies	0.1	0	0	0	0.3	0.1	0.4	0
All Hardware Companies	11.4	9.9	0	833	41.3	57.7	0	42.0
All Turnkey & SW Companies	10.7	3.5	3.9	82	38.8	20.4	78.4	4.1

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals
Source: Dataquest (December 1993)

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Table 11
1992 CAD/CAM/CAE/GIS Market Share Update

APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Taiwan
UNITS: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share: Total Factory Revenue (%)	Market Share: Hardware Revenue (%)	Market Share: Software Revenue (%)	Market Share: Hardware Units Shipped (%)
IBM	11.4	8.9	1.0	1,263	21.2	24.7	12.3	29.3
Sun Microsystems	5.2	4.5	0	254	9.7	12.4	0	5.9
Digital	4.7	3.2	0	79	8.7	9.0	0	1.8
Computervision	4.1	1.4	1.4	21	7.6	3.8	17.4	0.5
Intergraph	4.1	1.5	1.2	52	7.6	4.2	15.9	1.2
Mentor Graphics	3.5	0.5	1.6	14	6.4	1.4	20.6	0.3
Silicon Graphics	3.2	3.0	0	91	5.9	8.3	0	2.1
Hewlett-Packard	2.9	2.5	0	136	5.5	6.9	0	3.2
Hitachi Zosen Info Systems	0.8	0.7	0	8	1.5	1.8	0.4	0.2
COMPASS Design Automation	0.6	0	0.4	0	1.1	0	5.4	0
Applicon	0.3	0.1	0.1	3	0.5	0.3	1.5	0.1
Informatix*	0.3	0.2	0	2	0.5	0.6	0.3	0
Zuken	0.3	0.1	0.1	2	0.5	0.2	1.8	0
ACTEL	0.1	0	0.1	0	0.1	0	0.8	0
Cisigraph	0.1	0	0	0	0.1	0.1	0.3	0
Other Companies	12.5	9.6	1.8	2,391	23.2	26.5	23.3	55.4
All Companies	53.6	36.1	7.8	4,318	100.0	100.0	100.0	100.0
All N.A.-Based Companies	52.5	35.4	7.6	4,308	97.9	98.0	97.6	99.8
All Asian-Based Companies	1.0	0.7	0.2	10	1.9	2.0	2.2	0.2
All European-Based Companies	0.1	0	0	0	0.1	0.1	0.3	0
All Hardware Companies	23.4	20.2	0	1,799	43.7	56.0	0	41.7
All Turnkey & SW Companies	18.5	7.1	6.0	160	34.5	19.7	76.4	3.7

*Contains reseller or OEM revenue: All or portions of this revenue line are not included in market totals
Source: Dataquest (December 1993)

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Dataquest Company Profile

Software

CAD/CAM/CAE/GIS Asia/Pacific

NEC Corporation

Corporate Statistics

Location	5-7-1 Shiba Minato-ku Tokyo 108-01, Japan Telephone: (81)-3-3454-1111 Fax (81)-3-3457-7249
President	Hisashi Kaneko
Number of Employees	42,287
Capital	¥188 billion
Revenue (April 1993 to March 1994)	¥2,899 billion
1993 CAD/CAM/CAE/GIS Factory Revenue	$402.9 million (exchange rate: U.S. $1 = ¥110.85 in 1993)
Fiscal Year Ends	March 31
Founded	1899
Major Consolidated Subsidiaries (Capital)	NEC Home Electronics Ltd. (¥33.5 billion) Japan Aviation Electronics Industry (¥10.6 billion) NEC System Integration and Construction (¥8.1 billion) Ando Electric Company Ltd. (¥7.6 billion) Nippon Avionics Co. Ltd. (¥6.8 billion)
Overseas Subsidiaries	NEC America Inc. ($200 million) NEC Electronics Inc. ($171 million) NEC Technologies Inc. ($666 million)
Main Product Areas	Computers and industrial electronic systems; communications systems and equipment; electronic devices

NEC Corporation is one of Japan's representative high-technology enterprises that cover all segments of computers, electronic devices, semiconductors, telecommunications equipment, and home electronics.

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A well-known term for NEC's corporate strategy is "C&C," which represents the company's efforts to integrate computers and communication. NEC has held about 50 percent market share of the Japanese personal computer market during the last several years.

Corporate Organization

NEC was founded in 1899 as the Nippon Electric Company Limited. At the end of June 1994, Tadahiro Sekimoto became CEO, and Hisashi Kaneko, ex-president of NEC America, was named to the presidential position. Mr. Kaneko joined NEC in 1956 after graduating from Tokyo University and worked at NEC America until August 1993. NEC was the family company of NTT until the 1970s. Mr. Sekimoto, who began his career at NEC as an engineer in the transmission division, became president in 1979, when NEC had about ¥700 billion in sales. During the 14 years of Mr. Sekimoto's presidency, sales increased more than four times. In the last half of the 1970s, Mr. Sekimoto began the corporate strategy of integration of computers and communication, thus bringing NEC into the telecommunications field.

Japan has not yet completed the transition from an industrial society to an information-oriented one, in contrast to the United States, which has made further advances in changing to an information-oriented society. With abundant work experience from running NEC America in the United States, Mr. Kaneko, as the new president, seems to be the best candidate to implement the future strategy toward multimedia and globalization, two keywords of an information-oriented society.

The Revenue Picture

Figure 1 depicts the sales revenue for the past decade of the leading Japanese electronics manufacturers. The Japanese economy has been stagnant because of investment reductions in factories by private enterprises, as well as further yen appreciation. In light of these conditions, NEC's financial results for the fiscal year ending in March were satisfactory. Sales increased 1 percent from fiscal March 1993 to ¥2,899 billion. NEC has been growing at a yearly average rate of 4.9 percent between 1984 to 1994. NEC's revenue by division is shown in Figure 2.

Although NEC has traditionally sold large computers such as supercomputers and mainframes, revenue contribution from personal computers has been increasing in the last several years. NEC is selling fewer large computers partly because of the downsizing trend taking place within its customer base.

NEC Business Outlook

In the early half of the 1980s, NEC, with three major businesses of semiconductors, telecommunications, and computers, was one of the large general electrical machinery manufacturers, which included Toshiba, Hitachi, Fujitsu, and Mitsubishi. But in the 1990s, the whole information

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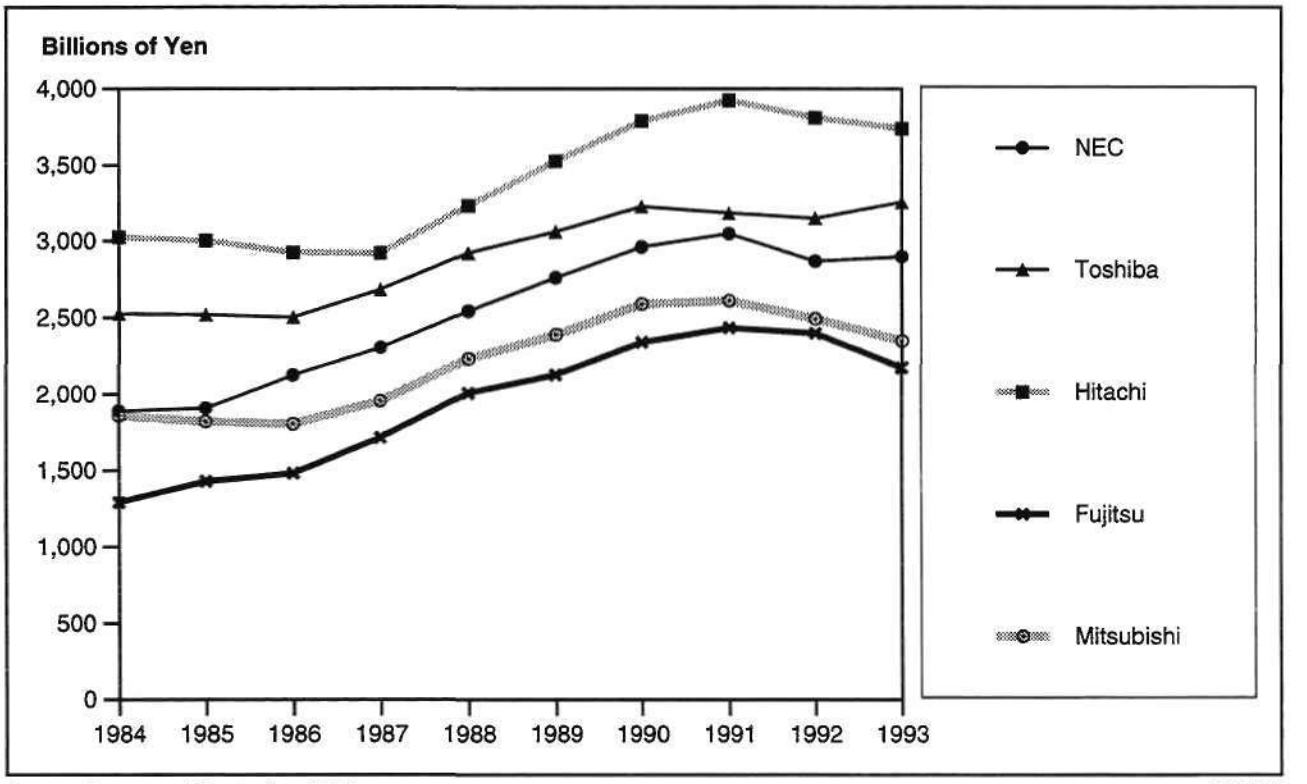
Figure 1
Japan's Major Electronics Companies Revenue History



Source: Dataquest (September 1994)

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industry entered into a period of change. NEC entered into many business partnerships, joint ventures, investments, and business deals. The company views these ventures as one of the survival measures in the progression toward open systems and downsizing (see Table 1).

In light of the growing popularity of open systems and downsizing, NEC is providing "Solution 21," a C&C technology product that consists of systems integration services and is aimed at solving the management tasks that many companies are facing. NEC is providing not only hardware, but also valuable software.

Workstations and Personal Computers

Since announcing its first workstation, the EWS 4800 in September 1986, NEC had sold 75,000 workstations by the end of March 1994. The newest EWS 4800/360EX uses a 64-bit RISC chip R4400SC (100 MHz) from the U.S.-based MIPS Computer Systems (now owned by Silicon Graphics Inc.). This EWS 4800/360EX workstation includes calculation speed specifications of 108 SPECint92 and 119 SPECfp92.

In 1994, NEC investigated the possibility of using the personal computer architecture, namely the PCI bus, with the workstation. NEC was able to reduce the cost of workstations by using this new technology.

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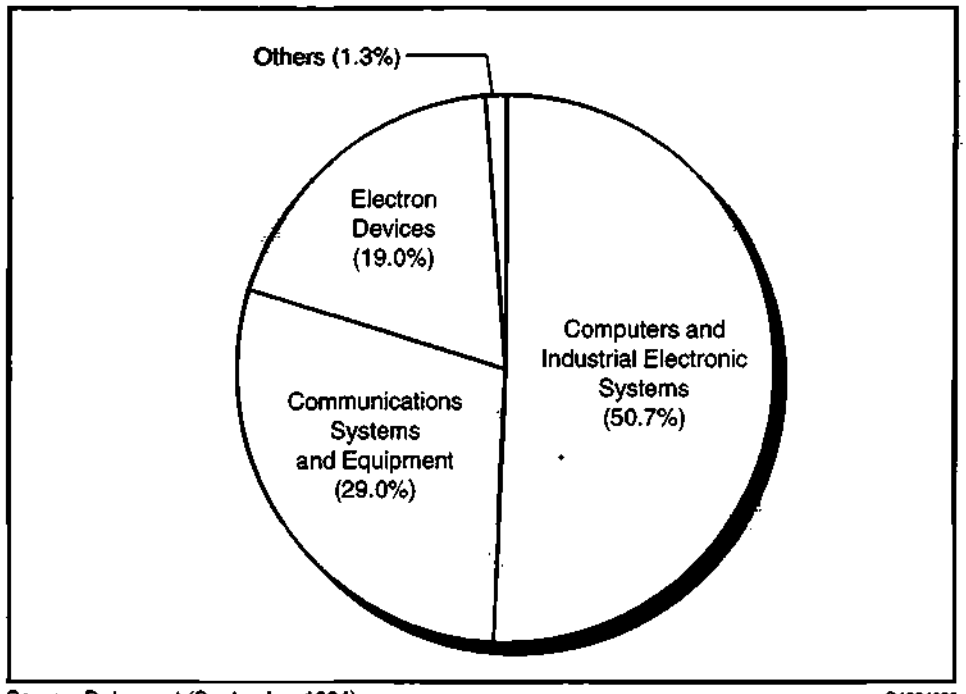
Figure 2
1994 NEC Revenue by Division



Source: Dataquest (September 1994) G4004960

The EWS 4800/220 workstation was listed at ¥5 million in 1990, but EWS 4800/310LC workstation was listed at ¥750,000 when it was announced in April 1994. NEC was able to achieve this 85 percent cost reduction in workstations by making parts for PCs and workstations in common. In spring 1995, NEC will sell a new, low-cost workstation for 40 percent of the price of current workstations.

During the past several years, PC hardware prices have been progressively decreasing. As a result, NEC's personal computer business is seeing more competition. Compaq's introduction of the low-priced PC into the Japanese market in October 1992 and IBM's introduction of the PS/V series into the market have attacked NEC's stronghold of 50 percent Japanese PC market share. IBM is eagerly approaching the Open Architecture Developers' Group (OADG) member companies to OEM the PS/V series. These companies, which include Ricoh and Canon, have been acting as OEM suppliers for IBM's PS/55, but they have not succeeded in destroying NEC's stronghold in 1993 (see Figure 3).

CAD/CAM/CAE Business

The CAD/CAM/CAE business of NEC is not limited to only offering the engineering workstation EWS 4000 series or advanced CAD/CAM/CAE software. The company offers electronic devices, electronic data interchange (EDI) services, and gate array design services. In addition, it offers

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Table 1
NEC Partnerships

Partner	Relationship
Bull (France)	In 1989 Bull selected NEC as an OEM mainframe supplier.
	In 1991 NEC invested 4.4 percent in Bull.
	In 1994 Bull selected NEC as a supercomputer supplier.
CDS (U.S.)	In 1992 NEC invested 5.0 percent in CDS
	In 1992 CDS sold NEC supercomputers in Europe and United States.
Compass Design Automation (U.S.)	In 1994 NEC and Compass codevelop ASIC library.
IBM (U.S.)	In 1992 NEC and IBM began codeveloping software that interlocks mainframes.
MIPS Computer Systems (U.S.)	In 1989 NEC and MIPS partnered in the semiconductor field.
	In 1989 NEC adopted MIPS CPU for NEC workstations.
Racal Redac (U.K.)	In 1992 NEC developed CAD integration for Racal-Redac's Visula product.
Samsung (Korea)	In 1994 NEC and Samsung codevelop 265Mb DRAM.
Sanyo (Japan)	In 1991 Sanyo began reselling of NEC workstations.
	In 1992 Sanyo began consignment development and production for NEC laptop-type workstations.
Sumitomo Denko (Japan)	In 1992 Denko began OEM sales of NEC workstations.
Synopsys (U.S.)	In 1994 NEC adopts Synopsys VSS simulator.
Toshiba (Japan)	In 1974 established NEC-Toshiba Information Systems Inc..
USL (U.S.)	In 1991 NEC invested 3.6 percent in USL.

Source: Dataquest (September 1994)

total services, from designing of parts procurement to manufacturing at the LSI/PCB Design Centers. Furthermore, because NEC is a general electrical machinery manufacturer, it has many design divisions, and it is making successive efforts in pursuit of design automation.

During the past five years, NEC's revenue has grown in dollars, but has fluctuated in yen, as illustrated in Figure 4. In 1993, NEC's CAD/CAM/CAE factory revenue was $402.9 million, and the respective sales of mechanical, AEC (architecture, engineering, and construction), GIS (geographic information systems), and EDA (electronic design automation) revenue was $245.8 million, $64.5 million, $8.1 million, and $81.4 million (see Figure 5). In 1993, NEC held second place in the Asian CAD/CAM/CAE and GIS market, with an 8 percent market share (tied with IBM). The top 10 CAD vendors in the Japanese market are shown in Figure 6.

Electronic Design Automation

Major EDA applications that NEC is handling are shown in Figure 7. NEC's EDA factory revenue in Japan is $84.6 million, placing the company fifth in terms of revenue sales (see Table 2).

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Figure 3
1993 Japanese PC Market Share

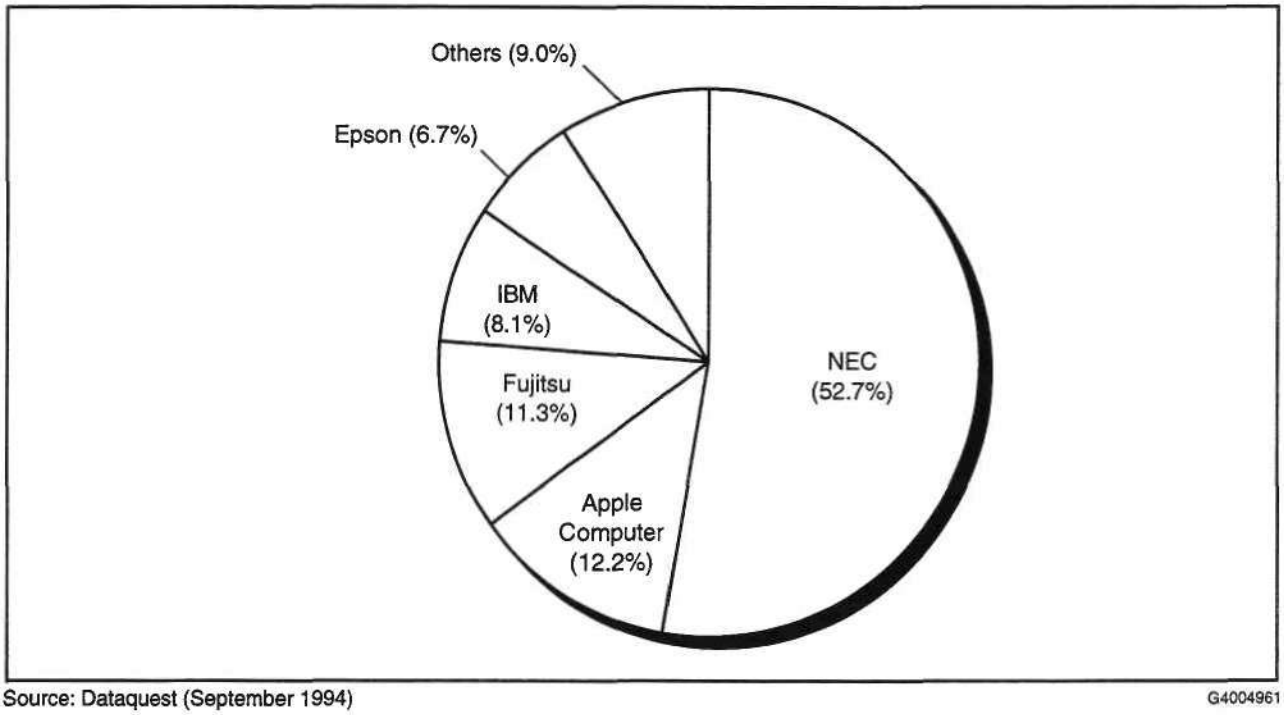

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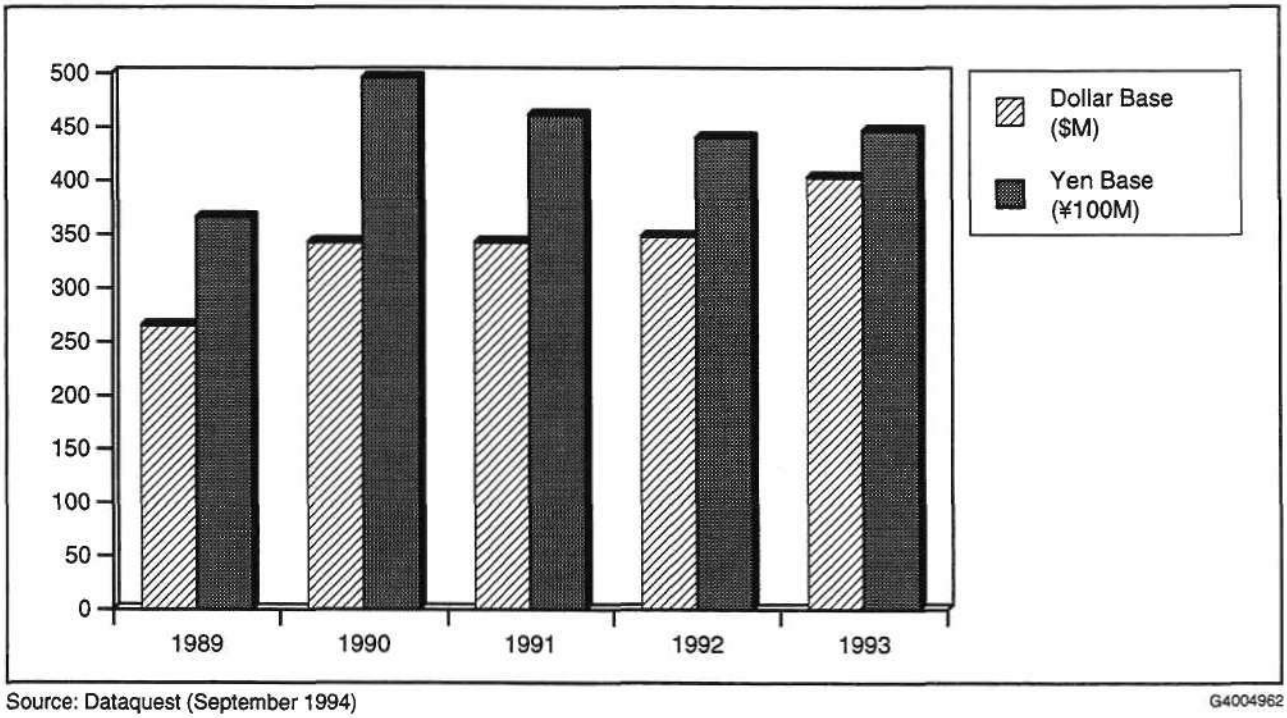
Figure 4
NEC CAD/CAM/CAE and GIS Factory Revenue History



Source: Dataquest (September 1994) G4004962

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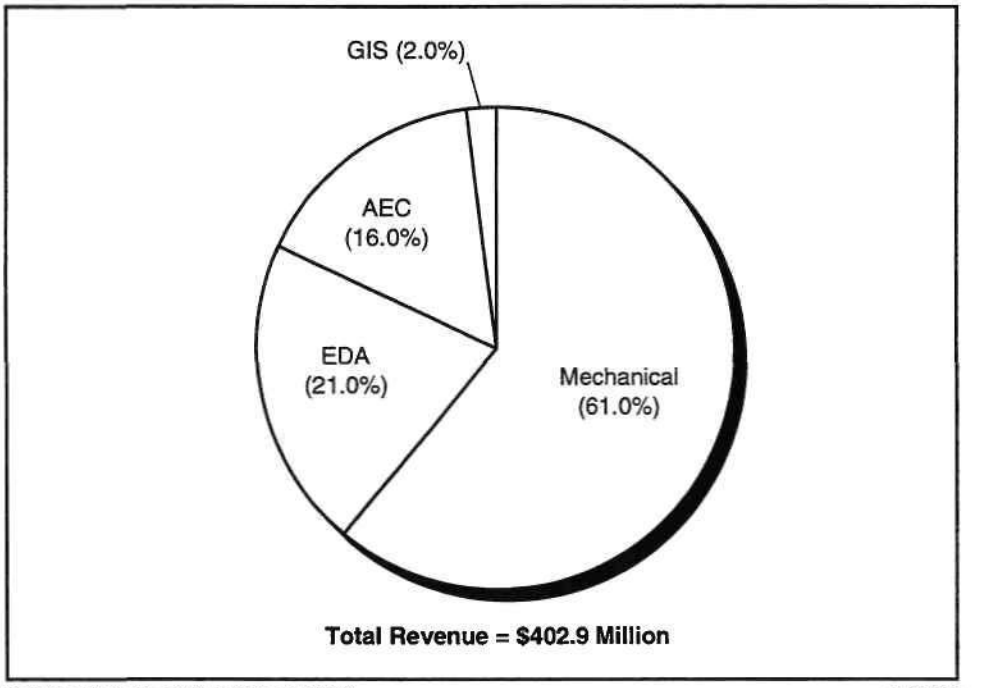
Figure 5
1993 NEC CAD/CAM/CAE and GIS Revenue by Application



Source: Dataquest (September 1994) G4004963

Figure 6
1993 CAD/CAM/CAE and GIS Asian Market Share

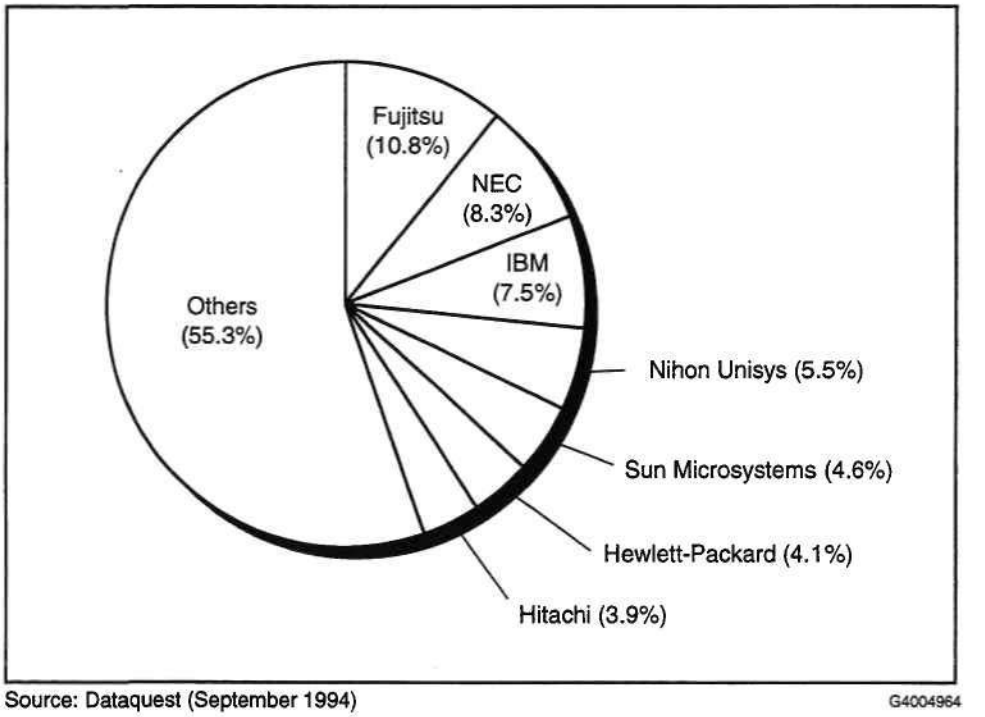


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Figure 7
NEC EDA Software Applications

Obbligato*
(NEC Product Data Mangement Application)

CAD Framework
- Power Frame
- Design Framework II
- Falcon Framework

Logic Synthesis
- Synopsys Design Compiler
- AutoLogic

Schematic Capture
- Design Architecture — CR-3000/SWS
- Concept — SCIDE
- Composer — Worldview
- Visula/Circuit Design

Simulation
- Logic Simulation
- QuickSim II — System HILO
- VSS — Vantage
- Verilog-XL — GRAG2
- Veritime — SmartModel
- Analog Simulation
- Analog Workbench II — HSPICE
- CR-3000/AWS — ContecSPICE
- SABER
- Real Chip Simulation
- LM-1000
- CATS
- Hardware Simulation

Micon Development Software

Inserkid Emulation

ASIC/Gate Array Design
- Open CAD* — DRACULA III
- Virtuoso — BEEMS/X-LAYOUT
- Gate Ensemble — SX-9000
- Cel 3 Ensemble

LSI Brock Generator
- GDT
- DRACULA III
- BEEMS/X-LAYOUT
- SX-9000

FPGA Design
- ABEL

Hybrid IC Design
- Visula/Hybrid Design
- CR-3000/PWS

PCB Design
- Visula/Layout Editor
- PLANET*
- CAD Integrator*
- CR-3000/PWS
- CADVANCE V
- U-ART

Mechanical CAD/CAM/CAE System
- CAE+2D* — Pro/Engineer
- CAE+3D* — NISA II/FEAP
- EUCLID — I-DEAS

Test
- TDS
- Verifault-XL
- HIFAULT/HITEST
- Test Compiler
- PDLtest-Plus

Chip
- (Plotter Data)

Technology Document
- Document Writer
- Publiss
- FrameMaker
- EGWord
- Island

Parts List

Manufacturing Data
- (NC Drill)
- (Photo Data)
- (Plotter Data)
- (Chip Mounter Data)

Board Test
- Verifault-XL

Technology Document
- Document Writer
- Publiss
- FrameMaker
- EGWord
- Island

*NEC Products

Source: Dataquest (July 1994)

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Table 2
Asian EDA Market Share

Company	Factory Revenue ($M)	Market Share (%)	Hardware Revenue ($M)	Software Revenue ($M)
Sun Microsystems	195.1	16.4	154.9	0
Cadence	111.2	9.3	0	71.9
Zuken	95.0	8.0	27.4	45.4
Fujitsu	94.3	7.9	51.3	30.9
NEC	**84.6**	**7.1**	**55.4**	**21.6**
Digital	78.2	6.6	58.8	2.6
Hewlett-Packard	70.5	5.9	49.1	10.1
Mentor Graphics	64.7	5.4	8.2	28.7
Seiko	58.7	4.9	20.5	29.4
Synopsys	33.8	2.8	0	22.9
Others	305.9	25.7	108.0	156.0
Total	1,192.0	100.0	533.6	419.5

Source: Dataquest (September 1994)

PCB/Hybrid/MCM

In recent years, hardware has increased in functionality and performance, and sophisticated design tools are required to increase the board densities of printed circuit boards (PCBs) and to increase the speed of ICs. There are new problems to be solved, such as high thermal radiation or noise.

NEC has been establishing printed wiring board (PWB) design centers all over Japan since 1987 in order to meet such needs. The PCB CAD system used in each designing center is called PLANET, and it is not sold to outside customers. The Hashimoto Technical Center is the core design center, connected to each PWB design center by INS64 high-speed private lines. Through this network, the other design centers have the capability to do online referencing for the newest information of parts and designs, thereby offering diligent and delicate services to NEC's customers.

NEC has also developed silicon-on-silicon boards, which virtually equip one chip as a set. Compared with the former ceramic multichip modules (MCMs), silicon-on-silicon boards can reduce the board size by one-third, so that existing packages like quad flat packages can be offered at a lower price.

MCM technology is often viewed as an indispensable technology for semiconductor parts mounting for the next-generation multimedia and mobile telecommunications equipment, such as portable phones. NEC's MCM design tools are sold jointly with Racal Redac's MCM editor. In Japan, Cadence and Kyocera, and Mentor Graphics and Toshiba are codeveloping MCM design tools, and the resulting race for market share will be even tighter. While NEC is jointly selling Racal Redac's MCM editor, plans for new MCM tools are being shelved because of the high cost associated with designing and producing MCMs. Dataquest believes that if NEC and its competitors can solve this cost problem, the MCM market will quickly expand.

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ASIC

It is becoming more common for customers themselves to design ASICs to a certain level using CAD systems and not to depend so heavily on semiconductor manufacturers. In August 1993, NEC and Synopsis Ltd. shipped the ASIC tool, Open CAD V3, using 0.5-micron processing technology, and there are further plans to sell a 0.35-micron ASIC development system in 1994.

Dataquest believes that NEC is striving to lead the ASIC technology battle by preparing the design environment. In June, NEC agreed on codevelopment of a CMOS cell-based ASIC library for 0.35-micron processing technology. Dataquest predicts that NEC is targeting early development of the multimedia ASIC market by completing a 0.35-micron ASIC library first.

AEC and GIS

At the present time, there are only two major architectural CAD applications developed by NEC, as shown in Table 3. One product is called CAE-ARC II, an architectural design support system. This system supports each architectural design process, from plan designing to cost planning (which checks conformity to the architectural law) to practical designing (drawing basic designs, including 3-D and exterior perspectives). Because it can write DXF as well as AutoCAD (Autodesk) file types, it can exchange drawings with ARVISS (from Graphica), DRACAD (from Kozo Systems), and others. The other NEC AEC application is CAE-HOME II, a housing unifying information system that supports a broad field of sales, design, and production in the housing business.

In Japan, there are about 200,000 architectural firms of all sizes. The use of architectural CAD systems in this field is so remarkable that many CAD products are thrown into the market by many vendors. However, because there is no CAD system that can generalize the advancing architectural design business, it is necessary to build the most suitable system to meet the design process. As shown in Table 3, NEC has not adhered to selling only its brand-name products. In an effort to further promote NEC hardware, the company has been involved in sales development of competing AEC vendor applications so that it can offer a full line of architectural products to meet users' needs. This strategy is not limited to NEC—powerful Japanese hardware vendors such as Fujitsu are doing the same type of sales strategy. NEC's sales of architectural CAD systems in 1993 are shown in Table 4.

Mechanical

NEC's major mechanical CAD/CAM/CAE software is shown in Table 5. Because the 3-D CAD/CAM + 3-D/MA[E] was developed as a succeeding system to the 2-D CAD system CAE + 2-D[E] by adding the 3-D function, the two systems are data compatible. The 3-D system can be applied to wireframe/surface/solid modeling. It is also possible to use a direct interface with other leading vendors' mechanical analysis applications.

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Table 3
Main AEC and GIS Applications for NEC Workstations (EWS 4800 Series)

	Vendor	Function
Architectural Applications		
MultiCAD-CAC	Tokyo Computer System	General architectural CAD system
CAE-ARC II	NEC	Architectural scheme designing CAE system
CAE-HOME II	NEC	Housing unification CAD system
DaynaPass4	Daynaware	Full-color architectural designing 3-D graphics software
ARVISS	Graphica	Architectural scenery simulation software
C-QUEL	Graphica	Widely used 3-D CG software package
SIGMARRIS	C. Itoh Techno-Science	3-D architectural supporting system for planning and designing
adpack-D	Kozo Keikaku	Architectural scheme drawing system
TORINO-K1	CAD Venture	Scheme of execution CAD system
Archi-CAD Series	Architectural Systems	General architectural CAD system
CAEASR-S2	CAD Venture	Architectural concrete processing system
Super Buil/SS1	Union System	Architectural structure calculation system
FRED-EX	INS Engineering	Architectural steel frame processing designing drawing system
Sigma Series	Sumitomo Cemento Computer Systems	General architectural CAD system
Civil Design Applications		
Mapview II	NEC	GIS system
ADVANS Series	Kawata Techno-System	Voluntary frame RC-CAD system
MetaPlan	S.I.S.D.	Civil engineering designing CAD system
LAPLAS	Kozo Keikaku	Civil engineering planning supporting system
STRAX-R	Kawata Techno-System	Highway planning CAD system
Facility Design Applications		
CADIAN-ARCADE+	Technodia	Unified facility designing execution drawing coherent system
CADIAN-ARCADE/EX	Technodia	Unified facility execution drawing CAD system
CADWe'LL Series	Daitec	Architectural facility unification CAD

Source: Dataquest (September 1994)

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Table 4
1993 Asian AEC Market Share

Company	Factory Revenue ($M)	Market Share (%)	Hardware Revenue ($M)	Software Revenue ($M)
Fujitsu	151.8	20.7	88.1	47.3
NEC	**64.6**	**8.8**	**49.2**	**15.6**
Kozo Keikaku Engineering	50.4	6.9	2.3	12.8
IBM	49.7	6.8	28.9	13.4
Nihon Unisys	47.9	6.5	27.2	11.6
Technodia	41.1	5.6	33.3	0.4
Autodesk	27.6	3.8	0	27.6
Informatix	25.5	3.5	20.4	3.0
Intergraph	25.4	3.5	10.7	7.0
Toshiba	21.6	2.9	10.8	8.6
Others	228.5	31.1	139.5	68.2
Total	734.0	100.0	404.4	215.5

Source: Dataquest (September 1994)

Table 5
NEC Mechanical Applications

Application	Function
CAE+2D[E]	2-D CAD system
CAE+3D/EM+[E]	3-D CAD system
CAE+3D/MA[E]	General 3-D modeling system
CAE+NCAM[E]	Machinery process support system
CAE+SML[E]	Steel sheet process design manufacturing support system

Source: Dataquest (September 1994)

Table 6 shows the market share of the major mechanical CAD/CAM vendors in Japan.

Product Data Management

NEC made an announcement in July to port software used on NEC's workstations and PCs to its competitors—specifically, Hewlett-Packard, IBM, and Sun Microsystems. This porting was accomplished through the systems integration business in order to expand the sales of software products that run on multiple platforms. With this porting, NEC was able to proceed toward market development not only in Japan, but also in China, South Korea, Singapore, the United States, and Europe. The company is making efforts to cultivate new users by porting a technical information management (product data management) software product, "Obbligato," to competitors' workstations. This software includes the ability to perform management of design information. About 250 systems were sold since the product was introduced in 1992. Because development of sales channels is indispensable for sales expansion, in June NEC developed Obbligato, a software that unified the PCB design CAD system. This

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Table 6
1993 Asian Mechanical CAD/CAM/CAE Market Share

Company	Factory Revenue ($M)	Market Share (%)	Hardware Revenue ($M)	Software Revenue ($M)
IBM	280.1	11.0	128.4	101.6
NEC	**245.8**	**9.6**	**165.4**	**58.4**
Fujitsu	219.9	8.6	128.9	67.4
Nihon Unisys	218.2	8.5	67.5	44.5
Hitachi	143.6	5.6	63.0	61.8
Toshiba	125.9	4.9	65.3	50.4
Hewlett-Packard	102.4	4.0	76.1	14.9
Hitachi Zosen Information Systems	89.8	3.5	33.5	4.4
Altium	82.3	3.2	16.3	46.3
Computervision	78.1	3.1	5.0	39.3
Others	969.2	37.9	673.0	297.8
Total	2,555.3	100.0	1,422.4	786.8

Source: Dataquest (September 1994)

software is sold by Mentor Graphics, a large U.S.-based EDA vendor, as well as NEC.

Other Products

Other than the CAD products discussed so far, NEC is manufacturing and selling the "SX A Series" of supercomputers and the "ACOS Series" of mainframes. Various applications, such as structural analysis, fluid analysis, and electromagnetic field analysis for mechanical engineering, and structural and vibration analysis for AEC are being offered by many CAD vendors that run on these supercomputers and mainframes.

Dataquest Perspective

NEC is a CAD vendor that offers not only hardware, but also software and services. Its range of products in the CAD/CAM/CAE field services many users, including mechanical engineers, electronic designers, and architects/engineers/construction firms.

The CAD/CAM/CAE group of NEC seems to be aiming to be a total solution provider that can solve problems by offering hardware, software, services, or a combination of these. NEC handles not only its own products, but also competitors' products when necessary. Dataquest envisions an increase in NEC's strategic partnerships with other companies in the next several years. It is certain that NEC is steadily changing.

By Tamio Fukuda

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