

Dataquest

 a company of
The Dun & Bradstreet Corporation

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Dear Personal CAD and Distribution Channels Program Subscriber:

I have some important news about your Dataquest research subscription. In 1992, we implemented a significant redesign of the deliverables for all Dataquest research programs. I am happy to say that we have had many favorable responses. On the basis of your response, we will continue to improve and expand our reports and services in 1993. Some of the highlights of our 1993 program are:

- *CAD/CAM/CAE Resellers*, a new *User Wants and Needs* study, focuses on what CAD dealers need to successfully sell in 1993 and 1994, which channel programs work best, and how dealer's business models are changing
- *Directory of North American CAD/CAM Resellers*, a unique prospecting tool listing 300 of the largest CAD/CAM resellers in North America
- Market statistics on the worldwide market for personal CAD tools provide comprehensive hardware, software, and service forecasts and market share information
- *Battle of the Desktop Operating Systems: A Competitive Analysis*, a new focus report examining the strengths and weaknesses of the primary OS contenders
- *Client/Server: The Driving Force of Information Technology in the 90's*, a focus report analyzing the trends and issues impacting the software components of the client/server model

You have just received your 1993 Personal CAD and Distribution Channels program binder. Documents to be filed in this binder will specify:

Program: Personal CAD and Distribution Channels Worldwide

I look forward to working with you closely in our overall effort to improve the content, quality, and delivery of Dataquest's products and services. If you have any questions about our research coverage, delivery schedule, or products and services, I encourage you to call me at (408) 437-8407.

Sincerely,



Kathryn Hale
Senior Analyst, CAD/CAM/CAE/GIS Worldwide

Enclosures: 1993 Subscription Program Specification
1993 Publication Schedule

**PERSONAL CAD AND DISTRIBUTION CHANNELS WORLDWIDE
Binder Checklist**

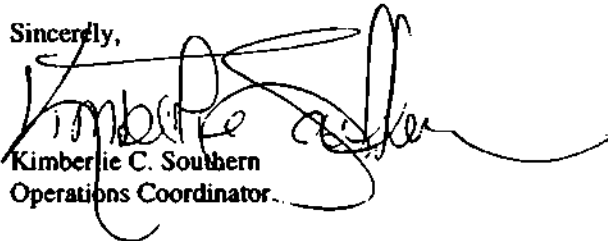
SECTION TITLES	COPYRIGHT	MISSING
<u>Perspectives (Tab)</u>		_____
<u>Market Statistics (Tab)</u>		_____
CPER-WW-MS-9301 (Personal CAD and Distribution Channels Worldwide Market Share)	03/15/93	_____
<u>User Wants and Needs (Tab)</u>		_____
<u>Vendor Profiles (Tab)</u>		_____

Please move your 1993 publications into the new 1993 service binder behind the appropriate tab.

This list indicates the documents that you should have received so far in 1993. If you find that you are missing any documents please check them off and fax the checklist back to me at (408) 437-0292.

If you have any questions please contact me directly at (408) 437-8320.

Sincerely,



























Kimberlie C. Southern
Operations Coordinator

1993 Publication Schedule

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Program: Personal CAD and Distribution Channels Worldwide (CPER-WW)
Core: CAD/CAM/CAE/GIS Worldwide (CCAM-WW)
Group: Software (SFTW-WW)

Program Manager: Kathryn Hale
Group Director: Frank Clugage

Program Deliverables	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Market Statistics												
User Wants and Needs												
Vendor Profiles												
Perspectives	Published on an event-driven basis (minimum of 2 for the year)											
Core Deliverables	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Market Statistics												
Perspectives	Published on an event-driven basis (minimum of 4 for the year)											
Group Deliverables	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Industry Trends												
Focus Reports												
Inquiry Summaries												

1993 SUBSCRIPTION RESEARCH SERVICE

PERSONAL CAD AND DISTRIBUTION CHANNELS

*What
you'll need to
know in
1993.*

Many CAD dealers can now sell workstation-based systems in networked environments, and their increasing sophistication allows them to sell solutions that previously could only be sold by a direct sales force. To what extent can we look to resellers to replace the direct sales force?

Dataquest's CAD/CAM/CAE Resellers *User Wants and Needs* study analyzes the evolving and expanding role resellers play in the overall market, keeping you abreast of the capabilities of CAD dealers, large and small, across North America. This study tells you which vendor programs are the most successful today. Channel data from our extensive market database tracks trends in distribution among vendors worldwide.

Dataquest

Worldwide

Software Group

Building a reseller channel is a lot of work, and mistakes are costly. Is there a way to jump-start the process?

An extensive database of reseller information and practices allows Dataquest to produce custom analysis, reports, and recommendations for developing a North American dealer program, based on considerations such as region or application offered. This program's tactical orientation helps you get the right people selling your product.

Autodesk's dominant position in the PC CAD market presents a lucrative target. What's the best way to challenge the AutoCAD product?

Dataquest's Personal CAD program analyzes and tracks the success of market leader Autodesk, from both a qualitative and quantitative perspective. *Market Statistics, Dataquest Perspectives*, and our dealer study provide insight into the success of both AutoCAD and its competitors.

PRODUCT COVERAGE

APPLICATIONS

Mechanical

AEC

EDA

GIS/Mapping

Electronic CAE

IC Layout

PCB/Hybrid/MCM

...

REGIONS

North America

Europe

Asia

Rest of World

...

PLATFORM

Personal Computer

1993 RESEARCH HIGHLIGHTS

International team of analysts, researchers and support staff in San Jose, Tokyo, and the UK

...

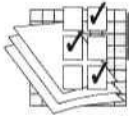
Electronic delivery of Directory of North American CAD/CAM Resellers, including custom cuts based on attributes such as region, size, or market specialty

...

Senior analyst consultation for strategic business opportunities

...

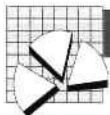
Competitive desk provides inquiry-driven analysis of major players



USER WANTS AND NEEDS

Dataquest's fourth annual survey of the major CAD value-added-resellers (VARs) will analyze which resellers are succeeding and why. Emphasis is placed on what the indirect channel expects from vendors and which products resellers expect to offer them the most opportunity over the next two years. A second publication provides a comprehensive directory of North American CAD/CAM resellers.

- **CAD/CAM/CAE Resellers User Wants and Needs Study:** survey will focus on what CAD dealers need to successfully sell in 1993 and 1994; which channel programs work best, and how dealers' business models are changing. We detail both what dealers sell now, and which opportunities they are looking for. The sample is selected to include the largest dealers in North America.
- **Directory of North American CAD/CAM Resellers:** this unique prospecting tool provides a listing of the 300 largest CAD/CAM resellers in North America. Information includes contact names, size of company, and hardware and software products sold. This directory can also be delivered in electronic form.



MARKET STATISTICS

Market share and forecasts are published twice a year for all major CAD/CAM applications operating on the personal computer platform. This series of reports provides comprehensive historical and forecast data for hardware, software, and service revenue, unit shipments, and changes in installed base. The structure and content of market share and forecast statistics are the same for each application and are described in the CAD/CAM/CAE industry overview data sheet.

Market share and forecast for the PC platform by application: Mechanical, AEC, EDA, GIS/Mapping, Electronic CAE, IC Layout, PCB/Hybrid/MCM.



FOCUS REPORTS

- **The Battle for the Desktop: The Future of Desktop Operating Systems**

A competitive analysis of the strengths and weaknesses of the primary OS contenders for the desktop: OS/2, Windows NT, Solaris, ODT, UNIXWare, and NeXTStep. The report also includes a forecast of the major desktop operating systems through 1996.

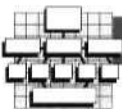
- **Client/Server: The Driving Force of Information Technology in the '90s**

As a major computing model of the '90s, client/server is generating a revitalization of the information technology industry. By analyzing the trends and issues impacting the software components of the client/server model (including networking, operating systems, development tools, and applications), this report identifies how software is emerging as the critical driver of client/server technologies.



INDUSTRYTRENDS

The IndustryTrends report provides insight into the market dynamics affecting the entire software industry, including top-level forecasts, market share and trend analysis.



VENDOR PROFILES

A vendor profile will be published in 1993 which will analyze major product releases, mergers, acquisitions, or technology issues that cause a fundamental shift in market perception, or change the competitive environment. All players in the market from market leaders to newly emerging niche vendors will be considered. Other event-driven analysis will be presented in Dataquest Alerts and Dataquest Perspective newsletters.

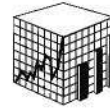
ADDITIONAL RESEARCH RESOURCES



INQUIRY SUPPORT AND MONTHLY SUMMARIES: year-long direct access to analysts and monthly summaries of representative inquiries.



DATAQUEST ALERTS*: news and analysis delivered by fax for fast breaking developments.



DATAQUEST PERSPECTIVES: timely analysis and commentary on industry events and issues.



INFORMATION RESOURCE CENTERS: access to extensive printed and on-line data in San Jose, Boston, UK, France, Germany and Japan.



CONFERENCES: the industry's preeminent conferences held throughout the year with a wide variety of special interest agendas.

* Available online through CompuServe.

PROGRAM DELIVERABLES

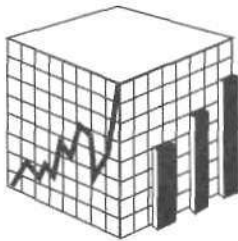
- User Wants and Needs Study
- ...
- Market Statistics
- ...
- Focus Reports
- ...
- IndustryTrends
- ...
- Vendor Profiles
- Competitive Desk
- ...
- Inquiry Support and Monthly Summaries
- ...
- Dataquest Alerts
- ...
- Dataquest Perspectives
- ...
- Information Resource Centers
- ...
- Conferences

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X



Dataquest Perspective

Software

Personal CAD and Distribution Channels Worldwide

In This Issue

End-User Analysis—A Look at the AutoCAD User

In this article, Dataquest profiles the typical PC-based CAD user through an in-depth look at AutoCAD users in the architecture, engineering, and construction (AEC) and mechanical CAD/CAM/CAE industries. This study highlights the needs of the end user, the factors that influence purchasing decisions, and growth opportunities for PC-based CAD vendors.

By Sharon Tan

End-User Analysis—A Look at the AutoCAD User

Dataquest identified two types of PC-based CAD users—those in the architecture, engineering, and construction industry and those in the mechanical CAD/CAM/CAE industry. Autodesk holds a dominant position in the PC-based CAD market, with approximately 42 percent of respondents in our survey reporting that they use AutoCAD for at least a portion of their design work. Whereas this article focuses solely on the survey responses of AutoCAD users, the results may indicate needs and requirements of a broader set of users of general-purpose, PC-based CAD.

Survey Methodology and Respondent Profile

Dataquest recently completed telephone surveys of nearly 400 North American and European AEC and mechanical CAD/CAM sites, drawn mainly from various industry-specific directories and Dataquest's own database of CAD/CAM/CAE sites. In an effort to profile the PC-based CAD users within the AEC and mechanical CAD/CAM/CAE industries, we analyzed a total of 161 survey responses from those respondents who reported that they used AutoCAD software at their site.

The target respondents in this study are purchasing decision makers of AEC and mechanical CAD/CAM/CAE tools in the United States and Europe. The survey population is dominated by CAD managers and department engineers, as shown in Figure 1. Designers are also well represented in the survey, with almost all of the designers coming from the mechanical CAD industry.

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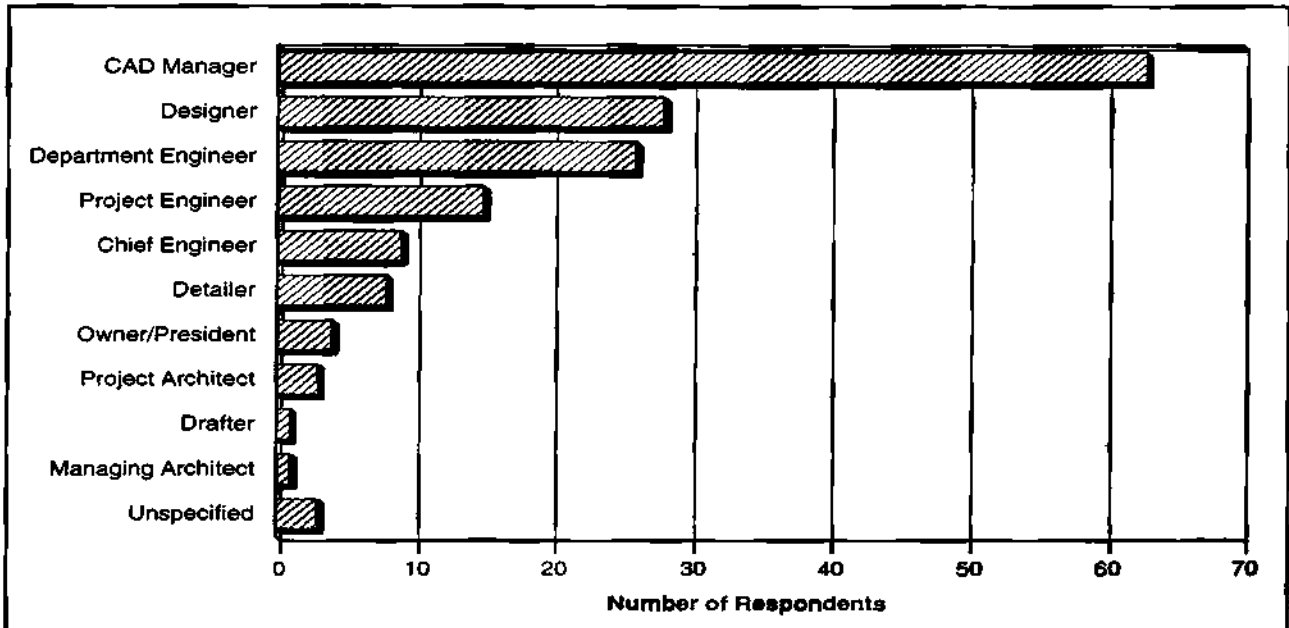
DB a company of
The Dun & Bradstreet Corporation

Program: Personal CAD and Distribution Channels Worldwide

Product Code: CPER-WW-DP-9301

Publication Date: August 23, 1993

Figure 1
Respondents' Job Title



Source: Dataquest (August 1993)

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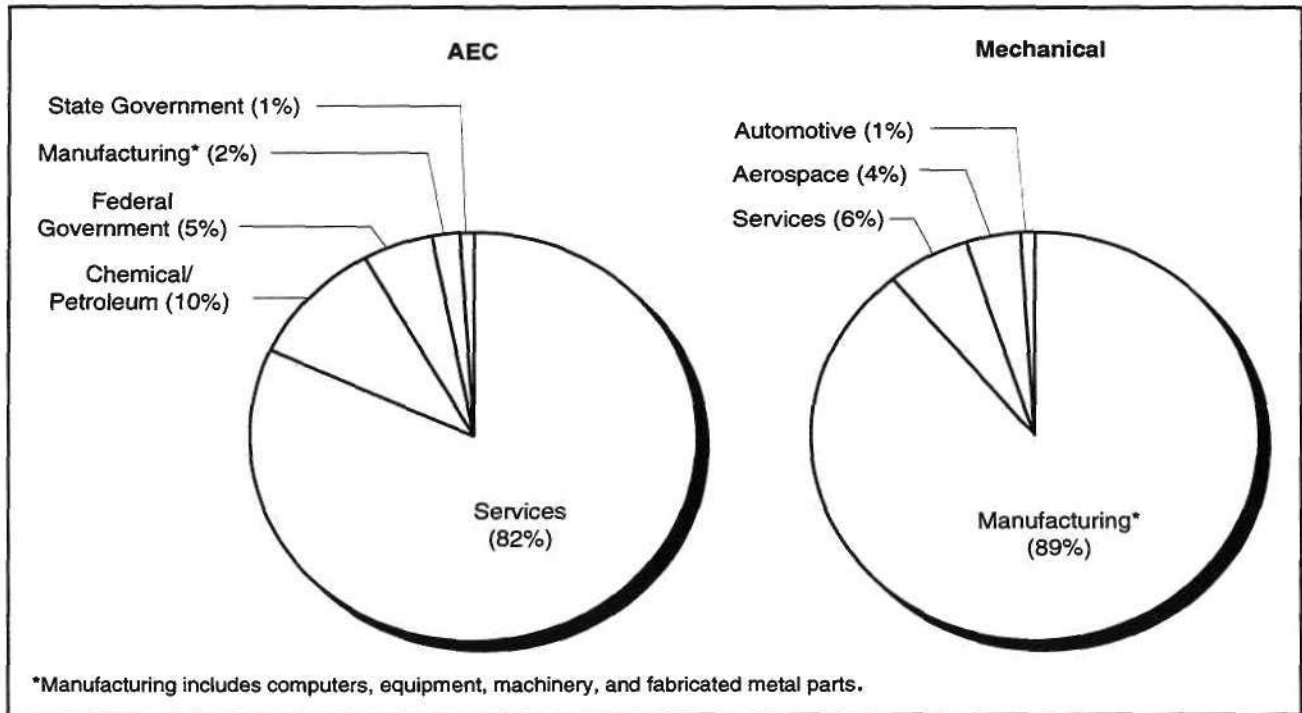
A Snapshot of the AutoCAD User

Figure 2 shows a breakdown of survey respondents by industry. AEC users dominate the services category whereas mechanical users dominate the manufacturing sector. It is interesting to note that within the manufacturing sector, AutoCAD users fall primarily in electronic equipment, industrial machinery, and fabricated metal parts manufacturing. The aerospace and automotive industries comprise less than 6 percent of the manufacturing respondents and less than 3 percent of respondents overall.

AutoCAD users average 6.7 years of experience, with no significant difference in the experience base between AEC users and mechanical users (6.6 years versus 6.8 years, respectively). This average is slightly lower than the average of approximately 7.5 years for all CAD users, not simply AutoCAD users. A breakdown of experience by position is shown in Figure 3. The experience base of all users ranged from no CAD experience to 19 years of experience.

A composite distribution of full-time users is shown in Figure 4. AEC and mechanical users had nearly the same full-time usage pattern. The majority of respondents had at least 50 percent of their users working full time on a CAD system. Fifteen sites had part-time workers only.

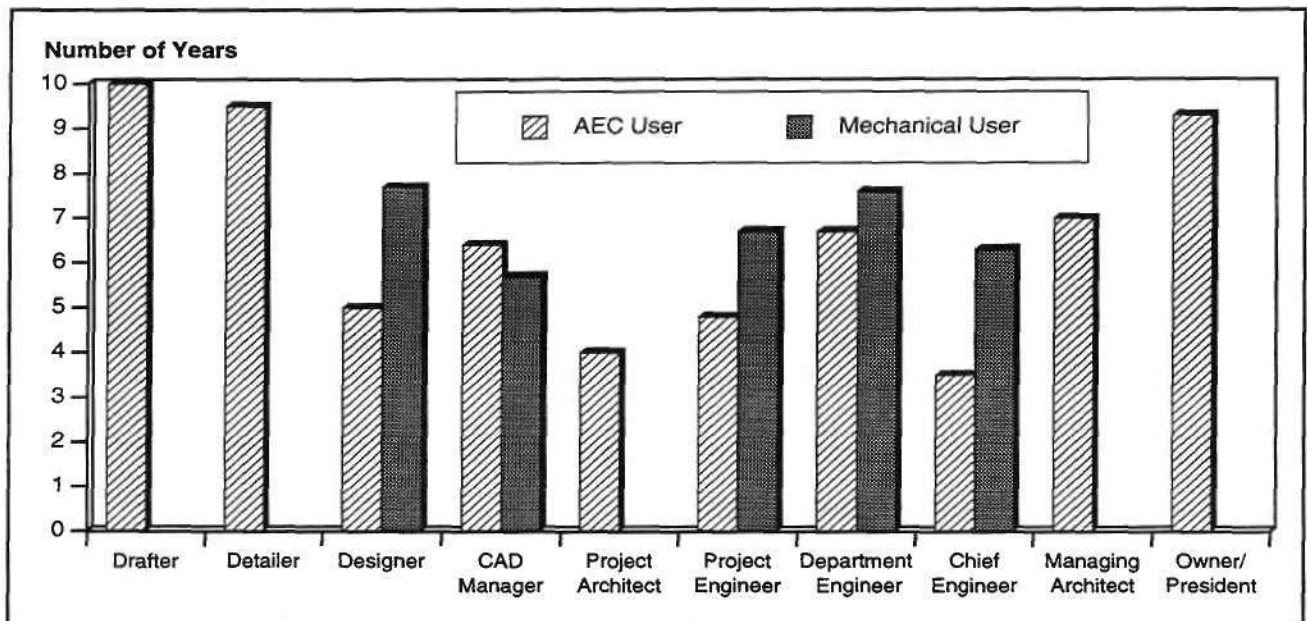
Figure 2
Respondents' Industry



Source: Dataquest (August 1993)

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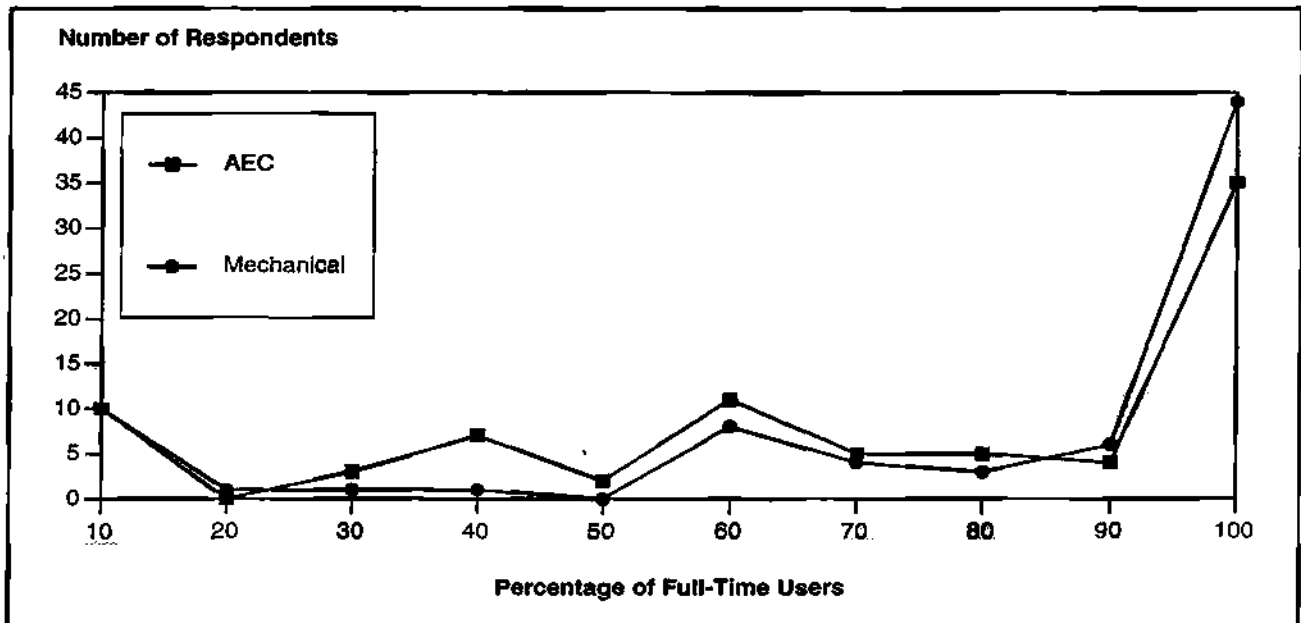
Figure 3
Average Years of Experience by Job Title



Source: Dataquest (August 1993)

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Figure 4
Distribution of Full-Time Users



Source: Dataquest (August 1993)

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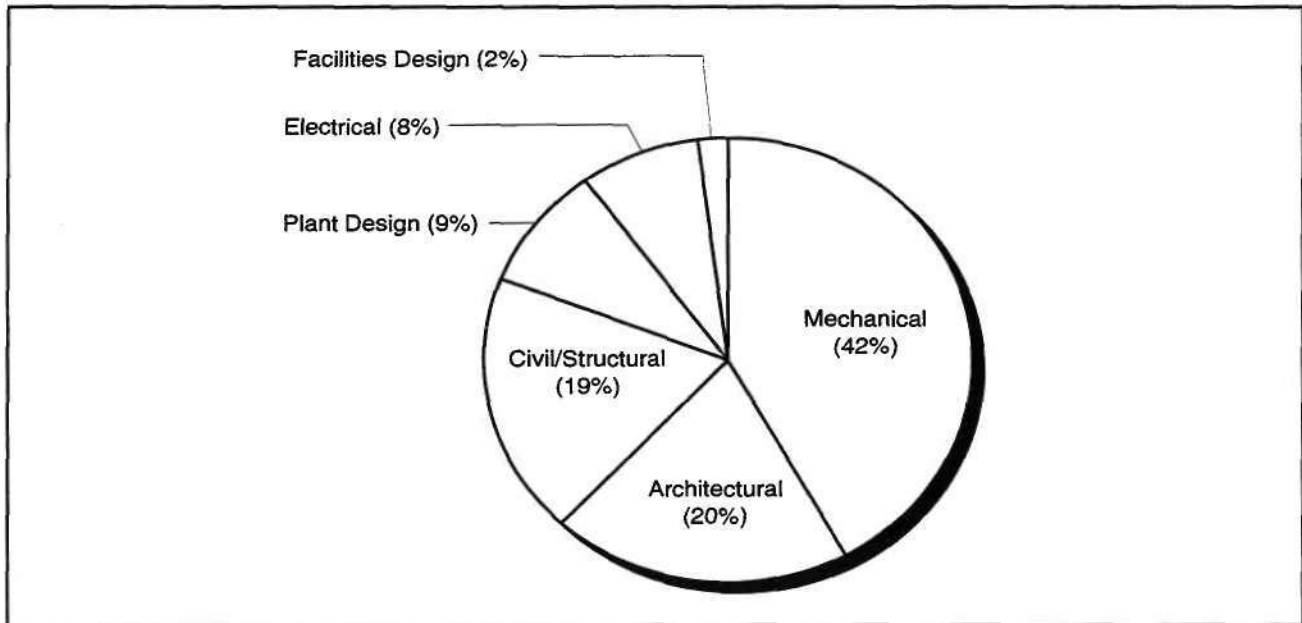
To no surprise, AutoCAD is most commonly used for mechanical, architectural, and civil design, as shown in Figure 5. There is some overlap between AEC and mechanical users in a breakdown by application. AEC users are primarily involved with architectural, civil, and plant design work while mechanical users dominate mechanical and electrical applications. However, a fair number of mechanical users use AutoCAD for plant design and facilities design as a second and third application choice at their site.

Software History and Potential Growth

On average, AutoCAD users have learned 2.5 CAD products, independent of the industry (AEC or mechanical) in which they work. A distribution of software products learned by user type is shown in Figure 6. Those users in the services arena have learned to use the most CAD software, nearly 2.9 products, while those in federal governments have learned to use only 1.5 CAD products.

Distribution of CAD software used on a regular basis is illustrated in Figure 7. AEC users average 1.7 CAD software packages whereas mechanical users average 1.5 CAD products. Again, those users in the services area are using the greatest number of CAD packages, averaging nearly two products for a given site. Those users in the chemical and petroleum industry, comprised solely of AEC users, use only one product on a regular basis.

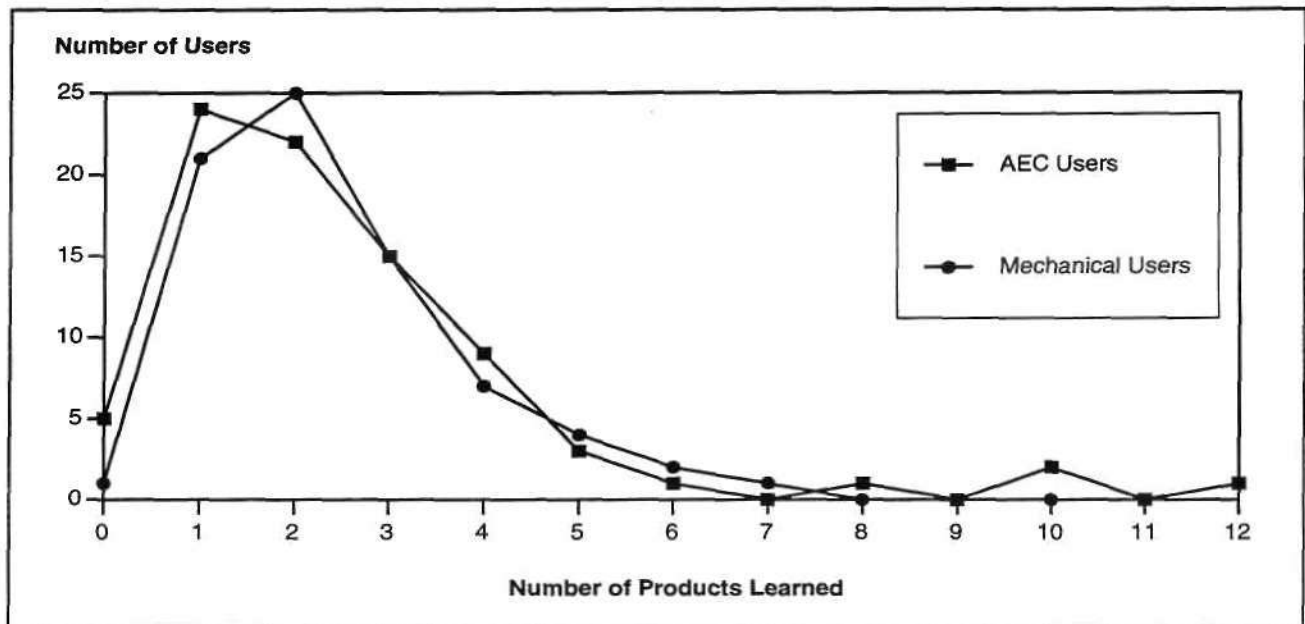
Figure 5
Respondents' Primary Application



Source: Dataquest (August 1993)

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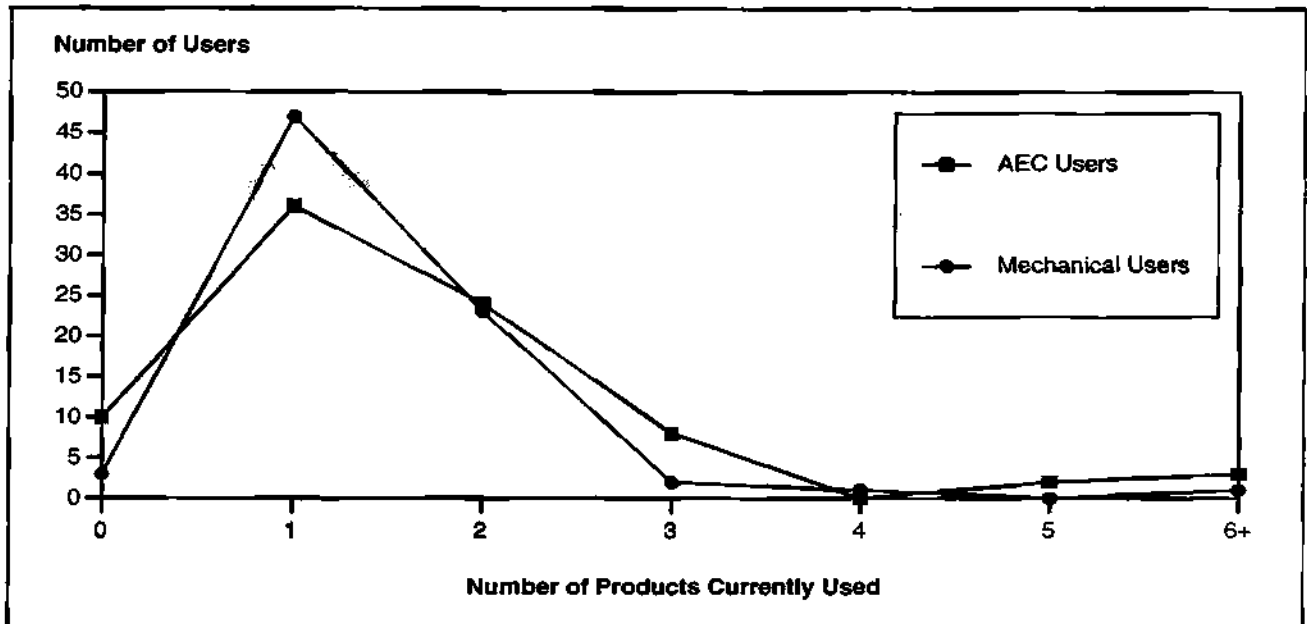
Figure 6
Distribution of CAD Software Learned



Source: Dataquest (August 1993)

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Figure 7
Distribution of CAD Software Currently Used



Source: Dataquest (August 1993)

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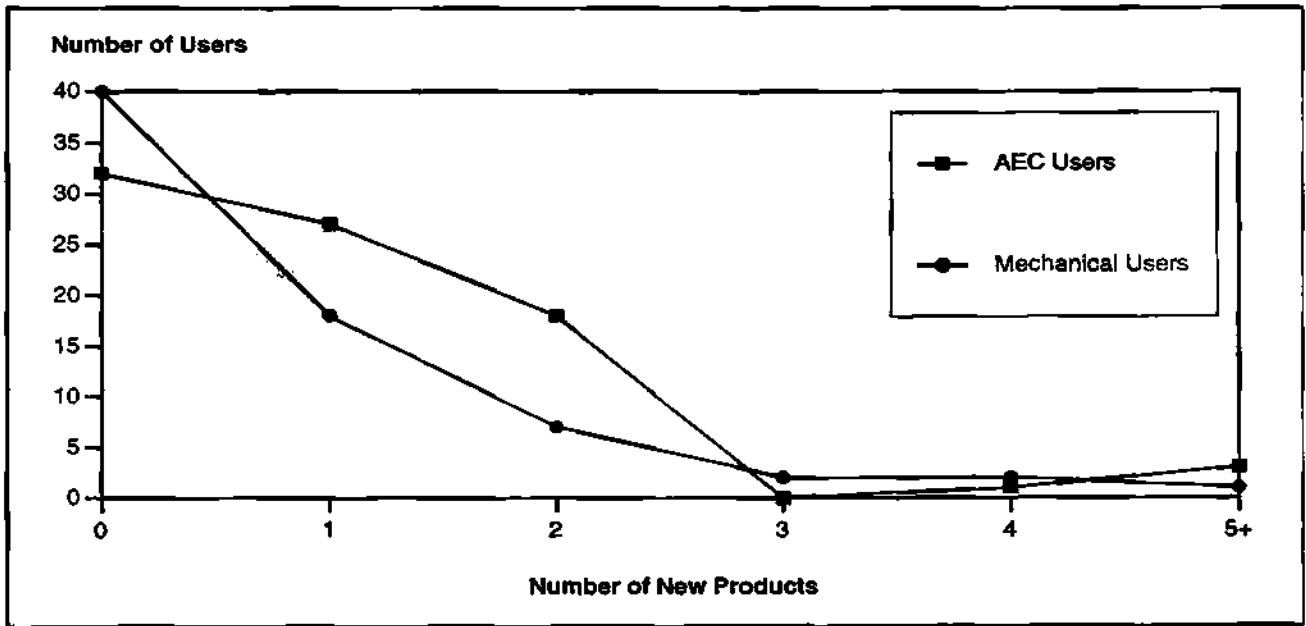
AutoCAD users plan to learn few new products; on average, users anticipate learning only 0.9 new products. Mechanical users plan to learn only 0.7 new products and AEC users plan to learn one new product. Figure 8 shows a distribution of anticipated software products to be learned.

What Users Need: Equipment Purchasing Plans

Several questions were asked regarding buying plans for computers, equipment, and services. Buying plans for equipment and services at AutoCAD sites are outlined in Table 1. While nearly 45 percent of respondents indicate that computer hardware seat purchases will remain the same for the next year, 42 percent of the surveyed sites anticipate an increase in hardware seats. The spending increases for new seats range from 26 percent for AEC users to 33 percent for mechanical users. A limited number of those surveyed said that they plan an average decrease of nearly 50 percent. Approximately 4.3 percent of users are undecided. Planned seat purchases vary only slightly with application type; a breakdown of anticipated seat count changes by application is shown in Figure 9.

Approximately 41 percent of all users anticipate no changes in peripheral purchases for the upcoming year. Peripherals is defined to include servers, printers, and plotters. It is interesting to note that nearly two-thirds of the AEC users are not planning a spending change for peripherals whereas more than two-thirds of the mechanical users are. Anticipated

Figure 8
Distribution of CAD Software to Be Learned



Source: Dataquest (August 1993)

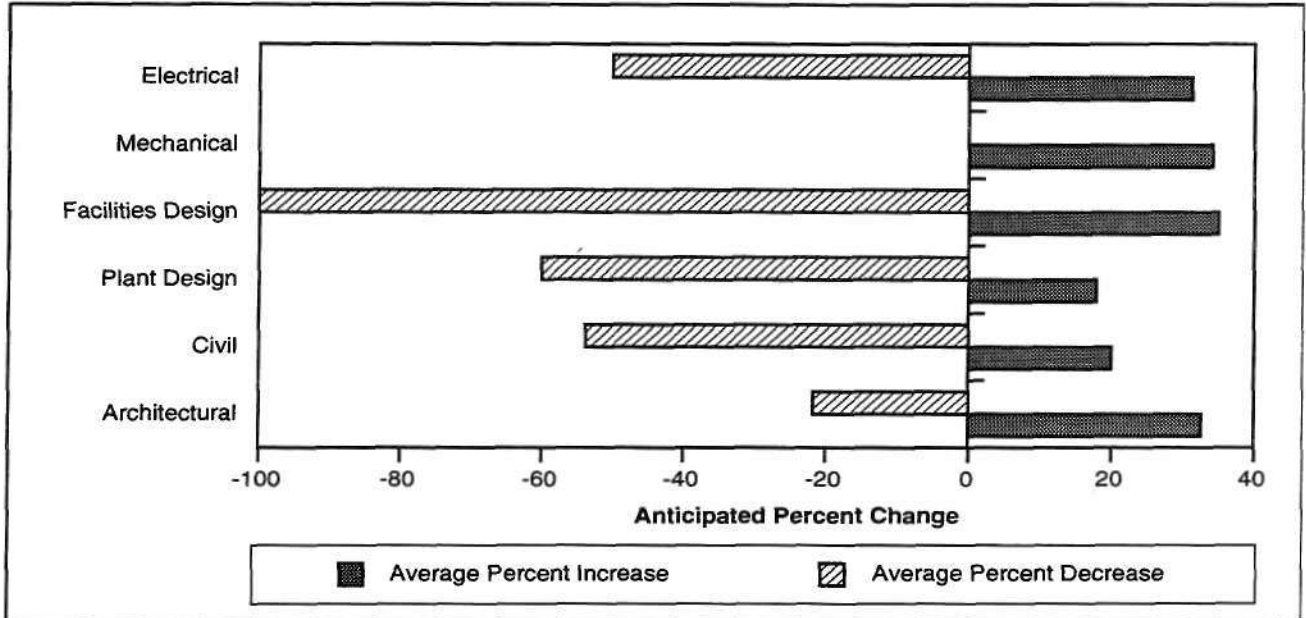
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Table 1
Planned Equipment Purchases

	Number of Respondents	Average Percent Change
Hardware Seats		
No Change	74	0
Increase	64	29.9
Decrease	10	49.0
Peripherals		
No Change	64	0
Increase	21	40.0
Decrease	39	46.1
Outside Services		
No Change	116	0
Increase	19	58.7
Decrease	20	55.8

Source: Dataquest (August 1993)

Figure 9
Planned Seat Changes by Application



Source: Dataquest (August 1993)

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increases for peripherals range from 24 percent for AEC users to 75 percent for mechanical users. Spending decreases are large, ranging from 45 percent for the mechanical AutoCAD users to 57 percent for the AEC community. Approximately 21 percent of the survey respondents are undecided about upcoming peripherals purchases; most of those who are undecided are mechanical users.

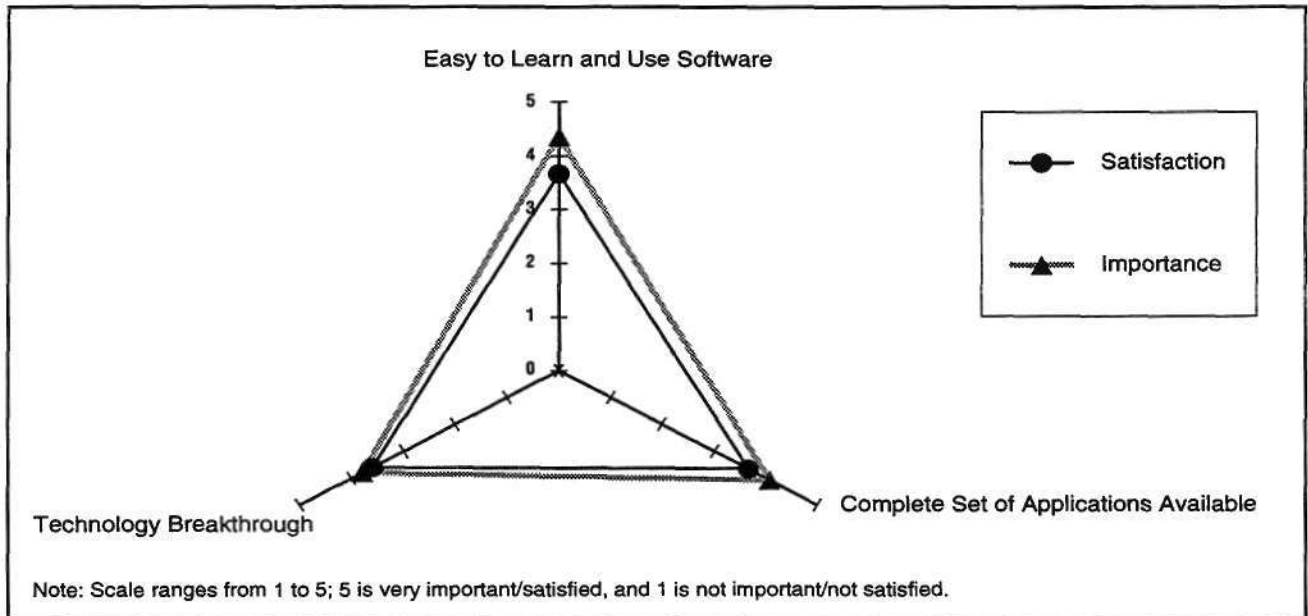
Outside service purchases, which include system integration, custom software development, and product design, are expected to remain the same over the next year. Almost three-quarters of all AutoCAD users plan no changes to outside service spending, 12 percent plan increases ranging from 43 percent to 86 percent, 10 percent plan decreases ranging from 28 percent to 68 percent and the remainder are undecided.

User Wish List: Software Features and Company Success

Software Features

Users rated the importance and level of satisfaction of CAD product attributes on a five-point scale. Figure 10 shows the average results for all respondents in the survey, with the most important feature being ease of software use. Importance and satisfaction closely track one another, and no large gaps exist. A gap analysis was performed on the data by type of user (AEC or mechanical) as seen in Figure 11. Here, it appears that the mechanical users are much less satisfied with their CAD tools—either mechanical users are looking for features and functions not yet available or AEC users are much easier to please. The mechanical group rated satisfaction with all product attributes much lower than the AEC users and showed larger gaps of up to negative 1.02 for ease of software use.

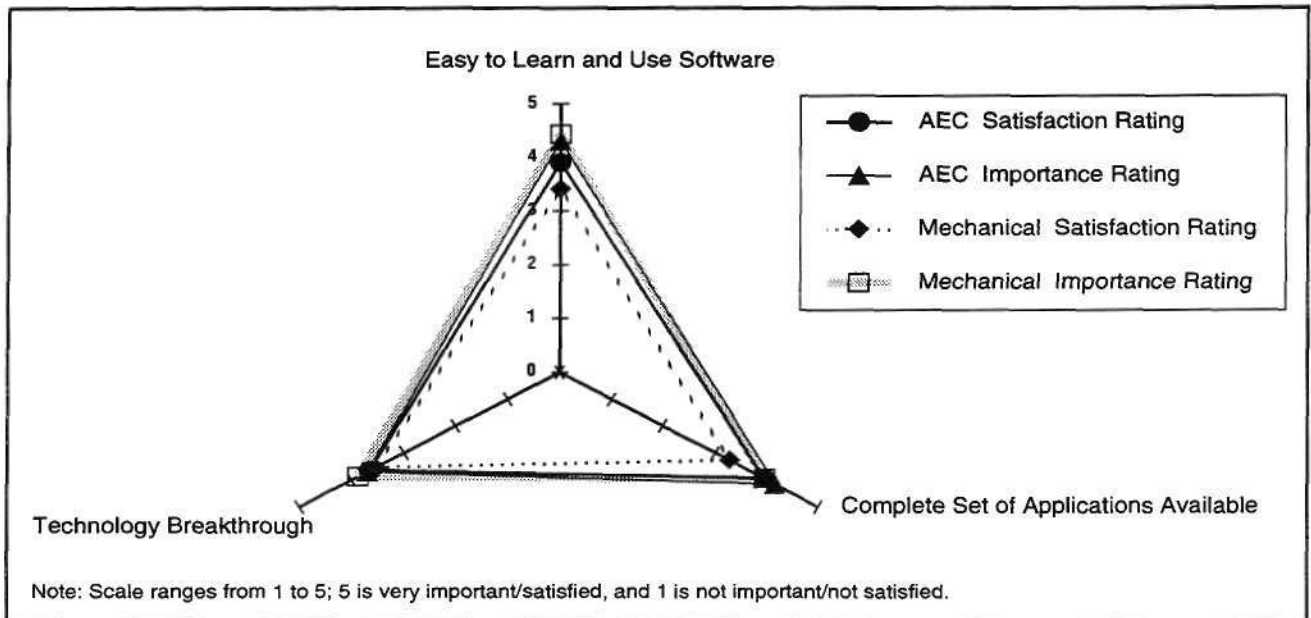
Figure 10
Importance versus Satisfaction with Personal CAD Software Features (All Users)



Source: Dataquest (August 1993)

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Figure 11
Importance versus Satisfaction with Personal CAD Software Features (by Type or User)



Source: Dataquest (August 1993)

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Future Company Success

We also asked users to rate the importance and satisfaction of the following factors to their company's future success:

- Maintaining a competitive advantage; producing a quality product
- Use of a design constraint system (such as parametric input)
- 3-D CAD
- Electronic design conferencing
- Document management for design or engineering

Maintaining a competitive advantage by designing quality products is seen as the most important factor to success in the eyes of AEC and mechanical CAD users. Also ranked highly is the ability to manage engineering and design data and documentation in an integrated fashion. Design constraint systems are ranked high in importance by mechanical users, but not as high by AEC users as might be expected.

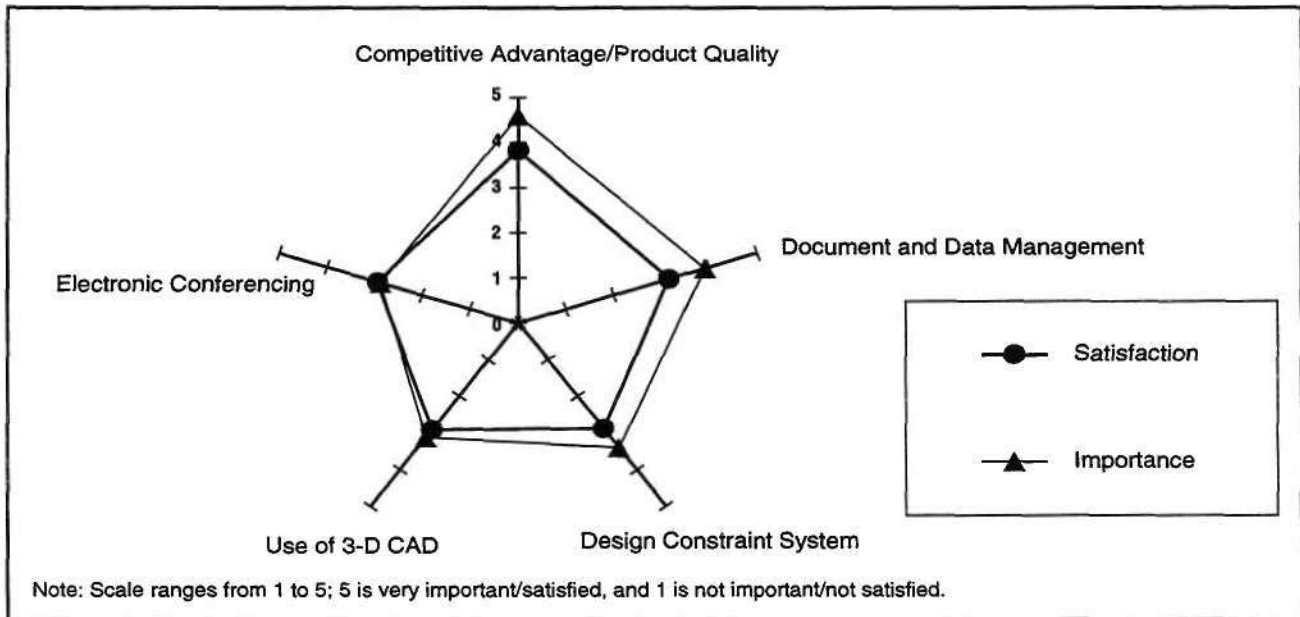
Technology-related advances, such as 3-D CAD, are ranked low in importance (3.0 by AEC users and 3.3 by mechanical users) for future company success. It seems that AutoCAD users are more interested in designing a quality product and managing data and documentation rather than incorporating advanced CAD features such as 3-D CAD into their design work.

A gap analysis of these results for all users is shown in Figure 12. The largest gaps, approximately negative 0.75, occur with respect to maintaining a competitive advantage and document management. The smallest gap, negative 0.1, occurs with electronic design conferencing.

A breakdown of importance and satisfaction by type of user is given in Figure 13. Again, it seems as if the mechanical users are much less satisfied with their company's progress to date with respect to most of these key success factors. The satisfaction ratings for mechanical users are much less than the ratings for AEC users, as displayed in Figure 13. All key success factors for mechanical users had gaps of negative 0.5 or greater with the exception of electronic conferencing. For AEC users, the largest gaps of concern are in maintaining a competitive advantage (gap of negative 0.7) and document management (gap of negative 0.5).

It is important to note that, with respect to maintaining a competitive advantage, all users rank satisfaction and importance of this factor nearly identical, with the gap for mechanical users being only slightly higher than for AEC users. When ranking document management, responses by type of user differ. It appears that AEC users are easier to please. This group is requiring less-sophisticated document management systems, as evidenced by an identical importance rating, but higher-satisfaction rating, than are mechanical users for this factor. Ratings for design constraint systems also differ by type of user. Mechanical users seem to value design constraint systems and are much more dissatisfied (gap of negative 1.1)

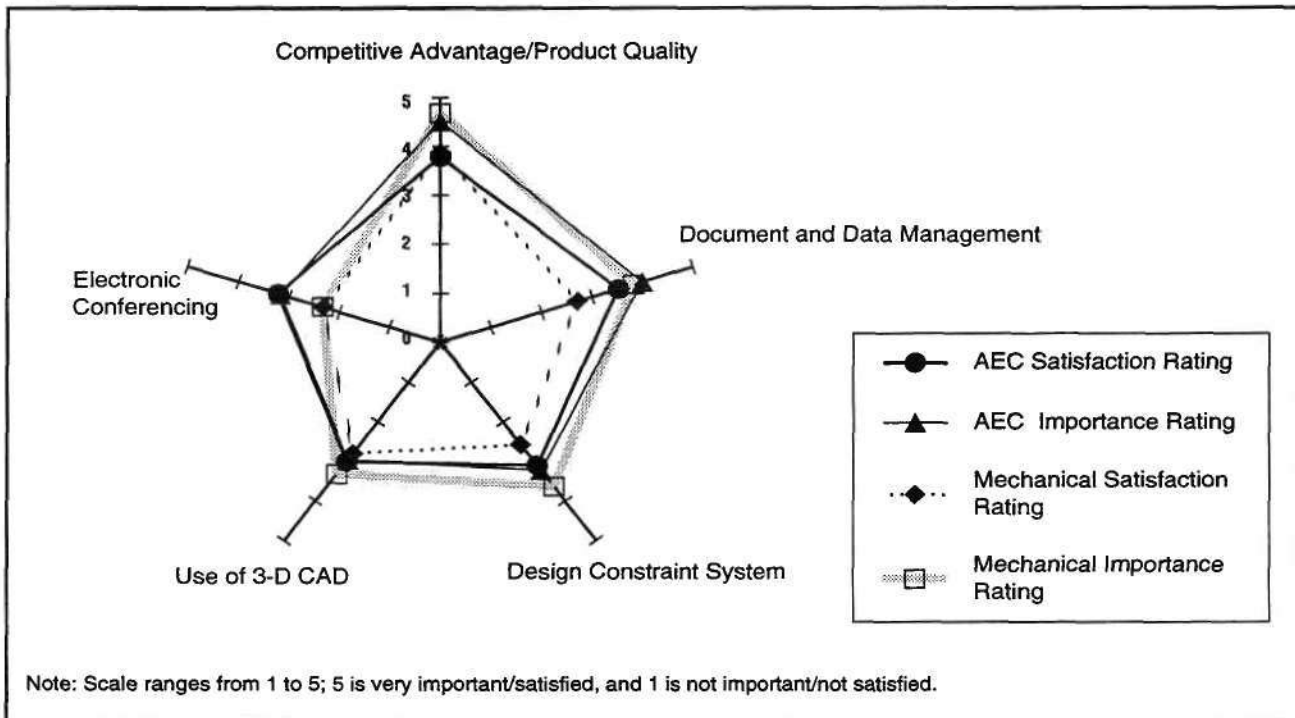
Figure 12
Importance versus Satisfaction with Key Success Factors (All Users)



Source: Dataquest (August 1993)

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Figure 13
Importance versus Satisfaction with Key Success Factors (by Type of User)



Source: Dataquest (August 1993)

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with the present systems available. On the other hand, AEC users reveal a lower-importance and satisfaction rating for this factor, indicating a lower need for such an advanced CAD system capability.

Dataquest Perspective

Because of the versatility of general-purpose PC-based CAD software such as AutoCAD, these users may seem like a diverse group with differing backgrounds and agendas. On the contrary, AEC and mechanical AutoCAD users are alike in many respects. Experience base, full-time usage distribution, and number of CAD products learned and currently being used are just some of the parameters in which these groups are similar. Also, users respond similarly when asked to rank the importance of certain CAD software features and company-related key success factors.

However, there is marked difference in user satisfaction with CAD software features and company-related key success factors. On the whole, it appears that mechanical users are much less satisfied with some of the software tools available because importance-satisfaction gaps are large. Mechanical users also appear to be much more dissatisfied with their company's progress on certain key success factors such as document management and design constraint systems. AEC and mechanical users have similar concerns in maintaining a competitive advantage; both groups have nearly identical rankings in importance and satisfaction for this factor.

It is no surprise that users are asking for easy-to-use and easy-to-learn products that enable them to maintain a competitive advantage. These AutoCAD users have a fair amount of experience with CAD products and seem to know what they want. Within this group of AutoCAD users, requirements and needs are diverse, which means there is still plenty of room for third-party vendors to develop applications to meet these needs.

By Sharon Tan

For More Information...

Sharon Tan, Industry Analyst (408) 437-8132
Via fax (408) 437-0292

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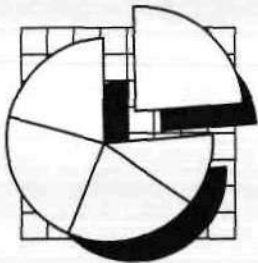
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Dataquest[®]

Software

CAD/CAM/CAE and GIS Personal CAD Forecast Update



Market Statistics

1993

Program: Personal CAD and Distribution Channels Worldwide

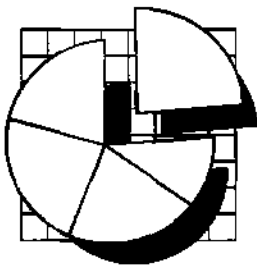
Product Code: CPER-WW-MS-9304

Publication Date: September 13, 1993

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Software

CAD/CAM/CAE and GIS Personal CAD Forecast Update



Market Statistics

1993

Program: Personal CAD and Distribution Channels Worldwide

Product Code: CPER-WW-MS-9304

Publication Date: September 13, 1993

Table of Contents

	Page
Currency Changes	3
Database Changes	4
Other Information	4
Regional Forecast Assumptions	5
Worldwide Forecast Drivers	5
Macroeconomy.....	5
Technology.....	6
Indispensability	6
Late Buyers.....	9
Desktop Dominance.....	9
Unbundling of Software.....	9
Replacement Market	9
Software	9
North American Forecast Drivers	9
Economy	9
Cuts in Defense Spending.....	10
European Forecast Drivers	11
Economy	11
Growth	12
Currency.....	12
Asian Forecast Drivers	12
Economy	12
Currency.....	13
Competitive Model Change.....	13
Developing Asian Countries	13
Personal Computer	13
Virtual Reality	13
Application Forecast Assumptions	13
Mechanical Forecast Assumptions.....	13
AEC Forecast Assumptions.....	16
Growth Inhibitors to the AEC Industry	17
GIS/Mapping Forecast Assumptions.....	18
Growth Inhibitors to the GIS Industry	19
EDA Forecast Assumptions	20
Growth Inhibitors to the EDA Industry.....	20
Forecast Comparison	21
Forecast Methodology	22
Segmentation Definitions	24
Applications.....	24
Mechanical.....	24

Table of Contents (Continued)

	Page
Architecture, Engineering, and Construction (AEC)	24
Geographic Information Systems (GIS)/Mapping	24
Electronic Design Automation (EDA)	24
Regions	25
North America	25
Europe	25
Asia	25
Rest of World	25
Platforms	25
Technical Workstation	25
Host-Dependent	25
Server	25
Personal Computer	26
Line Items	26

List of Figures

Figure		Page
1	Software Forecast Update versus Forecast, 1992-1997.....	1
2	Worldwide and Regional Revenue Forecast, All Applications and All Platforms.....	7
3	Worldwide Revenue Forecast, by Platform, All Applications.....	8
4	Unit Shipments versus Retirements—History and Forecast	11
5	Worldwide Software Revenue Forecast by Application.....	14
6	Software Revenue Distribution Forecast by Application	15
7	CAD/CAM/CAE and GIS Forecasting Model.....	23

List of Tables

Table		Page
1	Software Revenue Forecast Update versus Forecast.....	2
2	Foreign Currency per U.S. Dollar.....	3
3	Total Factory Revenue in Asia, Dollars as Compared to Yen	4
4	GDP/GNP Growth Rate Percentages.....	5
5	CAD/CAM/CAE/GIS Forecast by Region.....	6
6	CAD/CAM/CAE/GIS Software Revenue Forecast, by Application	10
7	Compound Annual Growth Rate, 1992-1997, Software Revenue...	12
Personal Computer		
Worldwide		
8	All Applications	28
9	Mechanical.....	29
10	AEC.....	30
11	GIS/Mapping.....	31
12	Electronic Design Automation	32
13	Electronic CAE.....	33
14	IC Layout	34
15	PCB/Hybrid/MCM	35
All Applications		
16	North America	36
17	Europe	37
18	Asia	38
19	Rest of World	39

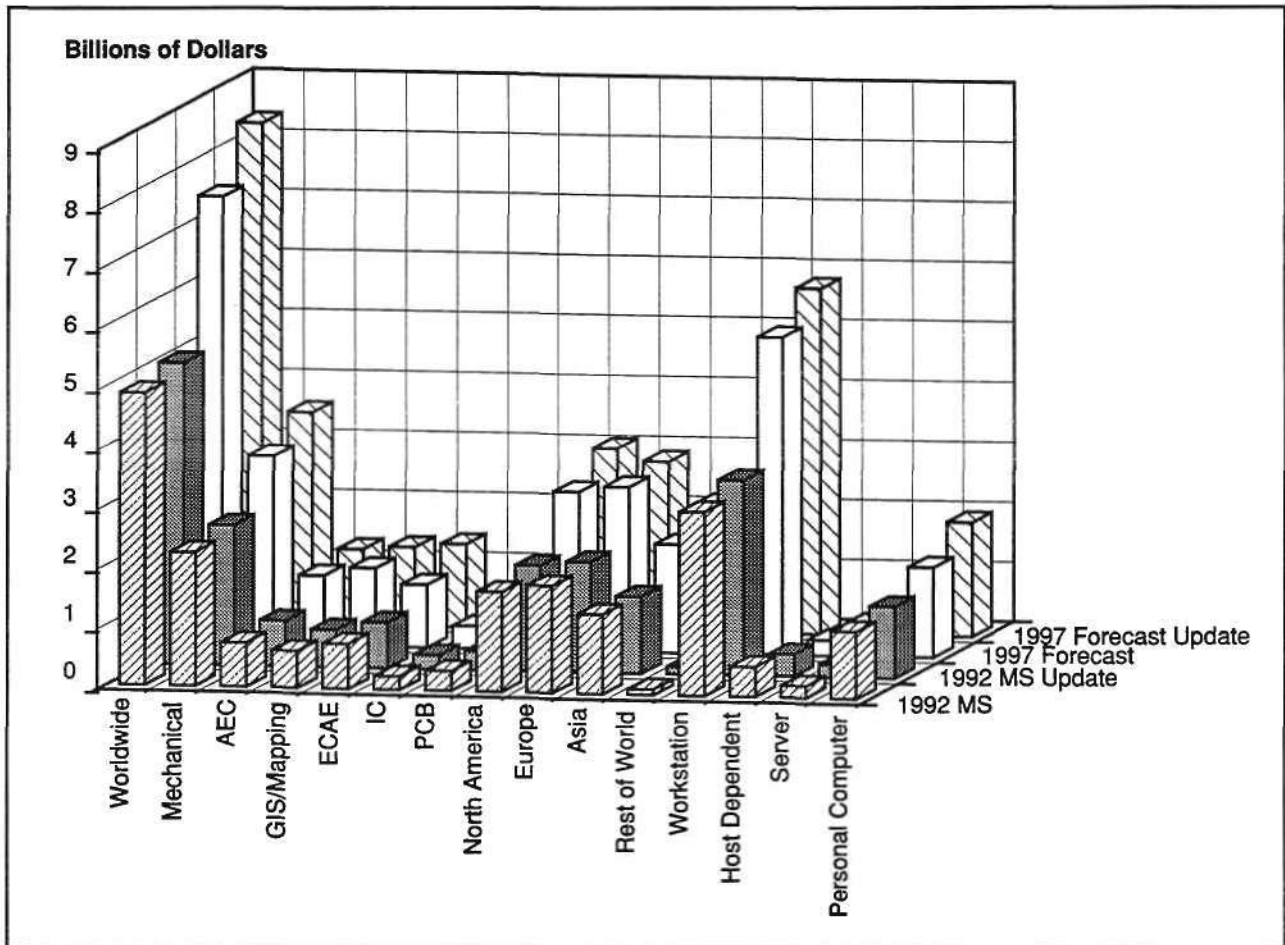
Note: All tables show estimated data.

CAD/CAM/CAE and GIS Personal CAD Forecast Update

This forecast update uses the market share update as the basis of a new forecast, incorporating any new information since May, including currency changes since year-end 1992. Additionally, with greater focus on country level data during the market share update process, this forecast update provides forecasts by country in Europe and Asia.

Figure 1 shows change from the 1993 forecast to this update in growth of software revenue by application, region, platform, and the total market. Table 1 provides the corresponding revenue figures and growth rates. This additional growth is divided somewhat equally among the applications, is concentrated in Asia because of currency issues, and resides primarily in the personal computer platform.

Figure 1
Software Forecast Update versus Forecast, 1992-1997



Source: Dataquest (September 1993)

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Table 1
Software Revenue Forecast Update versus Forecast

	Forecast Update		May Forecast		Market Share Update 1992 (\$M)	Forecast Update		Market Share 1992 (\$M)	May Forecast	
	1992-1993 Change (%)	1992-1997 CAGR (%)	1992-1993 Change (%)	1992-1997 CAGR (%)		1993 (\$M)	1997 (\$M)		1993 (\$M)	1997 (\$M)
Worldwide	12.0	10.6	9.6	8.9	5,036	5,642	8,353	4,885	5,352	7,467
Applications:										
Mechanical	12.3	8.7	10.6	7.2	2,341	2,628	3,548	2,233	2,469	3,154
AEC	11.8	11.0	9.0	10.0	758	847	1,275	730	796	1,178
GIS/Mapping	14.7	16.0	13.8	16.4	629	721	1,323	616	700	1,317
ECAE	12.7	12.7	8.0	7.1	764	861	1,390	752	812	1,057
IC	9.2	11.3	7.8	10.9	233	254	398	225	243	378
PCB	5.8	6.0	0.7	3.1	312	331	418	330	332	383
Regions:										
North America	13.2	11.5	12.0	9.8	1,767	2,000	3,041	1,669	1,869	2,659
Europe	7.7	9.0	10.9	9.0	1,848	1,990	2,840	1,793	1,988	2,753
Asia	15.1	10.6	3.8	6.4	1,288	1,483	2,134	1,327	1,378	1,813
Rest of World	27.2	20.6	22.8	20.3	132	168	338	96	118	242
Platforms:										
Workstation	13.8	12.1	13.5	11.5	3,256	3,705	5,773	3,072	3,486	5,293
Host Dependent	-19.1	-11.8	-19.2	-12.1	369	299	196	500	404	262
Server	22.8	16.8	20.3	15.5	216	265	470	197	237	405
Personal Computer	14.8	9.9	9.7	6.2	1,195	1,373	1,914	1,117	1,225	1,508

Source: Dataquest (August 1993)

Currency Changes

Worldwide revenue estimates include data from many countries, each of which has a different and fluctuating exchange rate. Estimates of non-U.S. revenue are based on the average exchange rate for a given year, calculated as the simple arithmetic mean of the 12 average monthly values. Dataquest does not forecast exchange rates per se; however, we do forecast with the best information available. Exchange rates, for the purposes of forecasting, are calculated assuming the June 1993 exchange rate will apply throughout all future months of the year. Table 2 provides the resulting exchange rates for each European and Asian country.

Given the bleak economic climate, it is surprising that we are forecasting increased growth from our earlier forecast. The main source of this growth comes from the depreciation of the dollar against the yen of 12 percent. With 96 percent of the Asian revenue reported in Japan, the yen dominates that region's revenue figures. Table 3 shows dollar values with equivalent yen values of total factory revenue for Asia for 1992 and 1993, with growth rates, by application, using the exchange rates as shown in Table 2.

Table 2
Foreign Currency per U.S. Dollar

	Country	Currency	Actual 1992	Current 1993	Appreciation (U.S.\$)
Europe	United Kingdom	Pound	0.5686	0.6606	16.2
	France	Franc	5.2712	5.5192	4.7
	Germany	Mark	1.5554	1.6334	5.0
	Italy	Lira	1,227.75	1,517.07	23.6
	Spain	Peseta	101.90	123.38	21.1
	Denmark	Krone	6.0153	6.2751	4.3
	Finland	Markka	4.4507	5.5955	25.7
	Norway	Krone	6.1824	6.9298	12.1
	Sweden	Krona	5.8105	7.4584	28.4
	Belgium	Franc	32.02	33.59	4.9
	Netherlands	Guilder	1.7512	1.8073	3.2
	Austria	Schilling	10.95	11.49	4.9
	Switzerland	Franc	1.3976	1.4727	5.4
	Asia	Japan	Yen	126.45	111.23
Hong Kong		Dollar	7.7401	7.7327	-0.1
Korea		Won	782.63	799.43	2.1
Singapore		Dollar	1.6285	1.6218	-0.4
Taiwan		Dollar	24.93	25.91	3.9
China		Renminbi	5.5082	5.7441	4.3

Source: Dataquest (August 1993)

Table 3
Total Factory Revenue in Asia, Dollars as Compared to Yen
(1992 Exchange Rate of U.S.\$1/¥126.45; 1993 Exchange Rate of U.S.\$1/¥111.23)

	1992 (\$M)	1993 (\$M)	Change (%)	1992 (¥M)	1993 (¥M)	Change (%)
Mechanical	2,180	2,384	9.4	275,647	265,178	-3.8
AEC	577	618	7.2	72,938	68,780	-5.7
GIS	332	375	12.8	42,016	41,683	-0.8
ECAE	508	585	15.2	64,213	65,096	1.4
IC Layout	194	208	7.5	24,491	23,154	-5.5
PCB	372	380	2.4	46,971	42,305	-9.9
All Applica- tions	4,162	4,551	9.3	526,275	506,197	-3.8

Source: Dataquest (August 1993)

In contrast, the dollar has appreciated against all other European currencies. This forecasting has shown a corresponding decrease in the growth of the European CAD/CAM/CAE/GIS markets as compared to the earlier forecast.

Database Changes

Dataquest intends to freeze the CAD/CAM/CAE/GIS database following the market share update. However, careful scrutiny of European numbers as part of the forecasting process uncovered some discrepancies at the country and application level. Adjustments were made to IBM, Hewlett-Packard, Digital, and Intergraph. In addition, Intergraph was underrepresented in the mechanical market to an alarming extent. Its data was fixed, with a corresponding decrease in service revenue and GIS/Mapping software revenue, moving Intergraph from No. 15 to No. 9 in mechanical software revenue. Finally, ESRI was updated to reflect higher total revenue, most of which was for service. The result is that Intergraph and ESRI are now separated by \$8 million in software revenue in the GIS market. There will be no more changes to this database until we begin our survey of 1993 data.

Other Information

Implicit in any forecasting are the GDP/GNP growth rates (see Table 4). We also track quarterly revenue of public companies and corresponding growth rates from previous quarters for a general view of the health of the industries.

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 our client inquiry service, which can provide custom analysis of the multidimensional database.

Table 4
GDP/GNP Growth Rate Percentages
(Constant Prices and Exchange Rates, Local Currencies)

		1992	1993	1994	1995	1996
North America	Canada	0.7	3.1	3.8	3.5	3.0
	United States	2.1	2.6	2.9	2.3	2.5
Europe	United Kingdom	-0.5	1.7	2.7	3.2	3.0
	France	1.1	-1.0	1.3	3.1	3.3
	Germany*	1.4	-1.5	1.2	2.8	3.5
	Italy	0.9	0.3	1.5	1.9	2.3
	Spain	1.0	-0.7	1.7	2.9	3.6
	Denmark	1.2	0.6	2.1	2.3	3.5
	Finland	-3.6	-0.2	1.8	2.5	3.2
	Norway	2.9	1.5	2.4	2.6	2.7
	Sweden	-1.8	-1.6	1.4	2.0	2.5
	Belgium	0.8	-0.5	1.8	2.7	3.1
	Netherlands	1.5	-0.4	1.5	2.9	2.9
	Austria	1.5	-0.1	2.0	3.7	3.9
	Switzerland	-0.6	0.2	1.5	2.1	2.4
Asia	Japan	1.5	1.3	2.7	3.6	4.1
	Korea	4.8	6.0	7.0	7.0	7.0
	Taiwan	6.1	6.5	7.0	7.0	7.0
	Singapore	5.8	6.5	6.5	6.5	6.5
	Hong Kong	5.0	5.5	5.5	5.5	5.5
	China	11.5	10.0	12.5	11.5	10.8

*Germany includes the former East Germany.

Source: The Dun & Bradstreet Corporation

Regional Forecast Assumptions

Table 5 provides the CAD/CAM/CAE/GIS forecast for total factory revenue, software revenue, and units. Following are the main worldwide forces driving this forecast.

Worldwide Forecast Drivers

The worldwide CAD/CAM/CAE/GIS market will maintain steady growth during the next five years. Figure 2 shows the forecast of hardware, software, and service revenue worldwide and by region, and Figure 3 shows the worldwide forecast by platform.

The main forces driving the CAD/CAM/CAE/GIS worldwide forecast are described in the following paragraphs.

Macroeconomy

The recovery, with its inherent renewed optimism after a worldwide recession and the resultant increased capital spending, will fuel growth

Table 5
CAD/CAM/CAE/GIS Forecast by Region
(Revenue in Millions of Dollars; Actual Shipments)

	1992	1993	1994	1995	1996	1997	CAGR (%) 1992-1997
Worldwide							
Total Factory Revenue	15,723	16,530	17,500	18,640	19,770	20,860	5.8
Software Revenue	5,036	5,640	6,320	7,040	7,710	8,350	10.6
Unit Shipments	739,511	857,200	972,100	1,072,700	1,155,000	1,215,900	10.5
North America							
Total Factory Revenue	5,437	5,680	6,100	6,550	7,000	7,520	6.7
Software Revenue	1,767	2,000	2,270	2,540	2,790	3,040	11.5
Unit Shipments	291,743	336,300	381,800	420,700	456,600	487,100	10.8
Europe							
Total Factory Revenue	5,736	5,850	6,060	6,390	6,760	7,120	4.4
Software Revenue	1,848	1,990	2,160	2,380	2,610	2,840	9.0
Unit Shipments	245,054	271,900	304,600	337,000	359,700	374,800	8.9
Asia							
Total Factory Revenue	4,162	4,550	4,840	5,110	5,300	5,460	5.6
Software Revenue	1,288	1,480	1,680	1,870	2,020	2,130	10.6
Unit Shipments	182,151	224,000	255,300	277,900	294,800	303,500	10.7
Rest of World							
Total Factory Revenue	388	450	530	600	680	760	14.3
Software Revenue	132	170	210	250	290	340	20.6
Unit Shipments	20,563	25,000	30,400	37,200	43,900	50,600	19.7

Source: Dataquest (August 1993)

gradually beginning in the North American, U.K., and Asian countries other than Japan.

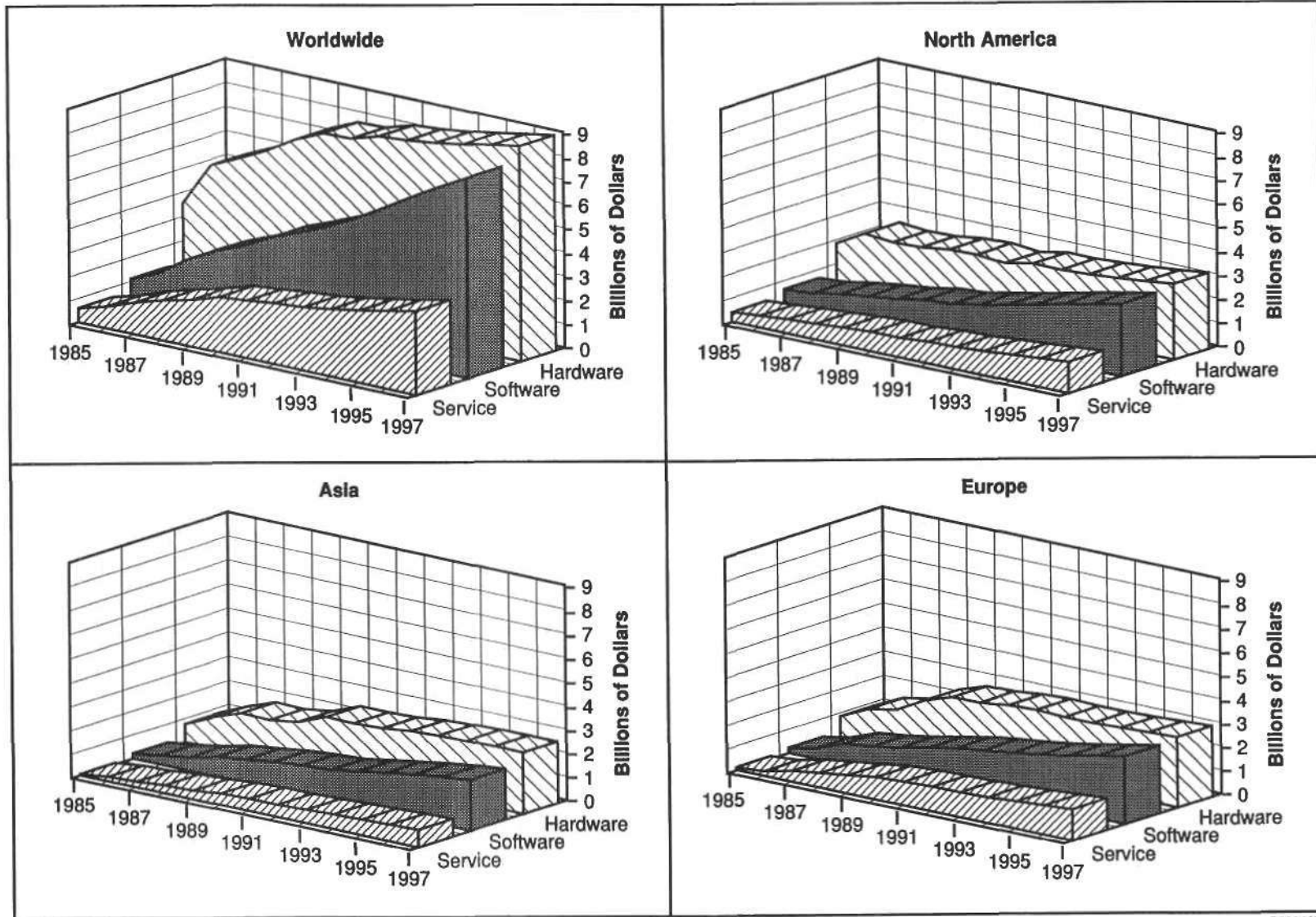
Technology

Computing performance will continue to improve at an exponential rate in the foreseeable future. The Dataquest Technical Computing group has forecast the growth in millions of instructions per second (mips) shipments: the total mips shipped in history through 1992 will be matched by the shipments in 1993. In other words, the total mips shipped will double in 1993, almost double again in 1994, and double again in 1995. This enabling resource will fuel the next-generation software tools focused on integrated solutions at the enterprise level.

Indispensability

As the complexity of the design, the need to share information, and the need to store information electronically increase, the benefits of automation improve dramatically and the level of indispensability rises. This, coupled with market pressures to produce higher quality and to reduce production cycles, is making CAD/CAM/CAE/GIS a necessity.

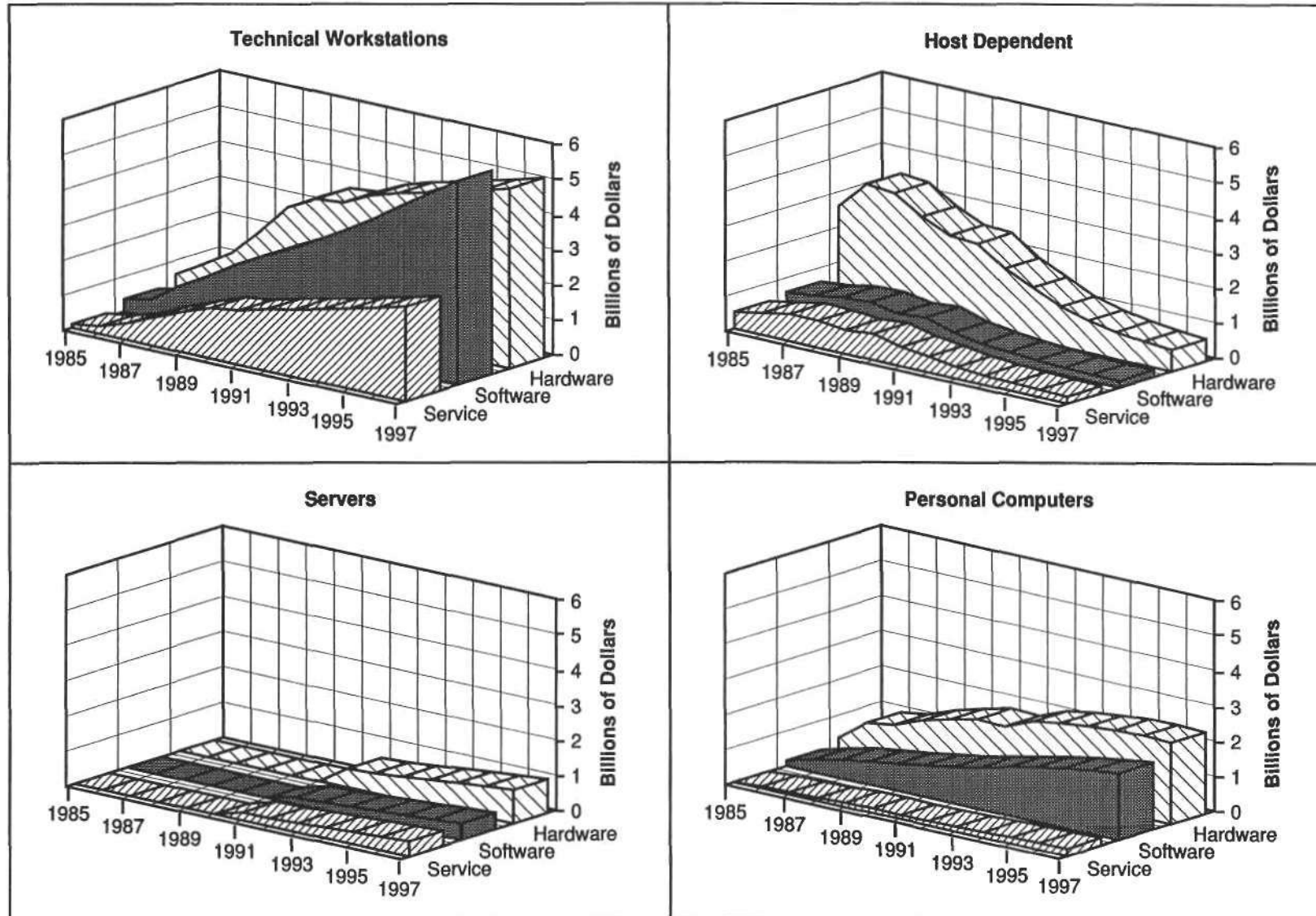
Figure 2
Worldwide and Regional Revenue Forecast, All Applications and All Platforms



Source: Dataquest (September 1993)

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Figure 3
Worldwide Revenue Forecast, by Platform, All Applications



Source: Dataquest (September 1993)

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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. In addition, the decline of host-dependent systems is continuing with replacements going to networked, desktop systems. Vendors, whose business models depend upon 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

With software vendors porting to multiple platforms, software is no longer the hinge upon which hardware swings. The market is quickly moving from proprietary to open systems, resulting in a shift from bundled to unbundled software (see Table 6).

Replacement Market

The replacement market is gaining importance as replacement seats exceed 50 percent of unit sales in 1993 (see Figure 4). This saturation implies that many parallel manual systems can be eliminated and new applications developed, knowing that everyone in a company needing access to the engineering database can have it in electronic format. The savings potential is tremendous. This also implies a growing sophistication in buyers who are more informed of the strategic importance of this technology.

Software

With technological advances, growing sophistication of users, and competitive pressures, the demand for software with greater ease of use, flexibility, and interoperability is growing. This demand is driving the growth in business alliances between small innovative software niche players and major software vendors with resources to sell to the new and replacement markets.

North American Forecast Drivers

North American CAD/CAM/CAE/GIS total revenue grew a robust 11.3 percent to \$5.4 billion in 1992 and is forecast to grow at a 6.7 percent compound annual growth rate (CAGR) through 1997 to \$7.5 billion. The following paragraphs describe the main factors driving the North American forecast.

Economy

According to The Dun & Bradstreet Corporation's August 1993 *Economic Overview*, the growth of the economy is led by capital spending and by trade, as the economies of U.S. trading partners bottom out. Information technology growth for the first two quarters of 1993 is an annualized

Table 6
CAD/CAM/CAE/GIS Software Revenue Forecast, by Application
(Millions of Dollars)

	1992	1993	1994	1995	1996	1997	CAGR (%) 1992-1997
All Applications							
Software Revenue	5,036	5,640	6,320	7,040	7,710	8,350	10.6
Bundled Software Revenue	1,939	1,960	2,000	2,040	2,090	2,120	1.8
Unbundled Software Revenue	3,097	3,680	4,320	4,990	5,620	6,230	15.0
Mechanical							
Software Revenue	2,341	2,630	2,880	3,140	3,360	3,550	8.7
Bundled Software Revenue	1,127	1,180	1,200	1,230	1,250	1,260	2.2
Unbundled Software Revenue	1,214	1,450	1,680	1,910	2,110	2,290	13.6
AEC							
Software Revenue	758	850	950	1,050	1,160	1,280	11.0
Bundled Software Revenue	300	310	330	340	360	380	4.9
Unbundled Software Revenue	458	540	620	710	800	900	14.3
GIS/Mapping							
16.0							
Bundled Software Revenue	267	290	320	340	370	400	8.6
Unbundled Software Revenue	362	430	520	640	770	920	20.5
Electronic CAE							
Software Revenue	764	860	1,010	1,160	1,280	1,390	12.7
Bundled Software Revenue	109	90	80	70	60	50	-13.0
Unbundled Software Revenue	655	770	930	1,090	1,220	1,340	15.3
IC Layout							
Software Revenue	233	260	290	320	360	400	11.3
Bundled Software Revenue	32	20	10	10	10	5	-28.9
Unbundled Software Revenue	201	240	280	310	350	395	14.3
PCB/Hybrid/MCM							
Software Revenue	312	330	350	380	400	420	6.0
Bundled Software Revenue	105	80	50	40	30	20	-26.3
Unbundled Software Revenue	208	250	300	340	370	400	13.7

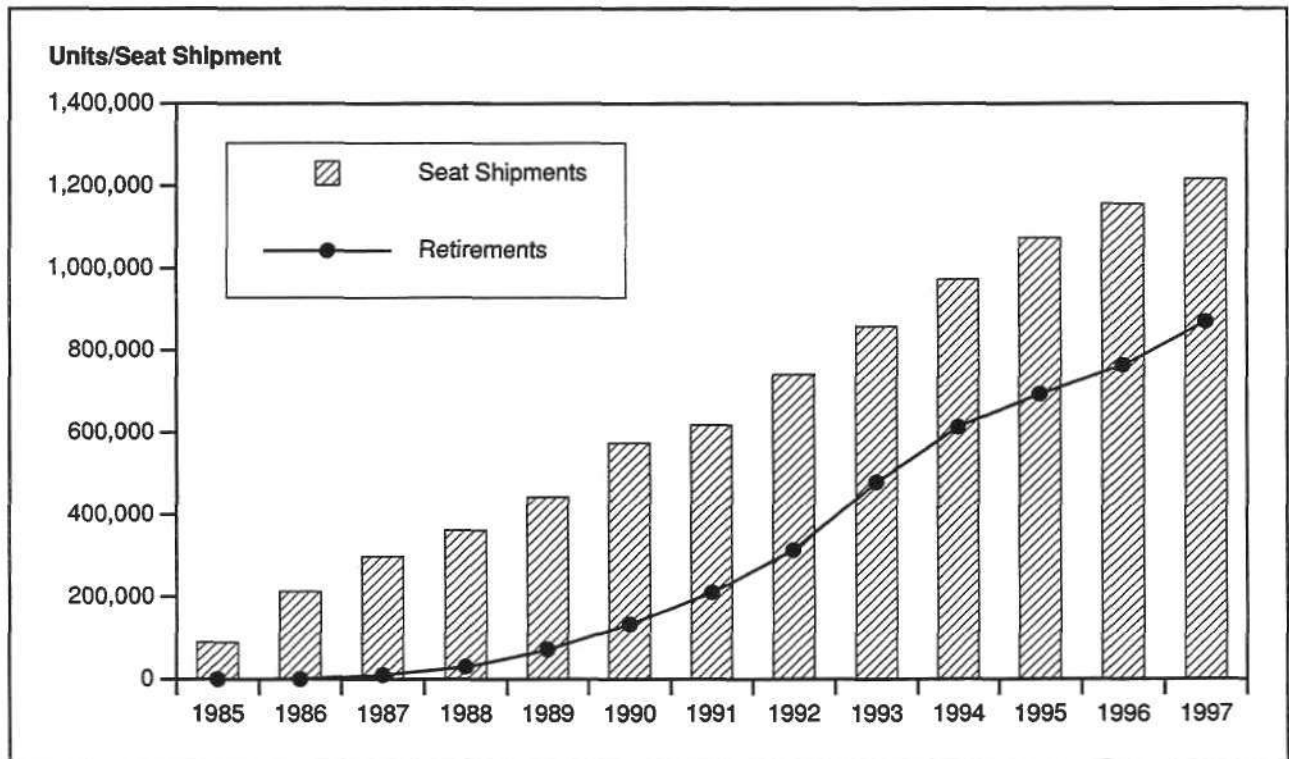
Source: Dataquest (August 1993)

13 percent, down from the 22 percent growth of the previous four quarters. The July 1993 survey of 1,000 manufacturers nationwide indicates that reduced output has resulted in a lowering of expectations, which should continue into the third quarter.

Cuts in Defense Spending

Cuts in defense spending will tend to soften the market. However, a focus on fewer, more sophisticated weapons systems will promote use of the latest design optimization and simulation capabilities.

Figure 4
Unit Shipments versus Retirements—History and Forecast



Source: Dataquest (September 1993)

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European Forecast Drivers

The European market grew 3.6 percent to \$5.7 billion in total revenue in 1992. This largest region is forecast to be the slowest growing at a mere 1.9 percent for 1993 to \$5.8 billion, with a 1992 to 1997 CAGR of 4.4 percent. The major factor behind this slowing growth is the sluggish German economy, which accounts for 35 percent of the European market. A slowdown in Germany rippled through all other European industries. Table 7 provides the forecast software CAGR for 1992 to 1997 for each country for each application in Europe.

The following paragraphs describe the main factors driving the European forecast.

Economy

Hopes abound for a recovery in the second half of 1994, with the United Kingdom and the Netherlands already leading the way. Governments are struggling to contain mounting budget deficits, particularly in the United Kingdom and in Germany. Manufacturing industries are being affected by a decline in consumer spending because of high unemployment throughout Europe. Massive budget deficits will continue to influence government public spending.

Table 7
Compound Annual Growth Rate, 1992-1997, Software Revenue (Percent)

	Mechanical	AEC	GIS	ECAE	IC	PCB	All
United Kingdom	6.0	5.2	11.8	4.6	0.9	-0.7	6.5
France	6.3	8.4	18.5	3.5	4.6	0.0	7.0
Germany	7.3	10.5	17.0	5.0	3.9	2.7	8.7
Italy	9.6	7.5	10.4	6.4	1.9	3.2	9.0
Benelux	7.2	10.0	18.4	4.1	3.7	4.0	9.3
Scandinavia	9.0	8.9	14.3	4.8	7.1	1.5	9.1
Spain	6.5	9.1	15.5	5.1	3.7	-0.5	9.0
Rest of Europe	16.5	13.9	20.2	8.8	-1.7	0.3	14.7
Europe	8.4	9.8	15.6	5.1	2.7	1.4	9.0

Source: Dataquest (August 1993)

Growth

There are a few bright spots. The European railway industry is undergoing a renaissance. Major public works projects are planned in the Netherlands and Norway. Denmark is the beneficiary of the building in the eastern Germany area. Defense spending is refocusing from the personnel needs of the cold war to the equipment needs for desert warfare, urban terrorism, and rapid response capabilities. This, with the growth of the telecommunications industry, bodes well for EDA spending.

Currency

The appreciation of the dollar against the European currencies places additional pressure on dollar growth rates for the European community. Just as the dollar growth of the Asian market is strikingly higher than growth of the yen, the dollar growth of the European market is less than the growth in local currency. Additionally, this conversion ratio forces U.S. products to sell at reduced dollar prices to remain competitive with the European products, resulting in less revenue for U.S. vendors.

Asian Forecast Drivers

The Asian market grew 2.9 percent to \$4.2 billion in total revenue for 1992. This represents a decrease of 4.3 percent on a yen basis. With the further depreciation of the dollar against the yen thus far in 1993, total revenue is forecast to grow 9.2 percent to \$4.5 billion, which is a decrease of 3.9 percent on the yen. The following paragraphs describe the main factors driving the Asian forecast.

Economy

After a hopeful but false recovery during the first quarter of 1993, the Japanese economy has once again taken a nosedive. According to a MITI survey, Japanese industry plans to cut capital spending for a second straight fiscal year (*Nikkei Weekly*, June 7, 1993). The survey also indicated that capital spending growth should return during the first quarter of calendar 1994.

Currency

Just as the appreciation of the dollar against the ECU causes pricing pressure on U.S. goods in Europe, the even greater depreciation of the dollar against the yen causes pricing pressure on Japanese goods in the United States. This currency volatility creates a cauldron of price competitiveness in the Japanese markets, with U.S. software and hardware able to provide high profits at low prices relative to the Japanese competitors.

Competitive Model Change

Japanese CAD/CAM/CAE/GIS users are shifting from the large, general-purpose, computer systems to the smaller workstations and personal computers. In response, major Japanese computer manufacturers, no longer the one-stop shop, are joining forces with foreign computer companies to provide the multiple solutions that are being demanded, adding to the already complex relationships among Japanese companies.

Developing Asian Countries

Although the cheap labor of China, Vietnam, and other developing Asian countries is fueling enormous growth in manufacturing, the lack of experienced and highly educated engineers and managers prevents a corresponding growth in the CAD/CAM/CAE/GIS industries in these countries. The design function still resides in Japan, North America, and Europe.

Personal Computer

The Japanese PC platform has been a small part of the CAD/CAM/CAE/GIS market. The introduction of DOS/V and Windows NT will be generating interest in this low-cost solution, especially with the small, late buyers.

Virtual Reality

Japan is creating tools for virtual reality that will eventually lead to the development of new technology suitable to enhance CAD/CAM/CAE/GIS.

Application Forecast Assumptions

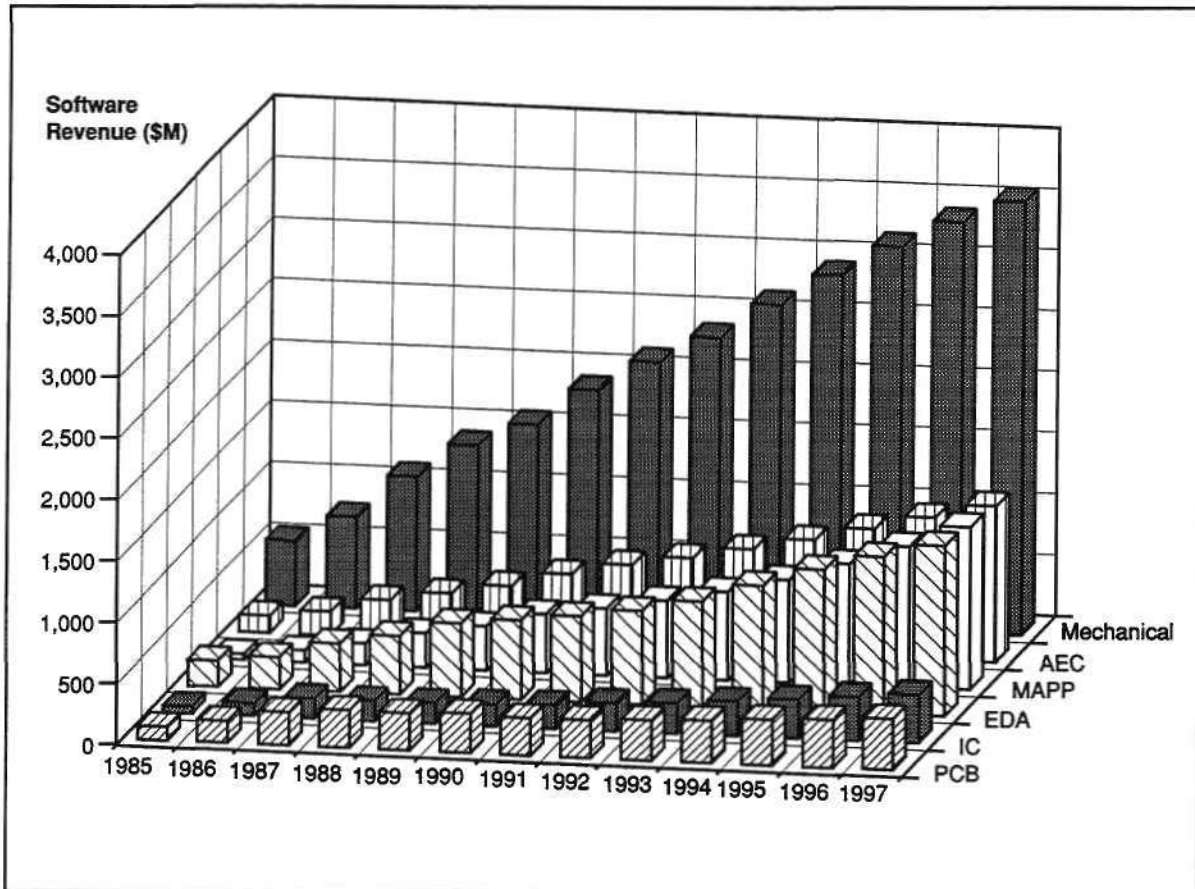
The expected growth in the next three or four years in AEC, GIS, ECAE, and IC applications is adding significantly to the total growth of the industry and is exceeding growth forecasts for mechanical and PCB applications. Market penetration, new application development, and shifting trends in average selling prices are all factors in this shift in total market application mix (see Figures 5 and 6).

Mechanical Forecast Assumptions

The mechanical application area is the largest of the CAD/CAM/CAE/GIS market with 46 percent share of software revenue, and a software revenue growth of 12.3 percent forecast for 1993. The main issues driving the mechanical forecast are as follows:

- **Software price**—Dataquest expects software prices to stabilize or increase slightly for leading products. The average value of software shipped per seat has increased slowly. In 1987, total software revenue

Figure 5
Worldwide Software Revenue Forecast by Application



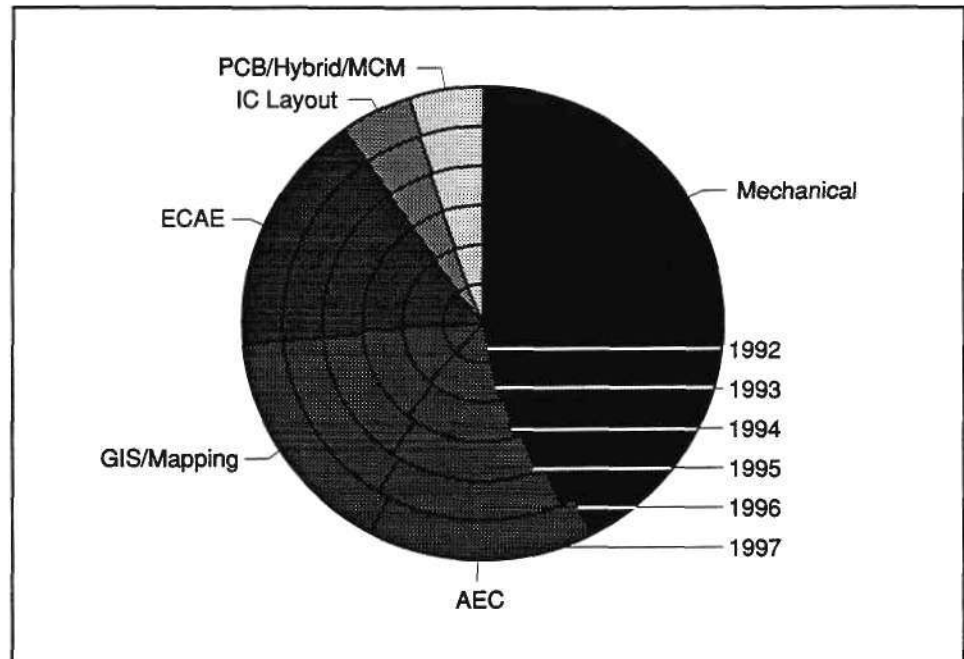
Source: Dataquest (August 1993)

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divided by total number of seats shipped was \$6,740. The average value has risen to \$7,390 in 1992. Corresponding numbers in 1992 for technical workstation-based software are \$19,338; \$2,300 for the PC; and \$11,544 for host-based seats. Leading vendors on all platforms have been raising prices directly or indirectly with new pricing structures for network licensing or site licensing. Microsoft's Windows NT is also expected to affect software prices, with PC vendors trying to raise prices, and workstation vendors possibly lowering prices as applications are ported to NT.

- **Hardware price erosion**—Dataquest expects hardware price erosion to continue at a slower rate as package complexity increases and accelerates demand for hardware purchases that provide more speed, memory, and storage. This trend can be expected on all platform configurations. Supercomputers are increasingly being used for high-end simulation and analysis applications while technical workstations range from very expensive, high-performance, real-time imaging systems to lower-cost, 2-D documentation systems. The need for integrated applications across platforms will cause significant upgrade and system replacements.

Figure 6
Software Revenue Distribution Forecast by Application



Source: Dataquest (September 1993)

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- **Second-tier products**—With a smaller installed base and less market share, second-tier vendors with stale technology are expected to fight forced price erosion. These second-tier vendors are struggling to build market share in an atmosphere of rampant price cutting, particularly on the PC platform. Building market share by cutting prices is becoming a more risky strategy.
- **Hardware performance**—With enabling technology providing increased mips, software vendors can redefine the concept of interactive design. In the future, designers will simulate the crash of one car into another and test to see if the doors still open. The value of this level of computing will change the nature of mechanical CAD/CAM/CAE.

The result will allow anyone in the design and manufacturing process to simulate real problems, to evaluate potential solutions, and to communicate the change instantly to all involved.

- **Modeling technologies**—Core modeling technologies will evolve slowly to support a product data structure growing in complexity. 3-D solutions are replacing 2-D solutions, which will be replaced by next-generation, integrated, solid-modeling-based solutions. The more complete data structure with improvements in performance is rapidly building strong interest with end users. The need to have this higher level of communication among departments is growing as well. Continued progress is being made in integration between the model and analysis applications, between model and documentation, and further into manufacturing applications.

- **Technology dependence**—The major mechanical applications have been defined: product conception, development, production, operation, and support will be necessary applications areas a hundred years from now. The dramatic changes taking place in the discrete manufacturing world because of competitive pressures are forcing shorter development cycles, localization and need for improved quality, resulting in a complexity that forces the users to be fully dependent upon this technology.
- **Manufacturing industry**—The growth opportunity in each country is dependent upon the success and health of the local manufacturing industries. Multinational corporations will fuel the growth in newly industrialized countries. Each country has a dominant industry or market segment that sets the tone for CAD/CAM/CAE use. The evolution of these industries has had an important impact on the growth of the CAD/CAM/CAE market in each region and has directed the success of many vendors trying to serve these markets. As an example, the automotive industries in Japan, the United States, Germany, Italy, and France have a major influence on these local CAD/CAM/CAE markets. Aerospace, a major force in the U.S. market, is less of a force in Europe and a minor but growing interest in Japan. All of the other manufacturing industries, such as fabricated metal, machinery, and consumer products, have strongholds in various locations around the world. For example, the machinery industry represents a significant local CAD/CAM/CAE opportunity in Japan and Germany.
- **Europe**—The automotive and aerospace industries, which are the largest customers of mechanical CAD/CAM/CAE tools, are suffering during the ongoing recession in Europe, experiencing budget and staff cuts. On top of this, 34 percent of the European mechanical market is in Germany where the economy is in a deep recession and manufacturing output is down. Growth for mechanical CAD software in 1992 was 10.1 percent and is expected to be 7.1 percent in 1993 as the German economy is not expected to get out of the recession before mid-1994 at the earliest.

AEC Forecast Assumptions

The AEC application area had software revenue growth in 1992 of 11.4 percent. The five-year CAGR for software is forecast to be 11.0 percent. The main factors driving the AEC forecast are as follows:

- **Untapped users**—A significant pool of untapped users still exists. The current relatively low market penetration of AEC CAD systems should allow steady worldwide growth during the next five years, despite constant volatility in demand for the building and infrastructure products to be designed.
- **Mandates for CAD**—Electronic design data is increasingly required by the designer's client, from the federal government down to the small commercial developer. In addition, design firms are growing at the expense of smaller firms. These large end users will increasingly require their employees and suppliers to adopt automation tools in the design and construction process.

- **Electronic partnering**—Designers in the AEC industry are finding themselves in markets that are more regionally and globally competitive, markets that favor partnering across design disciplines. Smaller design firms will increasingly buy CAD systems or risk being dropped from consideration as a partner.
- **Competitive advantage**—CAD purchases are increasingly justified as a competitive advantage in sales and design reviews. The architect who cannot produce the fourth iteration of a proposed design before signing up a client will lose out to the group that can use changes in a proposal to ratchet a prospect toward closure gradually.
- **Software leverage**—AEC CAD vendors can fuel upgrade revenue among sophisticated users by leveraging software advances first developed in mechanical design, such as faster structural analysis tools or incorporation of design rules.
- **New functionality**—Data and database functions (versus graphics functions) will increase in importance in AEC design systems, creating opportunities to sell users significant and new functionality.
- **Europe**—AEC growth in western Europe is tied to the construction industry and improvement of the infrastructure, manufacturing plants, and power stations in eastern Europe. In particular, German and Danish construction companies are involved in projects in former East Germany and central and eastern Europe. The construction industry in other countries is rather bleak, given the overbuilding of the 1980s and high interest rates. The Netherlands and Norway have public works projects planned or in process.

Growth Inhibitors to the AEC Industry

Trends that will inhibit growth in the AEC industry are as follows:

- **Low payoff to users**—AEC's one-design-one-build structure means CAD provides fewer economic benefits to these users than does the one-design-build-many structure of manufacturing. Construction, which is essentially a prototype build, is fraught with uncertainties and delays that are hard to change using design systems as they exist today.
- **Lack of interoperability**—Designs are often split among several different companies representing different aspects of the design process. User companies often have different CAD systems that do not communicate well, and alliances and consolidations in user organizations will only highlight the issue.
- **Low-cost solutions**—Because most AEC design is still focused on drafting, which requires relatively little computing power, PC-based growth will be strong for the foreseeable future, and PC-based solutions will produce less revenue to the vendor than other platforms.

- **Late adopters**—Attitudes of potential users inhibit market growth. Many experienced architects resist change in the design and construction processes. As this self-destructive mode of operating erodes the viability of the profession, the CAD market is also impacted because many architects who were once prospects for CAD systems simply are now unemployed.

GIS/Mapping Forecast Assumptions

The GIS application area had software revenue growth in 1992 of 15.3 percent. The five-year CAGR for software revenue is forecast to be 16.0 percent. The assumptions behind the GIS forecast are built on an optimism that during the forecast period the world economy will gradually improve and on an expectation that global competition will increase. Assumptions used to build Dataquest's GIS market forecast are as follows:

- **Low penetration**—Bread-and-butter prospects in government and utilities are charged with maintaining information on land and assets in perpetuity. The large number of utilities and sovereign and local governments all over the world still stuck with tabular data and paper maps, which will degrade, creates a plentiful supply of prospective buyers of the more readily changed and renewed computer maps, a first step to building a GIS system.
- **New technologies**—Faster, cheaper computers and developments in open, distributed systems open the door to an expanded user base. Advances in global positioning systems (GPSs) and aerial photography are making it possible to create GISs significantly more accurate and complete than existing paper maps, giving experienced users some compelling reasons to reinvest. Increasingly, portable computers, multimedia, cheaper storage, and better compression of satellite imagery will create opportunities to develop richer, more accurate, and more useful GIS systems. Although many markets will take advantage of these technologies, we can think of no other market as ready, willing, and able to put to work such a wide range of technology enhancements. Already in the last year or two, a number of users invested in image-oriented GIS systems, either supplementing or completely bypassing conversion of existing paper data that has helped provide a midlife kick to a market that has been slowed by troubled pilot projects.
- **New applications in industries like retail and insurance will drive growth**—Wherever there is competition for a limited prize—whether the prize is political or economic—GIS can create a competitive edge. Wherever assets or investments are geographically dispersed, GIS offers significant management capabilities. Revenue is growing more than 50 percent per year among new applications. However, we see a wide band of uncertainty surrounding future revenue opportunities. Several new applications in GIS are destined to become embedded as a relatively low revenue-producing feature in another software program (and market), rather than a standalone product in the GIS market.

- **Easier and cheaper GIS**—Inexpensive spatial data, public and private, is accumulating and can be passed on to new users. Successful multi-participant projects are growing, creating larger data sets that can be profitably resold by government/industry consortia. Also, although we do not envision the technology miracle that will eliminate development costs, implementation of GIS in new sites will be easier and cheaper than it has been.
- **Solutions filling a need**—GIS addresses the information age's growing problem of information overload. Any product that addresses a visible problem is more certain to grow than solutions that are still looking for the problem.
- **The U.S. government**—GIS is one of the rare markets where relatively simple government actions can directly fuel industry growth. In fact, the GIS industry depends on government cooperation for base data development. Governments all over the world are cooperating by developing spatial data standards, more sophisticated mapping goals, and increased cooperation across federal and local governments. The U.S. federal government is in a particularly influential position—and all stars are favorably positioned. The Landsat program appears to be headed in the direction of making satellite imagery more affordable. GPS satellites are proving extremely valuable outside of defense applications. Freedom of information remains a viable U.S. federal concept, creating opportunities to exploit low-cost, government-generated spatial data.

Growth Inhibitors to the GIS Industry

Trends that will inhibit growth in the GIS industry are as follows:

- **High cost**—Nothing important will emerge to create a low-cost, meaningful data set for traditional customers in government and utilities. Data conversion will remain costly, despite substantially lower-scanning costs and increasingly improved automated conversion products. The high cost will remain because, as existing paper records head toward computerization, widespread minor inaccuracies begin to be examined, often for the first time. The significant cost of correcting prior errors and omissions is inevitably bundled into the cost of conversion. At the same time, increasingly complex applications require increasingly accurate data, which also raises conversion costs.
- **Stuck projects**—The significant number of traditional GIS/mapping projects stuck in the pilot phase will reduce demand for new products, as users struggle to implement existing purchases. Even worse, the negative publicity created by these projects will chill the buying impulse among nonusers, reducing the ability of GIS projects to compete with other applications for capital equipment dollars.
- **Price pressure**—Computer prices will certainly drop, even in technical applications such as GIS where higher-performance hardware will command a premium price. Software prices are likely to come under increasing pressure, despite the industry's current ability to hold overall seat prices relatively even. Our current forecast is built on declining

hardware and steady software prices, primarily because of opportunities to add significant software data and functionality content to new sales among core, noncommodity buyers. Any significant deviation from this model would affect the forecast.

- Europe—GIS data in Europe is prohibitively expensive and not readily available, slowing down the potential growth. In addition, the current state of the various European economies, the enormous budget deficits of some of the major economies such as Germany, Italy, and the United Kingdom, and major cuts in public spending are holding back the development of GIS. However, the railway industry is a source of growth in GIS in Europe.

EDA Forecast Assumptions

The year 1992 showed a glimmer of hope in the EDA industry, with software revenue year-to-year growth rates climbing back to 8.9 percent, driven by the continued strength of the IC layout software industry and a resurgence in the CAE market. Dataquest expects EDA software revenue growth to increase to 10.4 percent year-to-year for 1993. Printed circuit board (PCB) software in particular will remain stagnant until multichip module (MCM) technologies begin to affect the market, which Dataquest anticipates will take effect in the 1994 to 1995 time frame. Factors that will help spur EDA software growth are as follows:

- New tool technologies—New tool technologies, including electronic system design automation (ESDA), signal integrity, and design automation, are becoming available, fueling growth.
- Analysis tools—Increasing clock frequencies require tighter design tolerances that require sophisticated analysis tools to ensure proper operation.
- Migration of IC layout—Migration of IC layout technologies to system designers in the form of floor planners may prove to be the vehicle to expand physical IC design into the larger ASIC design community.
- Europe—The EDA industry in Europe is now characterized by two or three big players jockeying for position. Furthermore, following the merger of Cadence Design Systems Inc. and Valid Logic Systems Inc., and several large end-user mergers, some strategic account changes have occurred and will continue. The total software revenue is unaffected, but market share is the prize for the winning EDA company.

Growth Inhibitors to the EDA Industry

Trends that will inhibit growth in the EDA industry are as follows:

- Short-term transitions and shifts—Product transition and strategy shifts will have a short-term downward effect. Difficulties at the No. 1 supplier of EDA software, Cadence, may cause a stall in the purchases of new tools as users ponder their options. Ongoing consolidations of key EDA technologies, including simulation and signal integrity, will also protract buying decisions.

- **Financial results**—Decreased revenue for all of EDA is readily evident in examining public company statements. As part of the forecasting process, Dataquest analyzes the short-term, company-specific issues. There are five publicly traded EDA software companies: Cadence, Mentor Graphics, Synopsys, Viewlogic, and Silvar-Lisco. These companies represent approximately 45 percent of the worldwide EDA software market. Comparing the first six months of 1992 versus the first six months of 1993, we find that the combined revenue of these companies was essentially flat. Cadence's troubles earlier in the year contributed heavily to this fact, but we anticipate that 1993 total EDA software revenue growth will suffer accordingly. Were it not for the stellar growth of such companies as Viewlogic and Synopsys, the EDA market would indeed be posting a poor 1993.
- **Legal issues**—Legal issues may induce fear, uncertainty, and doubt in buyers' minds. The recent spate of legal actions (for example, Synopsys versus Cadence, Analogy versus Anacad/Mentor Graphics, and stockholders versus Cadence) may divert the attention of the buying public and will definitely garner the attention of top management at the EDA vendors.
- **Use of PC-based tools will drop significantly**—Looking to EDA's future, Dataquest anticipates the use of what has classically been called PC-based tools to drop significantly. The Dataquest factors determining the differentiation of technical workstations from PCs are a virtual multitasking operating system (UNIX, VMS, and DOMAIN), the ability to run high-performance graphic applications in a multi-user environment, and the user's potential range of expansion on the platform. Windows NT on the Pentium chip will challenge this differentiation.

Dataquest anticipates that use of classical PCs as EDA platforms will begin to diminish significantly in 1995. At that time, classes of tools will be differentiated not upon hardware platform or operating system, but rather upon the features and functionality of the tools themselves. The emergence of Windows NT will have a minimal impact upon the overall revenue of the EDA software industry. However, its effect upon competing operating systems, average selling prices, distributing practices, and business and marketing practices will be far-reaching.

Forecast Comparison

The CAD/CAM/CAE/GIS database has undergone enormous scrutiny through our market share, forecast, market share update, and finally forecast update. It has only slightly changed downward from the 1992 forecast. In fact, the forecast total factory revenue for 1993 of \$16.5 billion is only 1.3 percent higher than last year's forecast of \$16.3 billion. However, the longer-term sights have been lowered so that the current 1996 forecast total factory revenue of \$19.8 billion is 6.1 percent lower

than was forecast last year for 1996. By examining the numbers, we discovered the following lowered expectations:

- The biggest factor in this lowered forecast is in the more rapidly declining host-dependent business. This is supported by the market share update reporting a faster drop in the host-dependent platform than estimates from our earlier market share. The forecast total revenue for 1996 of \$1.1 billion is 36.2 percent lower than the forecast last year for 1996.
- Regionally, the largest factor in this lowered forecast is Europe, where the 1996 forecast total factory revenue of \$6.8 billion is 14.7 percent lower than the \$7.9 billion forecast last year.
- As to applications, these lowered expectations apply to the AEC, GIS, IC, and PCB applications, while the mechanical and ECAE applications have been forecast to grow faster than reported in 1991.

Lowered expectations have become an economic reality, given that the recovery from this prolonged recession is not materializing as the past has taught us. However, a CAGR of 5.8 percent of this \$15.7 billion industry is solid and continuing growth. The technologies provided by the CAD/CAM/CAE/GIS industry are no longer just nice ideas, but have become the ticket to compete globally. The technological improvements of software, hardware, and the increasing involvement of vendors through services will continue to fuel the growth of this CAD/CAM/CAE/GIS market.

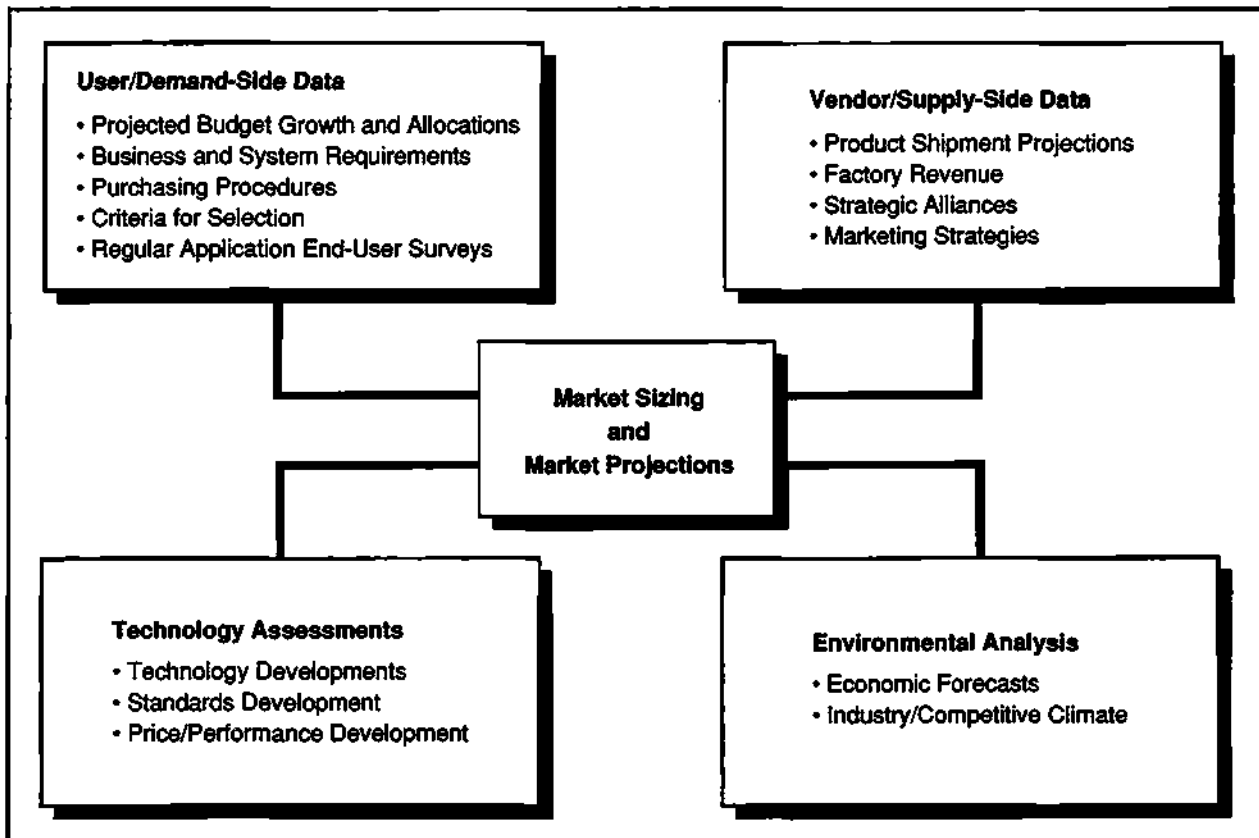
Forecast Methodology

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 from the events of 1993.

Figure 7 shows the CAD/CAM/CAE and GIS forecasting model. The overall forecasting process uses a combination of forecasting techniques

Figure 7
CAD/CAM/CAE and GIS Forecasting Model



Source: Dataquest (May 1993)

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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.

- 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 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.

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.

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).

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

Application: All Applications
Region: Worldwide
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	249,085	280,309	387,995	412,406	519,727	613,590	702,520	775,790	830,330	860,570	20	11
Unit Shipments or Seats	249,085	280,309	387,995	412,406	519,727	613,590	702,520	775,790	830,330	860,570	20	11
CPU Installed Base	646,426	875,632	1,165,511	1,422,028	1,707,462	1,952,870	2,180,680	2,436,500	2,699,110	2,919,000	27	11
Installed Seats	646,426	875,632	1,165,511	1,422,028	1,707,462	1,952,870	2,180,680	2,436,500	2,699,110	2,919,000	27	11
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	20.8	19.5	19.6	13.8	13.5	12.2	11.0	10.4	9.9	9.6	-10	-7
Hardware-Only ASP	4.7	4.8	3.9	3.7	3.5	3.2	2.9	2.8	2.6	2.5	-7	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,302	1,570	1,749	1,714	2,028	2,174	2,263	2,331	2,350	2,321	12	3
CPU Revenue	1,163	1,458	1,603	1,582	1,890	2,040	2,128	2,195	2,216	2,191	13	3
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	139	112	146	131	138	134	135	136	134	130	-0	-1
Software Revenue	658	767	899	1,032	1,195	1,373	1,546	1,696	1,822	1,914	16	10
Bundled	156	140	139	152	153	159	157	156	149	141	-1	-2
Unbundled	501	627	760	881	1,043	1,214	1,389	1,540	1,673	1,774	20	11
Service Revenue	88	130	137	116	130	148	170	184	198	209	10	10
Total Factory Revenue	2,047	2,466	2,785	2,862	3,353	3,694	3,979	4,211	4,370	4,444	13	6
Increase over Prior Year (%)	23	20	13	3	17	10	8	6	4	2		

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

Source: Dataquest (September 1993)

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

Application: Mechanical
Region: Worldwide
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	125,231	123,360	148,490	166,812	210,061	258,920	303,210	335,230	358,280	365,810	14	12
Unit Shipments or Seats	125,231	123,360	148,490	166,812	210,061	258,920	303,210	335,230	358,280	365,810	14	12
CPU Installed Base	330,205	428,119	526,607	614,244	712,014	809,590	914,560	1,036,200	1,158,730	1,252,760	21	12
Installed Seats	330,205	428,119	526,607	614,244	712,014	809,590	914,560	1,036,200	1,158,730	1,252,760	21	12
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	23.2	20.9	20.2	15.5	14.9	13.4	12.1	11.4	10.9	10.5	-10	-7
Hardware-Only ASP	4.4	4.8	3.8	3.6	3.4	3.2	2.9	2.7	2.6	2.5	-6	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	645	693	712	724	855	942	997	1,028	1,037	1,012	7	3
CPU Revenue	551	631	640	655	785	874	929	960	970	949	9	4
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	94	63	72	68	70	68	68	68	66	64	-7	-2
Software Revenue	287	324	345	418	483	546	600	644	676	690	14	7
Bundled	104	88	82	94	85	86	84	83	81	79	-5	-1
Unbundled	182	236	263	324	398	460	516	560	595	611	22	9
Service Revenue	33	56	53	50	60	67	75	80	85	88	16	8
Total Factory Revenue	965	1,073	1,110	1,191	1,398	1,555	1,672	1,751	1,797	1,790	10	5
Increase over Prior Year (%)	15	11	3	7	17	11	8	5	3	-0		

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

Source: Dataquest (September 1993)

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

Application: AEC
 Region: Worldwide
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	62,271	81,183	113,665	119,776	154,987	179,360	203,210	226,470	248,310	268,030	26	12
Unit Shipments or Seats	62,271	81,183	113,665	119,776	154,987	179,360	203,210	226,470	248,310	268,030	26	12
CPU Installed Base	164,074	231,392	319,701	399,580	492,535	569,530	636,660	711,160	792,920	874,000	32	12
Installed Seats	164,074	231,392	319,701	399,580	492,535	569,530	636,660	711,160	792,920	874,000	32	12
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	17.7	17.3	17.9	11.1	12.1	11.0	9.9	9.3	8.9	8.5	-9	-7
Hardware-Only ASP	4.8	4.7	3.7	3.6	3.4	3.2	2.9	2.7	2.6	2.5	-8	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	319	446	482	476	584	617	639	667	692	714	16	4
CPU Revenue	300	420	450	438	543	576	597	623	647	668	16	4
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	19	26	32	38	41	42	42	43	45	46	21	2
Software Revenue	154	202	264	297	356	418	485	551	617	683	23	14
Bundled	23	27	28	27	36	37	38	40	41	43	11	4
Unbundled	131	175	236	270	321	381	446	511	575	641	25	15
Service Revenue	25	35	32	24	26	30	36	41	47	53	1	15
Total Factory Revenue	499	683	778	796	966	1,066	1,160	1,258	1,355	1,450	18	8
Increase over Prior Year (%)	38	37	14	2	21	10	9	8	8	7		

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

Source: Dataquest (September 1993)

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

Application: GIS/Mapping
 Region: Worldwide
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	14,446	28,980	45,208	44,495	67,722	83,670	102,040	119,710	135,530	150,660	47	17
Unit Shipments or Seats	14,446	28,980	45,208	44,495	67,722	83,670	102,040	119,710	135,530	150,660	47	17
CPU Installed Base	26,479	54,577	96,968	134,707	186,693	236,690	288,810	347,180	408,710	469,490	63	20
Installed Seats	26,479	54,577	96,968	134,707	186,693	236,690	288,810	347,180	408,710	469,490	63	20
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	25.4	25.5	21.3	15.8	14.8	14.0	12.7	12.0	11.4	11.0	-13	-6
Hardware-Only ASP	4.9	4.9	3.9	3.9	3.5	3.2	3.0	2.8	2.6	2.5	-8	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	82	152	190	187	251	284	317	348	372	394	32	9
CPU Revenue	76	147	179	176	238	270	302	332	355	377	33	10
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue: (Turnkey)	5	5	11	11	13	14	15	16	16	17	25	5
Software Revenue	54	69	100	112	156	194	236	287	339	392	31	20
Bundled	8	7	9	10	10	11	11	12	11	11	5	3
Unbundled	46	62	90	102	146	184	225	276	328	381	34	21
Service Revenue	5	9	14	12	18	23	28	34	41	47	35	22
Total Factory Revenue	141	230	303	311	425	501	581	669	751	834	32	14
Increase over Prior Year (%)	57	64	32	3	37	18	16	15	12	11		

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

Source: Dataquest (September 1993)

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

Application: Electronic Design Automation
 Region: Worldwide
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	47,137	46,786	80,632	81,323	86,957	91,630	94,050	94,370	88,210	76,060	17	-3
Unit Shipments or Seats	47,137	46,786	80,632	81,323	86,957	91,630	94,050	94,370	88,210	76,060	17	-3
CPU Installed Base	125,668	161,544	222,235	273,497	316,219	337,060	340,640	341,960	338,750	322,740	26	0
Installed Seats	125,668	161,544	222,235	273,497	316,219	337,060	340,640	341,960	338,750	322,740	26	0
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	14.5	18.2	19.7	12.6	11.1	10.1	9.0	8.4	7.9	7.4	-6	-8
Hardware-Only ASP	5.3	5.1	4.2	3.8	3.6	3.3	3.0	2.8	2.7	2.5	-9	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	255	278	366	327	337	331	310	288	250	201	7	-10
CPU Revenue	235	260	335	313	324	320	300	279	243	196	8	-10
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	20	18	31	14	13	11	10	9	7	4	-10	-20
Software Revenue	163	171	189	206	200	214	225	214	190	149	5	-6
Bundled	21	19	20	21	23	24	24	21	15	7	2	-20
Unbundled	142	153	170	185	177	189	201	193	176	142	6	-4
Service Revenue	24	30	38	30	27	28	30	29	26	20	3	-5
Total Factory Revenue	443	480	594	563	564	572	566	532	466	370	6	-8
Increase over Prior Year (%)	18	8	24	-5	0	1	-1	-6	-12	-21		

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

Source: Dataquest (September 1993)

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

Application: Electronic CAE
 Region: Worldwide
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	23,601	34,705	61,301	64,020	64,770	68,100	72,100	74,360	71,540	63,660	29	-0
Unit Shipments or Seats	23,601	34,705	61,301	64,020	64,770	68,100	72,100	74,360	71,540	63,660	29	-0
CPU Installed Base	73,262	99,988	148,192	193,883	231,239	250,970	256,830	261,300	264,110	257,990	33	2
Installed Seats	73,262	99,988	148,192	193,883	231,239	250,970	256,830	261,300	264,110	257,990	33	2
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	19.3	24.0	21.7	14.1	12.0	10.9	9.8	9.2	8.6	8.3	-11	-7
Hardware-Only ASP	5.2	5.1	4.0	3.6	3.6	3.4	3.1	2.9	2.7	2.6	-9	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	129	200	265	246	250	244	236	225	200	166	18	-8
CPU Revenue	120	186	247	241	243	238	230	220	196	164	19	-8
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue: (Turnkey)	9	13	18	6	6	6	6	5	4	3	-9	-15
Software Revenue	96	122	143	161	149	158	168	160	140	113	12	-5
Bundled	11	15	16	18	18	20	20	17	11	6	14	-21
Unbundled	85	106	127	143	131	138	148	143	129	107	11	-4
Service Revenue	15	22	27	24	21	22	24	23	20	17	10	-4
Total Factory Revenue	240	344	436	431	419	425	428	408	361	296	15	-7
Increase over Prior Year (%)	28	43	27	-1	-3	1	1	-5	-12	-18		

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

Source: Dataquest (September 1993)

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

Application: IC Layout
 Region: Worldwide
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	1,503	487	478	555	913	530	470	390	310	200	-12	-26
Unit Shipments or Seats	1,503	487	478	555	913	530	470	390	310	200	-12	-26
CPU Installed Base	3,861	4,157	4,133	3,816	3,610	2,990	2,470	2,010	1,620	1,260	-2	-19
Installed Seats	3,861	4,157	4,133	3,816	3,610	2,990	2,470	2,010	1,620	1,260	-2	-19
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	11.6	23.6	27.0	26.8	27.4	25.3	23.1	21.6	21.3	18.9	24	-7
Hardware-Only ASP	5.0	3.7	3.0	2.3	2.7	2.5	2.3	2.1	2.1	1.9	-14	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	9	3	3	3	4	3	2	2	1	1	-18	-34
CPU Revenue	8	3	3	3	4	2	2	1	1	0	-19	-33
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-2	-41
Software Revenue	5	3	1	1	2	2	1	1	1	1	-19	-23
Bundled	1	1	0	0	1	1	0	0	0	0	-4	-37
Unbundled	4	2	1	1	1	1	1	1	1	1	-23	-18
Service Revenue	0	0	0	0	1	0	0	0	0	0	20	-43
Total Factory Revenue	14	6	4	5	7	5	4	2	2	1	-17	-30
Increase over Prior Year (%)	-45	-53	-31	6	37	-29	-23	-31	-25	-40		

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

Source: Dataquest (September 1993)

Table 15
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Worldwide
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	22,033	11,594	18,853	16,749	21,274	23,010	21,480	19,620	16,370	12,200	-1	-11
Unit Shipments or Seats	22,033	11,594	18,853	16,749	21,274	23,010	21,480	19,620	16,370	12,200	-1	-11
CPU Installed Base	48,545	57,399	69,911	75,797	81,370	83,100	81,350	78,650	73,020	63,490	14	-5
Installed Seats	48,545	57,399	69,911	75,797	81,370	83,100	81,350	78,650	73,020	63,490	14	-5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	10.7	12.3	15.5	9.4	8.9	8.1	7.3	6.9	6.5	6.3	-5	-7
Hardware-Only ASP	5.4	5.4	4.8	4.3	3.5	3.3	3.0	2.8	2.6	2.5	-10	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	117	75	98	78	84	84	72	62	48	34	-8	-17
CPU Revenue	107	71	85	70	77	79	68	59	46	32	-8	-16
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	11	4	13	8	6	4	4	3	3	1	-12	-26
Software Revenue	63	47	45	44	49	54	56	53	49	36	-6	-6
Bundled	10	3	4	4	4	4	4	4	3	2	-19	-15
Unbundled	53	44	41	40	45	50	52	50	46	34	-4	-5
Service Revenue	9	8	11	5	5	6	6	6	5	4	-13	-7
Total Factory Revenue	189	130	153	127	138	143	134	121	103	73	-8	-12
Increase over Prior Year (%)	16	-31	18	-17	9	4	-6	-10	-15	-29		

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

Source: Dataquest (September 1993)

Table 16
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
 Region: North America
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	141,725	129,427	151,483	155,531	209,626	244,660	278,350	304,860	327,830	342,110	10	10
Unit Shipments or Seats	141,725	129,427	151,483	155,531	209,626	244,660	278,350	304,860	327,830	342,110	10	10
CPU Installed Base	364,235	463,171	558,442	627,890	717,727	794,140	872,190	966,350	1,067,210	1,154,720	18	10
Installed Seats	364,235	463,171	558,442	627,890	717,727	794,140	872,190	966,350	1,067,210	1,154,720	18	10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	25.7	17.1	19.7	14.4	11.3	10.1	8.8	8.2	7.4	7.1	-19	-9
Hardware-Only ASP	4.0	4.8	4.0	3.9	3.7	3.4	3.1	2.9	2.8	2.7	-2	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	572	625	617	617	779	832	868	892	909	909	8	3
CPU Revenue	569	608	582	580	745	796	830	852	868	868	7	3
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	3	17	35	37	35	37	38	40	41	42	79	4
Software Revenue	260	305	348	384	482	575	665	741	807	858	17	12
Bundled	7	6	5	4	4	4	4	3	3	3	-12	-6
Unbundled	253	299	343	379	478	571	662	738	804	855	17	12
Service Revenue	33	43	36	30	33	41	50	56	62	67	0	15
Total Factory Revenue	866	974	1,001	1,031	1,295	1,448	1,584	1,689	1,778	1,835	11	7
Increase over Prior Year (%)	24	12	3	3	26	12	9	7	5	3		

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

Source: Dataquest (September 1993)

Table 17
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
 Region: Europe
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	66,843	93,225	131,041	136,951	166,736	188,670	215,310	240,780	255,940	263,630	26	10
Unit Shipments or Seats	66,843	93,225	131,041	136,951	166,736	188,670	215,310	240,780	255,940	263,630	26	10
CPU Installed Base	172,447	253,322	358,923	453,236	551,163	623,930	685,090	757,430	834,030	899,090	34	10
Installed Seats	172,447	253,322	358,923	453,236	551,163	623,930	685,090	757,430	834,030	899,090	34	10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	13.9	24.9	26.2	17.6	15.3	13.8	12.5	11.8	11.3	10.9	2	-7
Hardware-Only ASP	5.3	5.0	4.2	3.7	3.4	3.2	2.9	2.7	2.6	2.5	-11	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	398	530	614	560	624	645	673	703	708	698	12	2
CPU Revenue	370	481	554	515	575	604	631	661	665	656	12	3
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	28	49	60	45	49	42	42	42	42	41	15	-3
Software Revenue	207	258	297	341	383	421	458	493	523	547	17	7
Bundled	33	33	29	32	42	47	46	47	47	48	6	3
Unbundled	174	225	268	309	342	374	412	446	476	499	18	8
Service Revenue	33	44	54	41	48	53	60	64	69	73	10	9
Total Factory Revenue	637	832	965	941	1,056	1,119	1,190	1,261	1,300	1,318	13	5
Increase over Prior Year (%)	24	30	16	-2	12	6	6	6	3	1		

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

Source: Dataquest (September 1993)

Table 18
CAD/CAM/CAE/GIS History and Forecast Update

Application: All Applications
 Region: Asia
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	36,568	51,762	98,143	109,667	127,374	160,520	184,530	199,880	210,490	213,170	37	11
Unit Shipments or Seats	36,568	51,762	98,143	109,667	127,374	160,520	184,530	199,880	210,490	213,170	37	11
CPU Installed Base	98,542	142,895	226,237	311,481	397,501	481,190	556,000	628,780	695,110	742,240	42	13
Installed Seats	98,542	142,895	226,237	311,481	397,501	481,190	556,000	628,780	695,110	742,240	42	13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	28.4	18.2	18.2	13.1	13.2	11.9	10.7	10.0	9.6	9.3	-17	-7
Hardware-Only ASP	7.0	4.7	3.1	3.0	3.1	2.9	2.7	2.5	2.4	2.3	-18	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	310	384	490	497	571	636	653	655	642	614	17	1
CPU Revenue	202	339	438	449	519	583	601	605	595	571	27	2
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	107	45	51	48	52	53	52	50	47	44	-17	-3
Software Revenue	184	190	237	283	293	332	368	397	416	418	12	7
Bundled	116	100	105	115	106	107	106	104	97	89	-2	-3
Unbundled	68	90	132	168	187	225	262	293	319	329	29	12
Service Revenue	20	40	45	43	45	50	55	58	59	59	22	5
Total Factory Revenue	514	615	771	823	909	1,018	1,077	1,110	1,118	1,092	15	4
Increase over Prior Year (%)	21	20	25	7	11	12	6	3	1	-2		

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

Source: Dataquest (September 1993)

Table 19
CAD/CAM/CAE/GIS History and Forecast Update

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

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	3,949	5,894	7,329	10,256	15,991	19,730	24,320	30,280	36,080	41,660	42	21
Unit Shipments or Seats	3,949	5,894	7,329	10,256	15,991	19,730	24,320	30,280	36,080	41,660	42	21
CPU Installed Base	11,202	16,244	21,908	29,421	41,070	53,600	67,400	83,940	102,760	122,950	38	25
Installed Seats	11,202	16,244	21,908	29,421	41,070	53,600	67,400	83,940	102,760	122,950	38	25
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	11.4	16.3	9.1	6.5	6.0	5.4	4.9	4.7	4.4	4.2	-15	-7
Hardware-Only ASP	5.5	5.0	3.9	3.9	3.3	3.1	2.8	2.7	2.5	2.4	-12	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	22	30	29	40	53	61	69	80	91	100	24	13
CPU Revenue	22	30	28	39	51	58	66	77	87	96	24	14
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	1	1	1	3	3	3	4	4	4	51	9
Software Revenue	7	13	16	25	37	45	54	64	76	91	54	20
Bundled	1	1	0	1	1	1	1	1	1	1	19	-8
Unbundled	6	12	16	24	36	44	53	63	75	90	56	20
Service Revenue	1	2	2	2	3	4	5	6	8	9	24	25
Total Factory Revenue	30	46	47	67	93	110	128	150	174	200	33	17
Increase over Prior Year (%)	7	52	4	42	38	17	16	18	16	15		

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

Source: Dataquest (September 1993)

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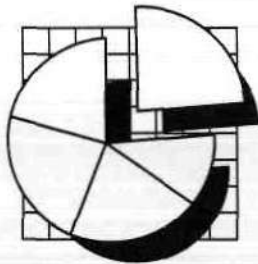
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Software

Personal CAD and Distribution Channels Worldwide Market Share Update



Market Statistics

1993

Program: Personal CAD and Distribution Channels Worldwide

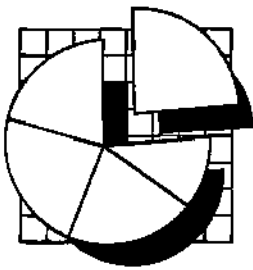
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Table of Contents

	Page
Introduction.....	1
CAD/CAM/CAE/GIS Market Share Update.....	2
Software Market Grew 9.6 Percent in 1992, Revised Down from 9.7 Percent.....	2
Database Changes.....	3
Software	3
Expanded Definition for Service.....	3
Shift in Revenue Distribution.....	4
Company Changes.....	5
Analysis of Workstation Distribution	5
Company Additions and Deletions.....	6
Market Share Battles.....	6
Mechanical.....	6
AEC.....	8
GIS/Mapping.....	8
ECAE	9
IC Layout	9
PCB/Hybrid/MCM Layout	9
Market Analysis	9
Hardware Revenue Suffers	12
About This Document	12
Segmentation Definitions.....	13
Applications.....	13
Mechanical.....	13
Architecture, Engineering, and Construction (AEC).....	13
Geographic Information Systems (GIS)/Mapping	13
Electronic Design Automation (EDA).....	14
Regions	14
North America	14
Europe	14
Asia	14
Rest of World.....	14
Platforms	14
Technical Workstation.....	14
Host-Dependent.....	14
Server.....	15
Personal Computer	15
Metrics	15
Market Share Methodology	16
The Audit Process.....	17
Publishing Schedule.....	17

List of Figures

Figure	Page
1 CAD/CAM/CAE/GIS Market Database.....	1
2 1992 Software Revenue Growth: Market Share versus Market Share Update.....	2
3 CAD/CAM/CAE/GIS Market Portfolio for Software Revenue for 1992.....	11

List of Tables

Table	Page
1 Comparison of 1991 and 1992 Software Revenue: Market Share versus Market Share Update	3
2 1992 Service as a Percentage of Total Revenue: Market Share versus Market Share Update	4
3 Change in Distribution of 1992 Revenue: Market Share versus Market Share Update	4
4 1992 Top 20 CAD/CAM/CAE/GIS Vendors Total Revenue: Market Share versus Market Share Update	5
5 Unit Sales of Technical Workstations by Application Segment, by Top U.S. Vendors for 1992 (Including Units Sold through OEMs).....	6
6 Changes in CAD/CAM/CAE/GIS Vendors with Total Revenue for 1991 and 1992	7
7 Top 10 Mechanical Software Companies Worldwide.....	7
8 Top 10 AEC Software Companies Worldwide	8
9 Top 10 GIS Software Companies Worldwide	9
10 Top 10 ECAE Software Companies Worldwide	10
11 Top 10 IC Layout Software Companies Worldwide	10
12 Top 10 PCB/Hybrid/MCM Software Companies Worldwide	11
13 Hardware Seats, Revenue, and Average Selling Price for 1991 and 1992.....	12
Personal Computer	
Worldwide	
14 All Applications	19
15 Mechanical	29
16 AEC	34
17 GIS/Mapping	39
18 Electronic Design Automation.....	43
19 Electronic CAE	47
20 IC Layout.....	51
21 PCB/Hybrid/MCM.....	52
All Applications	
22 North America.....	54
23 Europe	60
24 Asia.....	67
25 Rest of World	72

Note: All tables show estimated data.

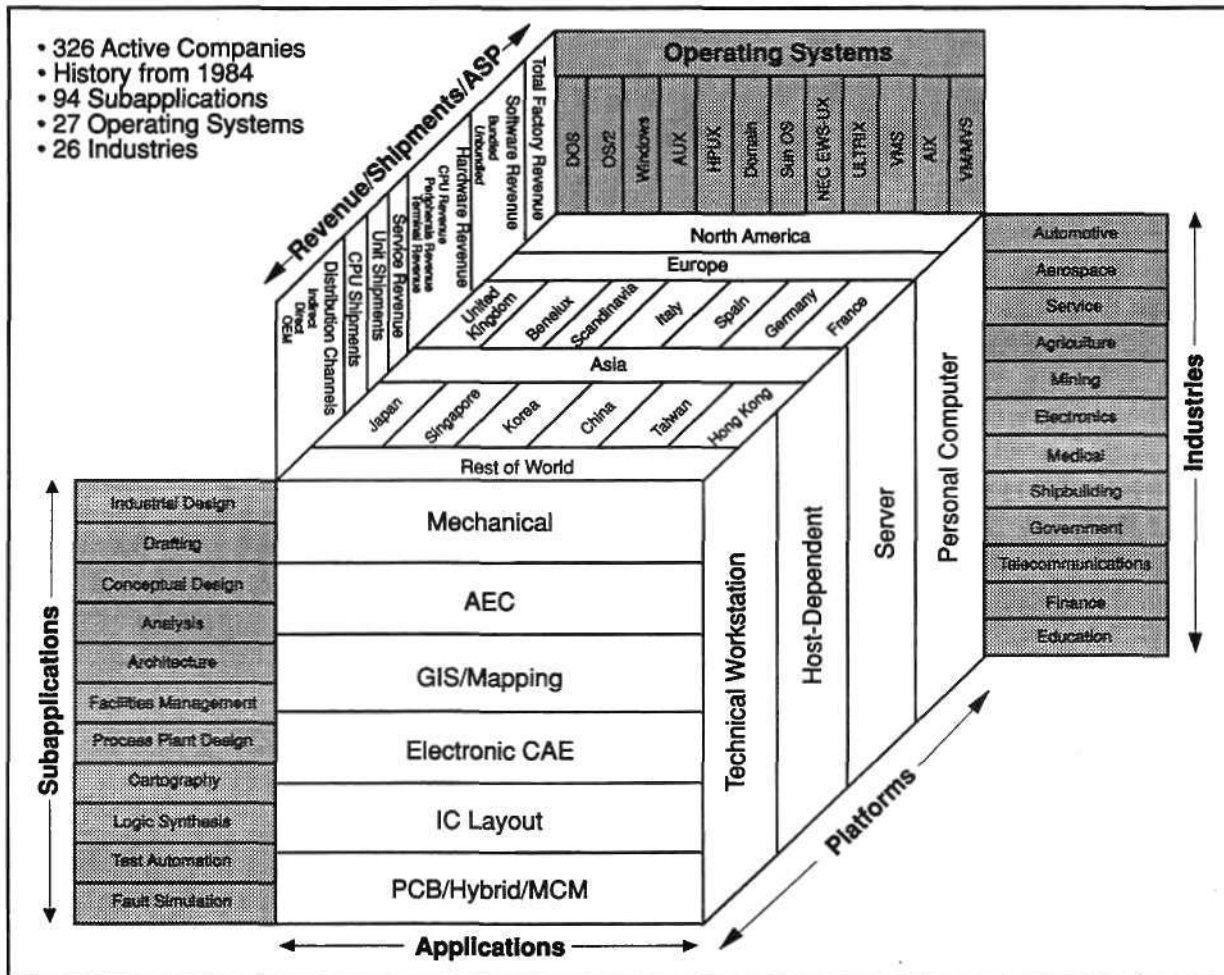
Personal CAD and Distribution Channels Worldwide Market Share Update

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 (July 1993)

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CAD/CAM/CAE/GIS Market Share Update

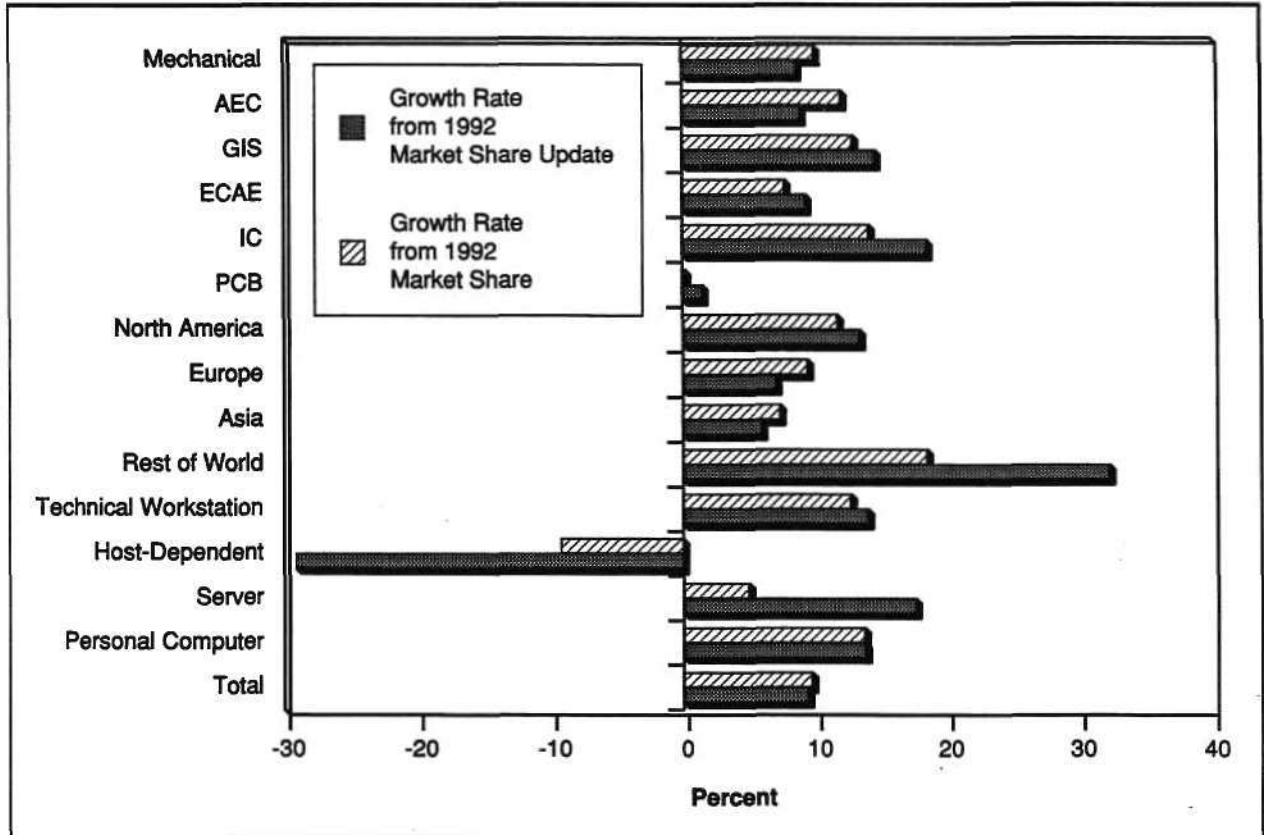
Software Market Grew 9.6 Percent in 1992, Revised Down from 9.7 Percent

Refinements of year-end figures leave the CAD/CAM/CAE/GIS markets essentially unchanged from our earlier market share data, with software revenue growth from 1991 to 1992 reduced to 9.6 percent from 9.7 percent and total factory revenue growth for the same period reduced to 4.0 percent from 4.2 percent. However, the stillness at this top level is deceptive. A look at the segment and company levels of the data and even at the database changes reveals some interesting shifts.

This market share update essentially revisits the companies in our database, seeking refinement of the previously reported market share data. Whereas much of the data from the initial survey came from vendor projections and early, year-end results, the update represents actual 1992 year-end results. From a global perspective, the results indicate that the optimists balanced the pessimists. The view from segments is a little more interesting.

Figure 2 provides a view of growth rates in software revenue by application, by region, and by platform, as well as the total market. In the area

Figure 2
1992 Software Revenue Growth: Market Share versus Market Share Update



Source: Dataquest (July 1993)

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of applications, geographic information system (GIS), electronic computer-aided engineering (ECAE), IC layout, and printed circuit board (PCB) were revised up while mechanical and AEC actually grew less than previously indicated, primarily because of overreporting of revenue for IBM in 1992 coupled with underreporting for 1991 in both areas. In the EDA arena, these revisions came about with more complete vendor input, readjusting some PCB revenue into ECAE and IC (see Table 1), and adding two companies to IC, two to ECAE, and deleting one from PCB, including past revenue.

Economic reality is confirmed by the regional picture with North America and Rest of World, previously reported with the greatest growth, now shown with greater growth, whereas Europe and Asia show less growth than our earlier view. From the view of platforms, the shift from host-dependent systems to client/server systems is occurring with greater speed than earlier indications.

Database Changes

Software

In viewing the actual market size for the above segments, looking at the earlier market share as compared with this updated version, the differences become considerable. We have continued to revise our company information with the best information available, even for past years. In addition to the growth rates changing as indicated above, the actual revenue figures have changed, as indicated in Table 1.

Expanded Definition for Service

In this survey, the service definition was expanded from hardware and software maintenance to now include:

- Hardware and software maintenance fees
- Training and education

Table 1
Comparison of 1991 and 1992 Software Revenue: Market Share versus Market Share Update

	1991 Software Revenue (\$M)			1992 Software Revenue (\$M)		
	Market Share	Market Share Update	% Change	Market Share	Market Share Update	% Change
Mechanical	2,033.0	2,117.0	4.1	2,235.3	2,299.1	2.9
AEC	666.1	680.2	2.1	746.1	740.8	-0.7
GIS/Mapping	555.8	545.3	-1.9	627.5	630.6	0.5
ECAE	691.2	699.8	1.2	744.1	765.8	2.9
IC	195.8	195.8	0	223.4	232.7	4.2
PCB/Hybrid/MCM	328.3	306.6	-6.6	329.1	311.4	-5.4
Total	4,470.2	4,544.4	1.7	4,905.5	4,980.3	1.5

Source: Dataquest (July 1993)

- Service bureau operators
- Application development
- Consulting
- Systems integration

In 1991, service revenue was \$2,408.6 million and was \$2,611.4 million in 1992. The resulting growth of 8.4 percent in service revenue reflects growth in service and our change in definition. This change had the largest impact on the IC layout market, and considerably added to the mechanical, ECAE, and PCB markets as well (see Table 2). In mechanical, SDRC was the big foot. The database was not revised backward to reflect this change. Forecasting, however, will now be expanded to include this area of growth.

Shift in Revenue Distribution

Reflecting this expansion of services definition and extreme pressure on hardware revenue is the redistribution of revenue by hardware, software, and services as shown in Table 3.

Table 2
1992 Service as a Percentage of Total Revenue: Market Share versus Market Share Update

	Market Share	Market Share Update	% Change
Mechanical	16.5	17.1	3.4
AEC	14.1	14.0	-0.7
GIS/Mapping	18.0	17.6	-2.2
ECAE	16.6	17.4	4.8
IC Layout	19.0	21.0	10.5
PCB/Hybrid/MCM	18.5	19.0	2.7

Source: Dataquest (July 1993)

Table 3
Change in Distribution of 1992 Revenue: Market Share versus Market Share Update

	Revenue (\$M)		% Distribution of Revenue	
	Market Share	Market Share Update	Market Share	Market Share Update
Hardware	8,093.8	7,765.5	52.0	50.5
Software	4,905.5	4,972.6	31.5	32.4
Services	2,578.0	2,624.2	16.5	17.1
Total	15,577.3	15,362.3		

Source: Dataquest (July 1993)

Company Changes

Table 4 provides a listing of the top 20 vendors and the changes in the total revenue figure from the market share previously reported. IBM revenue changes were made following the prior market share but before the subsequent forecasting. Intergraph's earlier reported revenue included document imaging and other graphics software, which does not belong in CAD/CAM. Digital previously did not report its hardware revenue, and neither did Autodesk with its software revenue, whereas SDRC now includes the expanded service.

Analysis of Workstation Distribution

In addition to these changes, the CAD/CAM/CAE/GIS group significantly refined its database model for workstations. Using two years of software revenue distribution by operating system, collected by a survey

Table 4
1992 Top 20 CAD/CAM/CAE/GIS Vendors Total Revenue: Market Share versus Market Share Update

	Total Revenue 1992 (\$M)		Revenue Change (\$M)	Final Market Share (%)	Share Difference (%)
	Market Share	Market Share Update			
IBM	1,861.2	1,756.9	-104.3	11.4	-0.5
Intergraph	1,171.7	1,126.6	-45.2	7.3	-0.2
Hewlett-Packard	922.4	919.9	-2.5	6.0	0.1
Digital	843.6	918.9	75.3	6.0	0.6
Sun Microsystems	876.8	869.5	-7.3	5.7	0.1
Computervision	781.7	777.3	-4.5	5.1	0.1
Fujitsu	442.0	442.0	0	2.9	0.1
Compaq	416.3	429.8	13.5	2.8	0.1
Cadence	425.6	425.4	-0.2	2.8	0.1
Autodesk	341.6	367.7	26.1	2.4	0.2
Mentor Graphics	350.8	349.4	-1.4	2.3	0
NEC	348.0	348.0	0	2.3	0.1
EDS-Unigraphics	302.9	310.1	7.2	2.0	0.1
Siemens Nixdorf Infosysteme	271.2	271.1	-0.1	1.8	0.1
Apple Computer	243.2	239.0	-4.2	1.6	0
Silicon Graphics	272.9	230.5	-42.4	1.5	-0.3
Nihon Unisys	228.3	228.3	0	1.5	0
Hitachi	174.0	174.0	0	1.1	0
Control Data	169.4	169.4	0	1.1	0
SDRC	123.3	149.8	26.5	1.0	0.2
Top 20 Companies	10,566.9	10,503.6	-63.3	68.3	0.5
All Companies	15,577.3	15,366.8	-210.5	100.0	0

Source: Dataquest (July 1993)

of software vendors, we can estimate the distribution of workstations by hardware vendor in the various application segments (see Table 5). This analysis resulted in realignment of workstation shipments of Hewlett-Packard, Sun, and Silicon Graphics to the distribution of software revenue. (Note that these unit sales are expanded to include units sold through OEMs. They, therefore, will not match the unit sales in the market share tables where OEM is deleted to prevent double counting.)

Company Additions and Deletions

Finally, we added nine new companies to our database with a collective total revenue of \$36.0 million for 1991; \$46.5 for 1992 (see Table 6). We deleted LPKF and Simulation Science: upon re-evaluation, we realized that both companies are related to, but not included in the CAD/CAM/CAE/GIS market. IGC was purchased by IMSI, which was not previously in our database, so IMSI was added to include IGC for 1991 and 1992. However, we have not incorporated other company name changes (such as Cadam to Altium) or acquisitions (such as Quad Design by Viewlogic) that have occurred during 1993.

Market Share Battles

An interesting view of the CAD/CAM/CAE/GIS market is at the level of market leaders in software revenue for each application. The tables that follow provide software revenue and share of market for 1991 and 1992 as they now appear in the database.

Mechanical

An army of well-equipped companies is on the march in the mechanical market, assaulting the two old guards, IBM and Computervision (see Table 7). IBM, showing decline in its mechanical software despite its partnerships with the market leaders, Dassault, SDRC, and CADAM, is struggling to survive the squeeze of moving from high-margin, host-dependent systems to the more competitive market of technical workstations and client/servers. With losses in its host dependent business as

Table 5
Unit Sales of Technical Workstations by Application Segment, by Top U.S. Vendors for 1992 (Including Units Sold through OEMs)

	Mechanical	AEC	GIS	ECAE	IC	PCB	Total	Share of Market
Sun Microsystems	27,567	3,804	6,607	16,586	7,709	7,624	69,897	40.3
Hewlett-Packard	17,370	3,871	1,581	7,039	2,321	4,054	36,236	20.9
Digital	8,965	1,762	2,327	1,196	855	1,499	16,604	9.6
Intergraph	2,421	4,980	5,698	516	45	422	14,082	8.1
Silicon Graphics	8,574	461	478	117	0	0	9,630	5.6
IBM	6,065	717	213	0	0	244	7,239	4.2
Total Worldwide Units	77,471	22,559	20,453	26,385	11,347	15,264	173,479	100.0
Distribution (%)	44.7	13.0	11.8	15.2	6.5	8.8	100.0	

Source: Dataquest (July 1993)

Table 6
Changes in CAD/CAM/CAE/GIS Vendors with Total Revenue for 1991 and 1992

	1991 Total Revenue (\$M)	1992 Total Revenue (\$M)	Application Segment
Additions:			
CAMAX Systems	7.3	9.2	Mechanical
Chronologic Simulation	1.0	1.5	ECAE
CrossCheck Technology	4.5	6.8	ECAE
Enghouse Systems	5.4	8.3	GIS/Mapping
High-Level Design System	1.5	2.5	IC Layout
IMSI	1.7	2.2	PC-Design
PCI Remote Sensing	5.0	6.0	GIS/Mapping
PiE Design	6.0	6.0	ECAE
Softronics	3.6	4.0	Spain-Design
Total	36.0	46.5	
Deletions:			
IGC	0.7	0.7	PC-Design
LPKF	15.0	14.1	PCB
Simulation Science	1.2	1.2	AEC
Total	16.9	16.0	
Gross Change	19.1	30.5	

Source: Dataquest (July 1993)

Table 7
Top 10 Mechanical Software Companies Worldwide

	1991 Software Revenue (\$M)	1991 Share of Market (%)	1992 Software Revenue (\$M)	1992 Share of Market (%)	Change in Software Revenue (%)
IBM	370.4	17.5	359.8	15.6	-2.9
Computervision	232.4	11.0	206.9	9.0	-11.0
Autodesk	108.3	5.1	147.1	6.4	35.9
Dassault*	133.5	6.3	146.9	6.4	10.0
SDRC	101.1	4.8	129.2	5.6	27.7
EDS-Unigraphics	80.7	3.8	107.7	4.7	33.4
CADAM*	66.3	3.1	88.7	3.9	33.8
Parametric Technology	43.4	2.0	81.2	3.5	87.2
Hewlett-Packard	64.0	3.0	72.1	3.1	12.7
MacNeal-Schwendler	53.4	2.5	64.7	2.8	21.1
Top 10 Companies	1,253.4	59.2	1404.2	61.1	12.0
All Companies	2,117.0	100.0	2,299.1	100.0	8.6

*Includes distributor and/or supplier revenue

Source: Dataquest (July 1993)

well as in Europe and Asia, IBM is outflanked by the hardy and nimble players in the workstation platform where there is real competition.

Computervision is heavily deployed in Europe where the dark cloud of recession continues to cast its gloom. This offshore presence has weakened the company on its home front, resulting in a decrease of 11 percent in software revenue, which is a loss in market share of 2 percentage points, a big loss for a big player. Despite the losses of these two market leaders, the eight attackers grew a collective 28.7 percent, gaining a whopping 5.7 percentage points in market share.

AEC

The AEC market is quite another story, with the market leaders, Autodesk and Intergraph, cementing their leadership by growing faster than the market, gaining a combined 2.6 percentage points share of market while three of the other eight top 10 competitors declined (see Table 8). The interesting part of this picture is right in the middle: two German companies, Nemetschek and IEZ, battling tooth-and-nail for leadership. The companies are growing in stark contrast to the economic climate of Europe's home front.

GIS/Mapping

The GIS market, with its amazing growth rate of 15.6 percent, is marked by a fight for the top. In 1991, Intergraph led ESRI in share of market by 5.5 percentage points, whereas in 1992 Intergraph's lead was reduced to 2.6 percentage points, giving ESRI a 2.9 percentage points annual gain on Intergraph (see Table 9). In the meantime, the remaining top 10 companies most grew at impressive rates, although much of GeoVision's growth resulted from acquisition during 1992.

Table 8
Top 10 AEC Software Companies Worldwide

	1991 Software Revenue (\$M)	1991 Share of Market (%)	1992 Software Revenue (\$M)	1992 Share of Market (%)	Change in Software Revenue (%)
Autodesk	128.2	18.9	158.1	21.3	23.3
Intergraph	100.4	14.8	111.0	15.0	10.6
IBM	40.5	6.0	41.5	5.6	2.6
Fujitsu	37.1	5.5	35.6	4.8	-3.9
Nemetschek	24.7	3.6	32.5	4.4	31.7
IEZ	19.8	2.9	32.1	4.3	62.2
Computervision	23.2	3.4	25.1	3.4	8.1
ISICAD	19.4	2.9	17.2	2.3	-11.6
NEC	16.8	2.5	11.7	1.6	-30.2
Dassault*	10.1	1.5	11.1	1.5	9.9
Top 10 Companies	420.1	61.8	476.0	64.3	13.3
All Companies	680.2	100.0	740.8	100.0	6.2

*Includes distributor and/or supplier revenue

Source: Dataquest (July 1993)

Table 9
Top 10 GIS Software Companies Worldwide

	1991 Software Revenue (\$M)	1991 Share of Market (%)	1992 Software Revenue (\$M)	1992 Share of Market (%)	Change in Software Revenue (%)
Intergraph	107.2	19.7	114.4	18.1	6.7
ESRI	77.6	14.2	98.0	15.5	26.3
Siemens Nixdorf Infosysteme	49.7	9.1	53.2	8.4	7.0
Autodesk	28.5	5.2	40.5	6.4	42.0
EDS-Unigraphics	17.0	3.1	24.1	3.8	41.5
Landmark Graphics	23.2	4.3	18.8	3.0	-19.0
GeoVision Systems	8.5	1.6	14.0	2.2	64.6
Moss Systems	9.7	1.8	14.0	2.2	43.9
Genasys II	9.7	1.8	13.0	2.1	34.2
Fujitsu	13.2	2.4	12.6	2.0	-3.9
Top 10 Companies	344.3	63.1	402.6	63.8	16.9
All Companies	545.3	100.0	630.6	100.0	15.6

Source: Dataquest (July 1993)

ECAE

The electronic computer-aided engineering (ECAE) market has been shaken up with mergers and acquisitions. Cadence merged with Valid and skipped over Mentor Graphics. Viewlogic bought Vantage, but was still passed by Synopsys. The European ECAE software market grew only 2.3 percent, providing a rough road for Racal-Redac. Wacom, with its emphasis on the personal computer platform in Japan, also had a rough year in this market (see Table 10).

IC Layout

The fastest-growing and smallest application segments have few players. The top 10 comprise almost 97 percent of the market, with Cadence continuing to dominate (see Table 11). The change in growth rates versus The PCB/hybrid/MCM layout market continues to stagnate, showing previous market share is because of changes reported by Cadence. Compass Design Automation appears to be a hard charger, driven by new library development tools.

PCB/Hybrid/MCM Layout

little growth in the past two years (see Table 12). This market is drawn along geographic lines: Zuken rules the Japanese market, whereas Racal-Redac's strength lies in Europe. Neither company has a strong presence in North America where Mentor Graphics and Cadence battle it out.

Market Analysis

The final view of all this activity is shown in Figure 3, which depicts the market size and market growth rate for each segment in the CAD/CAM/CAE/GIS software industry. In Figure 3, the heavy horizontal line

Table 10
Top 10 ECAE Software Companies Worldwide

	1991 Software Revenue (\$M)	1991 Share of Market (%)	1992 Software Revenue (\$M)	1992 Share of Market (%)	Change in Software Revenue (%)
Cadence (Valid)	154.2	22.0	165.6	21.6	7.3
Mentor Graphics	73.2	10.5	77.3	10.1	5.6
Synopsys	30.1	4.3	51.3	6.7	70.6
Viewlogic (Vantage)	36.2	4.4	46.7	6.1	29.0
Racal-Redac	28.5	4.1	27.2	3.6	-4.3
Wacom	25.5	3.6	23.3	3.0	-8.7
EEsof	18.1	2.6	22.1	2.9	22.2
Intergraph	17.5	2.5	20.9	2.7	19.4
Marubeni Hytech*	16.5	2.4	19.7	2.6	19.3
Autodesk	17.1	2.4	18.4	2.4	7.5
Top 10 Companies	411.6	58.8	472.5	61.7	14.8
All Companies	699.8	100.0	765.8	100.0	9.5

*Includes distributor and/or supplier revenue

Source: Dataquest (July 1993)

Table 11
Top 10 IC Layout Software Companies Worldwide

	1991 Software Revenue (\$M)	1991 Share of Market (%)	1992 Software Revenue (\$M)	1992 Share of Market (%)	Change in Software Revenue (%)
Cadence (Valid)	114.0	56.9	136.3	58.6	19.5
Mentor Graphics	33.7	16.8	31.5	13.5	-6.4
Compass Design	11.7	5.9	17.3	7.4	47.4
Seiko*	13.7	6.8	14.5	6.2	5.9
Sagantec	3.6	1.8	6.7	2.9	86.9
Silvar-Lisco	5.2	2.6	5.8	2.5	9.7
Cascade Design	3.0	1.5	4.7	2.0	55.9
Fujitsu	0	0	3.5	1.5	NA
Integrated Silicon Systems	2.5	1.2	3.0	1.3	21.0
Intergraph	1.6	0.8	1.9	0.8	22.2
Top 10 Companies	189.0	96.5	225.2	96.8	19.1
All Companies	195.8	100.0	232.7	100.0	18.8

*Includes distributor and/or supplier revenue

NA = Not applicable

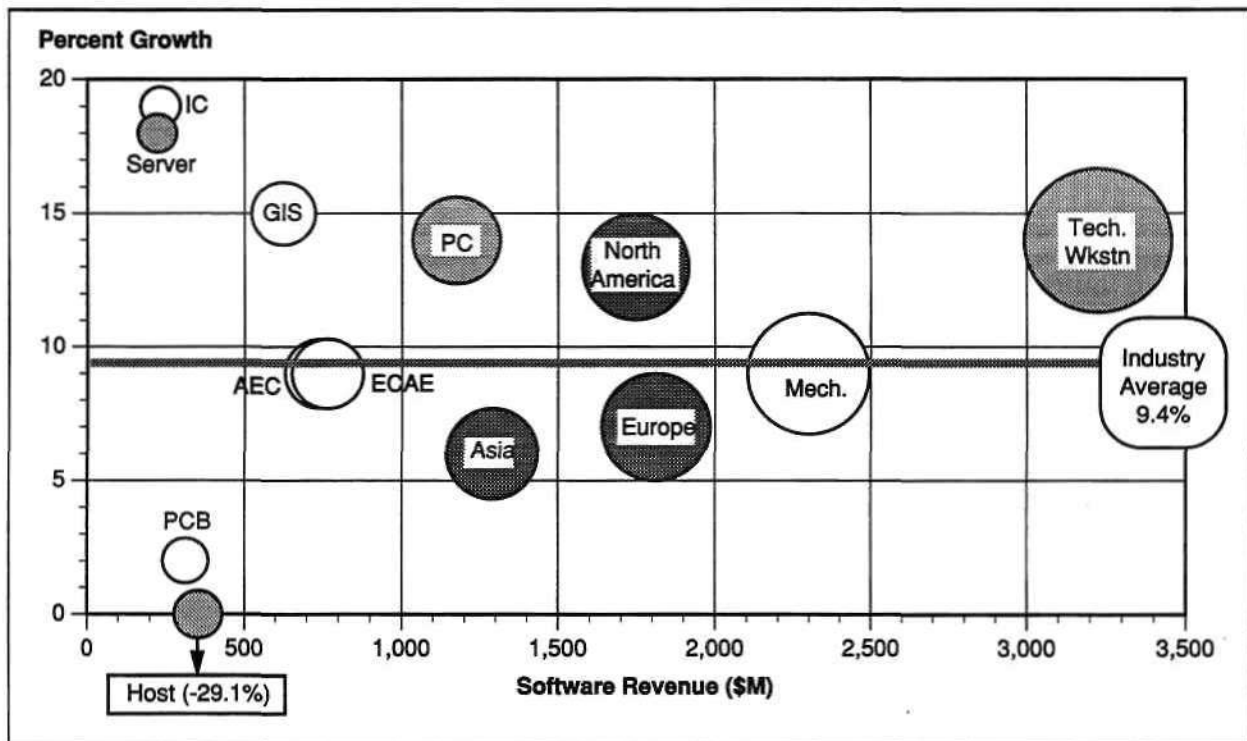
Source: Dataquest (July 1993)

Table 12
Top 10 PCB/Hybrid/MCM Software Companies Worldwide

	1991 Software Revenue (\$M)	1991 Share of Market (%)	1992 Software Revenue (\$M)	1992 Share of Market (%)	Change in Software Revenue (%)
Racal-Redac	42.1	13.7	46.3	14.9	10.0
Mentor Graphics	39.5	12.9	43.0	13.8	8.7
Zuken	46.9	15.3	41.6	13.4	-11.3
Cadence (Valid)	31.5	10.3	36.5	11.7	15.8
IBM	16.3	5.3	17.1	5.5	4.7
Intergraph	12.7	4.1	16.0	5.1	25.5
Harris EDA	13.9	4.5	12.2	3.9	-11.8
CADIX	11.3	3.7	11.8	3.8	4.0
Sharp*	15.0	4.9	9.6	3.1	-35.8
Fujitsu	8.4	2.7	8.1	2.6	-3.8
Top 10 Companies	237.6	77.5	242.0	77.7	1.9
All Companies	306.6	100.0	311.4	100.0	1.6

*Includes distributor and/or supplier revenue
 Source: Dataquest (July 1993)

Figure 3
CAD/CAM/CAE/GIS Market Portfolio for Software Revenue for 1992



Source: Dataquest (July 1993)

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indicates the industry average for software growth, the size of the bubbles reflects market share, and the bubbles are centered over their market size (y-axis) and market growth rate (x-axis) for 1992.

From this figure, the IC layout application segment and server platform are the two smallest and two fastest-growing segments. Workstations are the largest market segment with a higher than average growth rate of 14 percent. Notice that host-dependent platform segment is off the chart with a negative 29.1 percent growth rate.

Hardware Revenue Suffers

In contrast to the high growth rates of software, hardware took a beating with a total growth rate of negative 0.1 percent despite an increase of seats totaling 5.9 percent (see Table 13). The hardware market continues to be pressured by decreasing margins and increasing competitiveness. Host-dependent systems are being replaced by networked, desktop systems, and distinctions between workstations and PCs are becoming increasingly blurred.

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 Update* books:

- Source—All companies in database; overview of industry
- Mechanical Applications—All companies in database with mechanical revenue
- AEC Applications—All companies in database with AEC revenue
- GIS Applications—All companies in database with GIS revenue
- Electronic Design Automation Applications—All companies in database with EDA (electronic CAE, IC layout, PCB/hybrid/MCM) revenue

Table 13
Hardware Seats, Revenue, and Average Selling Price for 1991 and 1992

	1991 Seats	1992 Seats	Growth (%)	1991 Hardware Revenue (\$M)	1992 Hardware Revenue (\$M)	Growth (%)	1991 Average Selling Price (\$K)	1992 Average Selling Price (\$K)	Growth (%)
Workstation	150,748	173,489	15.1	3,670.6	3,967.9	8.1	24.3	22.9	-6.0
Host- Dependent	39,897	31,771	-20.4	1,854.6	1,529.8	-17.5	46.5	48.2	3.6
Server	14,830	16,301	9.9	531.0	573.8	8.1	35.8	35.2	-1.7
Personal Computer	412,406	432,848	5.0	1,718.7	1,705.4	-0.8	4.2	3.9	-5.5
Total	617,881	654,408	5.9	7,774.8	7,776.8	0	12.5	11.9	-4.8

Source: Dataquest (July 1993)

- Europe Overview—All Europe-based companies and all other companies with more than \$1 million in European revenue
- European Countries—All companies in the European overview that report revenue by European country: Benelux, France, Germany, Italy, Scandinavia, Spain, United Kingdom, and Rest of Europe (includes Austria, Switzerland, and Eastern Europe).
- Asia—All Asia-based companies and all other companies with more than \$1 million in Asian revenue
- Personal CAD and Distribution Channels—All companies in database with personal computer revenue

More detailed data on these markets may be requested through our client inquiry service.

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.

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.
- **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.
- **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).
- **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.
 - 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
- 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.

Table 14
1992 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
 Platform: Personal Computer
 Region: Worldwide
 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
Compaq	429.8	429.8	.0	93,060	14.3%	25.2%	.0%	21.5%
Autodesk	345.7	.0	345.7	0	11.5%	.0%	29.4%	.0%
IBM	318.0	193.2	106.9	57,740	10.6%	11.3%	9.1%	13.3%
Apple Computer	239.0	239.0	.0	50,007	7.9%	14.0%	.0%	11.6%
NEC	112.9	94.8	9.0	16,805	3.8%	5.6%	.8%	3.9%
Fujitsu	88.4	56.6	23.0	2,627	2.9%	3.3%	2.0%	.6%
Hewlett-Packard	75.3	67.8	.0	23,520	2.5%	4.0%	.0%	5.4%
Digital	44.4	39.4	.5	11,311	1.5%	2.3%	.0%	2.6%
Mutoh Industries—No OEM	40.0	24.0	12.0	809	1.3%	1.4%	1.0%	.2%
Wacom	38.9	7.8	26.8	748	1.3%	.5%	2.3%	.2%
Hakuto	37.9	22.8	15.2	827	1.3%	1.3%	1.3%	.2%
Dell Computer	34.6	34.6	.0	9,012	1.2%	2.0%	.0%	2.1%
Hitachi	31.3	15.0	13.2	1,656	1.0%	.9%	1.1%	.4%
Nemetschek	31.3	11.6	17.5	1,288	1.0%	.7%	1.5%	.3%
Intergraph	29.5	.0	29.5	0	1.0%	.0%	2.5%	.0%
Investronica SA	29.3	23.4	2.9	1,170	1.0%	1.4%	.2%	.3%
Toshiba—No OEM	27.1	13.5	10.8	2,165	.9%	.8%	.9%	.5%
Wiechers Datentechnik	20.3	5.1	9.5	722	.7%	.3%	.8%	.2%
Tebis	19.6	3.0	13.7	112	.7%	.2%	1.2%	.0%
Viewlogic Systems	17.9	.0	14.1	0	.6%	.0%	1.2%	.0%
CAD Distribution	16.9	8.4	6.7	261	.6%	.5%	.6%	.1%

(Continued)

Table 14 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
ESRI	16.3	.0	15.0	0	.5%	.0%	1.3%	.0%
Andor	15.7	3.9	11.1	121	.5%	.2%	.9%	.0%
Research Machines	15.6	15.6	.0	2,517	.5%	.9%	.0%	.6%
Ziegler Informatics	14.4	.0	14.4	0	.5%	.0%	1.2%	.0%
Soft-Tech Software Technologies	13.8	2.1	10.4	932	.5%	.1%	.9%	.2%
Altera	13.0	.0	11.1	0	.4%	.0%	.9%	.0%
Design Automation	12.7	2.5	9.5	267	.4%	.1%	.8%	.1%
Cimatron	12.0	5.4	5.4	569	.4%	.3%	.5%	.1%
Strategic Mapping	11.5	.0	10.4	0	.4%	.0%	.9%	.0%
ISICAD	11.3	.0	11.3	0	.4%	.0%	1.0%	.0%
CADKEY	11.2	.0	11.2	0	.4%	.0%	1.0%	.0%
Xilinx	11.2	.0	10.1	0	.4%	.0%	.9%	.0%
Swanson Analysis	11.0	.0	10.6	0	.4%	.0%	.9%	.0%
Orcad	10.9	.0	10.9	0	.4%	.0%	.9%	.0%
MapInfo	10.6	.0	8.5	0	.4%	.0%	.7%	.0%
CPU	10.5	.0	9.5	0	.3%	.0%	.8%	.0%
Microsim	10.1	.0	9.5	0	.3%	.0%	.8%	.0%
Racal-Redac	9.6	.0	9.2	0	.3%	.0%	.8%	.0%
Mitsubishi Electric	9.5	6.3	3.2	900	.3%	.4%	.3%	.2%
Point Control	9.0	.0	7.1	0	.3%	.0%	.6%	.0%
PADS Software	8.3	.0	7.1	0	.3%	.0%	.6%	.0%

(Continued)

Table 14 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Infocel	8.3	1.2	6.3	186	.3%	.1%	.5%	.0%
DAT Standard info systems	7.9	.0	7.5	0	.3%	.0%	.6%	.0%
Computervision	7.6	.0	7.6	169	.3%	.0%	.6%	.0%
ETAK	7.6	.4	7.3	18	.3%	.0%	.6%	.0%
Softdesk	7.6	.0	7.6	0	.3%	.0%	.6%	.0%
ACTEL	7.5	.0	6.5	0	.2%	.0%	.6%	.0%
Olivetti	7.3	6.2	.0	877	.2%	.4%	.0%	.2%
RoboCAD Solutions	7.3	.0	5.9	0	.2%	.0%	.5%	.0%
Data I/O	7.3	.0	7.3	0	.2%	.0%	.6%	.0%
Micrografx	7.3	.0	7.3	0	.2%	.0%	.6%	.0%
Enghouse Systems Ltd.	7.1	.0	6.2	0	.2%	.0%	.5%	.0%
Serbi	7.0	.7	6.3	200	.2%	.0%	.5%	.0%
Ground Modelling Systems	7.0	3.7	2.8	611	.2%	.2%	.2%	.1%
CNC Software	6.8	.0	6.8	0	.2%	.0%	.6%	.0%
Aucotec	6.8	2.7	2.7	437	.2%	.2%	.2%	.1%
Hochtief	6.8	1.0	4.8	84	.2%	.1%	.4%	.0%
ASG	6.5	.0	6.5	0	.2%	.0%	.6%	.0%
BATISOFT	6.3	.9	3.2	314	.2%	.1%	.3%	.1%
Moda CAD	6.3	1.5	4.4	52	.2%	.1%	.4%	.0%
Graphisoft Software Dev	6.2	.0	6.2	0	.2%	.0%	.5%	.0%
RIB/RZB	6.0	.5	4.9	41	.2%	.0%	.4%	.0%

(Continued)

Table 14 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
 Platform: Personal Computer
 Region: Worldwide
 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
Aspen Technology	5.8	.0	5.2	0	.2%	.0%	.4%	.0%
American Small Business Comp.	5.3	.0	5.3	0	.2%	.0%	.5%	.0%
Seiko Instruments—No OEM	5.3	2.6	2.6	136	.2%	.2%	.2%	.0%
mb Programme	5.1	2.5	1.8	122	.2%	.1%	.2%	.0%
ADRA Systems	5.0	.0	4.0	0	.2%	.0%	.3%	.0%
BETRONEX	4.8	.5	4.3	89	.2%	.0%	.4%	.0%
GeoQuest	4.8	.0	4.8	0	.2%	.0%	.4%	.0%
Microway	4.7	2.9	1.4	60	.2%	.2%	.1%	.0%
Algor Interactive Systems	4.7	.0	4.2	0	.2%	.0%	.4%	.0%
International Software Systems	4.7	.0	4.7	0	.2%	.0%	.4%	.0%
Claris	4.6	.0	4.6	0	.2%	.0%	.4%	.0%
Kloeckner-Moeller	4.5	.9	3.1	46	.1%	.1%	.3%	.0%
Computer Services Consultants	4.2	.0	4.2	0	.1%	.0%	.4%	.0%
Pathtrace	4.2	.9	2.7	62	.1%	.1%	.2%	.0%
MCS	4.1	.0	3.6	0	.1%	.0%	.3%	.0%
Softronics	4.0	1.1	3.0	361	.1%	.1%	.3%	.1%
EEsof	3.9	.0	3.3	0	.1%	.0%	.3%	.0%
Uchida Yoko	3.8	2.4	1.6	171	.1%	.1%	.1%	.0%
Anilam Electronics	3.7	.8	2.6	88	.1%	.0%	.2%	.0%
Innovative Data Design	3.7	.0	3.7	0	.1%	.0%	.3%	.0%
Mitsui Engineering	3.6	2.5	.7	60	.1%	.1%	.1%	.0%

(Continued)

Table 14 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Datagraphic	3.6	1.8	1.4	57	.1%	.1%	.1%	.0%
GeoGraphix	3.4	.0	2.5	0	.1%	.0%	.2%	.0%
Engineering Mechanics	3.3	.2	2.8	407	.1%	.0%	.2%	.1%
PacSoft	3.2	.0	3.2	0	.1%	.0%	.3%	.0%
Accel Technologies	3.2	.0	2.9	0	.1%	.0%	.2%	.0%
Vero International Software	3.1	.0	2.9	0	.1%	.0%	.2%	.0%
PCI Remote Sensing Corp	3.0	.0	3.0	0	.1%	.0%	.3%	.0%
Sweet's Electronic Publishing	3.0	.0	2.4	0	.1%	.0%	.2%	.0%
Whessoe Computing Systems	3.0	.0	3.0	0	.1%	.0%	.3%	.0%
CAD Lab	2.8	.0	2.5	0	.1%	.0%	.2%	.0%
Superdraft	2.8	1.3	1.4	160	.1%	.1%	.1%	.0%
Delcam International	2.7	1.0	1.1	59	.1%	.1%	.1%	.0%
Sigma Design	2.7	.0	2.5	0	.1%	.0%	.2%	.0%
ERDAS	2.6	.7	1.8	139	.1%	.0%	.1%	.0%
Generation 5 Technology	2.6	.0	2.6	0	.1%	.0%	.2%	.0%
CADWorks	2.6	.0	2.3	0	.1%	.0%	.2%	.0%
Harris EDA	2.6	.2	2.0	10	.1%	.0%	.2%	.0%
Foresight Resources	2.5	.0	2.3	0	.1%	.0%	.2%	.0%
Visionics	2.5	.0	2.4	10	.1%	.0%	.2%	.0%
ALS Design	2.4	.1	2.1	20	.1%	.0%	.2%	.0%
Facility Mapping Systems	2.3	.0	2.0	0	.1%	.0%	.2%	.0%

(Continued)

Table 14 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
 Platform: Personal Computer
 Region: Worldwide
 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
Neocad	2.3	.0	2.3	0	.1%	.0%	.2%	.0%
Elstree Computing	2.2	1.0	1.2	62	.1%	.1%	.1%	.0%
IMSI	2.2	.0	2.2	0	.1%	.0%	.2%	.0%
Accugraph	2.2	.1	1.8	10	.1%	.0%	.2%	.0%
Rasna Corporation	2.2	.0	2.0	0	.1%	.0%	.2%	.0%
CAD-UL	2.1	.0	2.1	0	.1%	.0%	.2%	.0%
Evolution Computing	2.1	.0	2.1	0	.1%	.0%	.2%	.0%
Carrier Corporation	2.0	.0	2.0	0	.1%	.0%	.2%	.0%
CAD-Capture	2.0	.4	.6	10	.1%	.0%	.1%	.0%
Kork Systems	2.0	.2	1.4	20	.1%	.0%	.1%	.0%
PAFEC	1.9	.0	1.9	0	.1%	.0%	.2%	.0%
Terra Sciences	1.9	.0	1.9	0	.1%	.0%	.2%	.0%
Genasys II	1.9	.2	1.3	46	.1%	.0%	.1%	.0%
Engineered Software	1.7	.0	1.7	0	.1%	.0%	.1%	.0%
Han Dataport	1.7	.5	.9	41	.1%	.0%	.1%	.0%
Massteck	1.6	.0	1.6	0	.1%	.0%	.1%	.0%
ALDEC	1.6	.0	1.4	0	.1%	.0%	.1%	.0%
Intera Tydac	1.6	.0	1.6	0	.1%	.0%	.1%	.0%
Integrated Computer Graphics	1.6	.6	.8	122	.1%	.0%	.1%	.0%
Radian Corporation	1.6	.0	.9	0	.1%	.0%	.1%	.0%

(Continued)

Table 14 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
CAMTEK	1.6	.3	1.0	118	.1%	.0%	.1%	.0%
Research Engineers—Civilsoft	1.5	.0	1.5	0	.1%	.0%	.1%	.0%
FEA	1.5	.4	.4	0	.1%	.0%	.0%	.0%
LandCadd	1.5	.0	1.4	0	.1%	.0%	.1%	.0%
Minc Software	1.5	.0	1.5	0	.0%	.0%	.1%	.0%
EME	1.5	.4	.7	41	.0%	.0%	.1%	.0%
Technische Computer Systeme	1.5	.3	1.2	42	.0%	.0%	.1%	.0%
ISDATA	1.4	.0	1.3	0	.0%	.0%	.1%	.0%
GRAPHSOFT	1.4	.0	1.4	0	.0%	.0%	.1%	.0%
ARKTEC	1.4	.1	1.2	32	.0%	.0%	.1%	.0%
Lamp Software	1.4	.3	1.1	76	.0%	.0%	.1%	.0%
Aries Technology	1.3	.0	1.2	0	.0%	.0%	.1%	.0%
Cimlinc	1.3	.0	.9	0	.0%	.0%	.1%	.0%
Engineering Systems Corp.	1.3	.0	1.3	0	.0%	.0%	.1%	.0%
Compact Software	1.3	.0	1.3	0	.0%	.0%	.1%	.0%
Applicon	1.3	.4	.5	40	.0%	.0%	.0%	.0%
Geometria GIS Systems House	1.3	.2	.4	15	.0%	.0%	.0%	.0%
Tanner Research	1.3	.0	1.1	0	.0%	.0%	.1%	.0%
Aucos elektronische Gerate	1.2	.4	.9	121	.0%	.0%	.1%	.0%
Mucke Software	1.1	.6	.4	27	.0%	.0%	.0%	.0%

(Continued)

Table 14 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
 Platform: Personal Computer
 Region: Worldwide
 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
Spectrum Software	1.1	.0	1.1	0	.0%	.0%	.1%	.0%
Mega CADD	1.1	.0	1.1	0	.0%	.0%	.1%	.0%
CAE-link	1.1	.0	1.1	0	.0%	.0%	.1%	.0%
Intrinsic	1.0	1.0	.0	10	.0%	.1%	.0%	.0%
Aura CAD/CAM Systems	1.0	.0	.9	0	.0%	.0%	.1%	.0%
Quicklogic	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
MacNeal-Schwendler	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
Areon	.9	.5	.2	6	.0%	.0%	.0%	.0%
Maptech	.9	.0	.9	0	.0%	.0%	.1%	.0%
Terr-Mar Resource Info Svs	.9	.2	.5	24	.0%	.0%	.0%	.0%
Contract Data Research	.9	.0	.6	0	.0%	.0%	.1%	.0%
CADSI	.8	.1	.6	14	.0%	.0%	.1%	.0%
A.I. Systems	.8	.0	.8	0	.0%	.0%	.1%	.0%
INS Engineering	.7	.4	.4	13	.0%	.0%	.0%	.0%
Integrated Silicon Systems	.7	.0	.6	8	.0%	.0%	.0%	.0%
debis Systemhaus	.7	.2	.4	13	.0%	.0%	.0%	.0%
Mc2 Engineering Software	.7	.0	.7	0	.0%	.0%	.1%	.0%
ECOM Associates	.7	.0	.7	4	.0%	.0%	.1%	.0%
Caroline Informatique	.7	.1	.3	10	.0%	.0%	.0%	.0%
Infinite Graphics	.6	.0	.6	0	.0%	.0%	.1%	.0%

(Continued)

Table 14 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
ASCAD/ASCAM	.6	.4	.2	14	.0%	.0%	.0%	.0%
Sharp System Products—No OEM	.6	.3	.3	17	.0%	.0%	.0%	.0%
Ashlar	.5	.0	.5	0	.0%	.0%	.0%	.0%
Bechtel Software	.5	.0	.5	0	.0%	.0%	.0%	.0%
Inca	.5	.5	.0	2	.0%	.0%	.0%	.0%
S.T.L.D. s.r.l.	.5	.0	.5	0	.0%	.0%	.0%	.0%
Phase Three Logic	.4	.0	.4	0	.0%	.0%	.0%	.0%
The CAD Group	.4	.0	.4	0	.0%	.0%	.0%	.0%
Logic Modeling Systems	.4	.0	.3	0	.0%	.0%	.0%	.0%
Geotrace Technologies	.3	.0	.3	0	.0%	.0%	.0%	.0%
GEOVISION Inc.	.3	.2	.1	38	.0%	.0%	.0%	.0%
Meta-Software	.3	.0	.2	0	.0%	.0%	.0%	.0%
SIMUCAD	.3	.0	.3	0	.0%	.0%	.0%	.0%
Catalpa	.2	.0	.1	10	.0%	.0%	.0%	.0%
Genrad	.2	.0	.2	9	.0%	.0%	.0%	.0%
Pacific Numerics	.2	.0	.2	0	.0%	.0%	.0%	.0%
Radan Computational	.2	.1	.1	6	.0%	.0%	.0%	.0%
Exemplar Logic	.0	.0	.0	0	.0%	.0%	.0%	.0%
Teradyne	.0	.0	.0	0	.0%	.0%	.0%	.0%
Electrical Eng. Software	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 14 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	338.4	328.5	12.8	147,632	11.3%	19.3%	1.1%	34.1%
All Companies	3,006.9	1,705.4	1,174.3	432,848	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2,228.2	1,335.7	832.9	393,538	74.1%	78.3%	70.9%	90.9%
All Asian-Based Companies	438.9	255.4	149.0	27,321	14.6%	15.0%	12.7%	6.3%
All European-Based Companies	339.9	114.3	192.4	11,988	11.3%	6.7%	16.4%	2.8%
All Hardware Companies	1,376.0	1,350.8	.0	395,596	45.8%	79.2%	.0%	91.4%
All Turnkey & SW Companies	1,630.9	354.6	1,174.3	37,251	54.2%	20.8%	100.0%	8.6%

Source: Dataquest (July 1993)

**Table 15
1992 CAD/CAM/CAE/GIS Market Share Update**

Application: Mechanical
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	165.3	67.6	88.7	19,976	13.0%	9.3%	18.5%	11.3%
Compaq	156.5	156.5	.0	33,874	12.3%	21.5%	.0%	19.1%
Autodesk	138.3	.0	138.3	0	10.9%	.0%	28.8%	.0%
Apple Computer	80.6	80.6	.0	16,378	6.4%	11.1%	.0%	9.2%
NEC	53.1	44.6	4.3	7,902	4.2%	6.1%	.9%	4.5%
Hewlett-Packard	42.1	37.9	.0	12,931	3.3%	5.2%	.0%	7.3%
Hakuto	37.9	22.8	15.2	827	3.0%	3.1%	3.2%	.5%
Fujitsu	36.2	23.2	9.4	1,077	2.9%	3.2%	2.0%	.6%
Mutoh Industries—No OEM	34.1	20.4	10.2	689	2.7%	2.8%	2.1%	.4%
Investronica SA	29.3	23.4	2.9	1,170	2.3%	3.2%	.6%	.7%
Digital	29.0	26.2	.0	7,502	2.3%	3.6%	.0%	4.2%
Toshiba—No OEM	24.5	12.3	9.8	1,961	1.9%	1.7%	2.0%	1.1%
Hitachi	23.5	11.3	9.9	1,242	1.9%	1.6%	2.1%	.7%
Wiechers Datentechnik	20.3	5.1	9.5	722	1.6%	.7%	2.0%	.4%
Tebis	19.6	3.0	13.7	112	1.5%	.4%	2.9%	.1%
Dell Computer	12.5	12.5	.0	3,244	1.0%	1.7%	.0%	1.8%
Cimatron	12.0	5.4	5.4	569	.9%	.7%	1.1%	.3%
Swanson Analysis	11.0	.0	10.6	0	.9%	.0%	2.2%	.0%
Andor	10.4	2.6	7.4	80	.8%	.4%	1.5%	.0%
Design Automation	10.2	2.0	7.6	214	.8%	.3%	1.6%	.1%
CAD Distribution	10.1	5.1	4.1	157	.8%	.7%	.8%	.1%

(Continued)

Table 15 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
 Platform: Personal Computer
 Region: Worldwide
 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
CADKEY	9.2	.0	9.2	0	.7%	.0%	1.9%	.0%
Point Control	9.0	.0	7.1	0	.7%	.0%	1.5%	.0%
Wacom	7.7	1.5	5.3	147	.6%	.2%	1.1%	.1%
Research Machines	7.5	7.5	.0	1,208	.6%	1.0%	.0%	.7%
CNC Software	6.8	.0	6.8	0	.5%	.0%	1.4%	.0%
DAT Standard info systems	6.7	.0	6.4	0	.5%	.0%	1.3%	.0%
Computervision	6.5	.0	6.5	136	.5%	.0%	1.3%	.1%
Ziegler Informatics	5.8	.0	5.8	0	.5%	.0%	1.2%	.0%
ADRA Systems	5.0	.0	4.0	0	.4%	.0%	.8%	.0%
Serbi	4.8	.5	4.3	136	.4%	.1%	.9%	.1%
Intergraph	4.7	.0	4.7	0	.4%	.0%	1.0%	.0%
Algor Interactive Systems	4.7	.0	4.2	0	.4%	.0%	.9%	.0%
Moda CAD	4.4	1.1	3.1	36	.3%	.1%	.6%	.0%
Pathtrace	4.2	.9	2.7	62	.3%	.1%	.6%	.0%
Mitsubishi Electric	4.1	2.7	1.4	387	.3%	.4%	.3%	.2%
MCS	4.1	.0	3.6	0	.3%	.0%	.8%	.0%
Olivetti	3.9	3.4	.0	475	.3%	.5%	.0%	.3%
Anilam Electronics	3.7	.8	2.6	88	.3%	.1%	.5%	.0%
Engineering Mechanics	3.3	.2	2.8	407	.3%	.0%	.6%	.2%
RoboCAD Solutions	3.2	.0	2.6	0	.3%	.0%	.5%	.0%
American Small Business Comp.	3.1	.0	3.1	0	.2%	.0%	.7%	.0%

(Continued)

Table 15 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Micrografx	3.1	.0	3.1	0	.2%	.0%	.7%	.0%
Vero International Software	3.1	.0	2.9	0	.2%	.0%	.6%	.0%
Whessoe Computing Systems	3.0	.0	3.0	0	.2%	.0%	.6%	.0%
CAD Lab	2.8	.0	2.5	0	.2%	.0%	.5%	.0%
Superdraft	2.8	1.3	1.4	160	.2%	.2%	.3%	.1%
Delcam International	2.7	1.0	1.1	59	.2%	.1%	.2%	.0%
Kloeckner-Moeller	2.7	.6	1.9	0	.2%	.1%	.4%	.0%
Claris	2.7	.0	2.7	0	.2%	.0%	.6%	.0%
ISICAD	2.6	.0	2.6	0	.2%	.0%	.5%	.0%
Softronics	2.3	.6	1.7	206	.2%	.1%	.4%	.1%
Rasna Corporation	2.2	.0	2.0	0	.2%	.0%	.4%	.0%
Mitsui Engineering	2.0	1.4	.4	34	.2%	.2%	.1%	.0%
PAFEC	1.9	.0	1.9	0	.2%	.0%	.4%	.0%
CAMTEK	1.6	.3	1.0	118	.1%	.0%	.2%	.1%
FEA	1.5	.4	.4	0	.1%	.0%	.1%	.0%
Aries Technology	1.3	.0	1.2	0	.1%	.0%	.3%	.0%
Applicon	1.3	.4	.5	40	.1%	.1%	.1%	.0%
Evolution Computing	1.2	.0	1.2	0	.1%	.0%	.3%	.0%
Cimline	1.2	.0	.8	0	.1%	.0%	.2%	.0%
Softdesk	1.1	.0	1.1	0	.1%	.0%	.2%	.0%
Foresight Resources	1.0	.0	.9	0	.1%	.0%	.2%	.0%

(Continued)

Table 15 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
 Platform: Personal Computer
 Region: Worldwide
 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
MacNeal-Schwendler	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Areon	.9	.5	.2	6	.1%	.1%	.0%	.0%
CADSI	.8	.1	.6	14	.1%	.0%	.1%	.0%
Han Dataport	.8	.2	.5	21	.1%	.0%	.1%	.0%
Innovative Data Design	.8	.0	.8	0	.1%	.0%	.2%	.0%
Aura CAD/CAM Systems	.7	.0	.6	0	.1%	.0%	.1%	.0%
A.I. Systems	.7	.0	.7	0	.1%	.0%	.1%	.0%
GRAPHSOFT	.7	.0	.7	0	.1%	.0%	.1%	.0%
Caroline Informatique	.7	.1	.3	10	.1%	.0%	.1%	.0%
CADWorks	.6	.0	.6	0	.1%	.0%	.1%	.0%
ASCAD/ASCAM	.6	.4	.2	14	.0%	.0%	.0%	.0%
Sharp System Products—No OEM	.6	.3	.3	17	.0%	.0%	.1%	.0%
CAD-Capture	.6	.1	.2	3	.0%	.0%	.0%	.0%
Engineering Systems Corp.	.5	.0	.5	0	.0%	.0%	.1%	.0%
Graphisoft Software Dev	.5	.0	.5	0	.0%	.0%	.1%	.0%
S.T.L.D. s.r.l.	.5	.0	.5	0	.0%	.0%	.1%	.0%
EME	.4	.1	.2	12	.0%	.0%	.0%	.0%
IMSI	.4	.0	.4	0	.0%	.0%	.1%	.0%
Ashlar	.4	.0	.4	0	.0%	.0%	.1%	.0%
debis Systemhaus	.4	.1	.2	6	.0%	.0%	.0%	.0%
Mc2 Engineering Software	.3	.0	.3	0	.0%	.0%	.1%	.0%

(Continued)

Table 15 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: Mechanical
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mega CADD	.2	.0	.2	0	.0%	.0%	.0%	.0%
Catalpa	.2	.0	.1	10	.0%	.0%	.0%	.0%
Uchida Yoko	.2	.1	.1	9	.0%	.0%	.0%	.0%
Radan Computational	.2	.0	.1	5	.0%	.0%	.0%	.0%
Engineered Software	.1	.0	.1	0	.0%	.0%	.0%	.0%
Accugraph	.1	.0	.1	0	.0%	.0%	.0%	.0%
Lamp Software	.1	.0	.1	4	.0%	.0%	.0%	.0%
Other Companies	141.3	138.4	2.8	62,916	11.1%	19.0%	.6%	35.5%
All Companies	1,268.0	727.2	480.6	177,373	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	861.8	521.3	318.1	157,453	68.0%	71.7%	66.2%	88.8%
All Asian-Based Companies	244.4	145.2	81.2	14,586	19.3%	20.0%	16.9%	8.2%
All European-Based Companies	161.7	60.7	81.3	5,333	12.8%	8.3%	16.9%	3.0%
All Hardware Companies	542.4	530.4	.0	158,503	42.8%	72.9%	.0%	89.4%
All Turnkey & SW Companies	725.6	196.8	480.6	18,870	57.2%	27.1%	100.0%	10.6%

Source: Dataquest (July 1993)

Table 16
1992 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
 Platform: Personal Computer
 Region: Worldwide
 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
Autodesk	148.6	.0	148.6	0	17.5%	.0%	43.0%	.0%
Compaq	103.2	103.2	.0	22,334	12.1%	21.5%	.0%	17.5%
Apple Computer	100.3	100.3	.0	21,223	11.8%	20.9%	.0%	16.6%
IBM	56.5	42.5	10.7	12,556	6.6%	8.9%	3.1%	9.8%
Nemetschek	31.3	11.6	17.5	1,288	3.7%	2.4%	5.1%	1.0%
NEC	30.6	25.7	2.5	4,560	3.6%	5.4%	.7%	3.6%
Fujitsu	27.4	17.5	7.1	815	3.2%	3.7%	2.1%	.6%
Intergraph	16.0	.0	16.0	0	1.9%	.0%	4.6%	.0%
Soft-Tech Software Technologies	13.8	2.1	10.4	932	1.6%	.4%	3.0%	.7%
Dell Computer	11.1	11.1	.0	2,884	1.3%	2.3%	.0%	2.3%
CPU	10.5	.0	9.5	0	1.2%	.0%	2.7%	.0%
Hewlett-Packard	9.7	8.7	.0	3,143	1.1%	1.8%	.0%	2.5%
ISICAD	8.7	.0	8.7	0	1.0%	.0%	2.5%	.0%
Hochtief	6.8	1.0	4.8	84	.8%	.2%	1.4%	.1%
ASG	6.5	.0	6.5	0	.8%	.0%	1.9%	.0%
BATISOFT	6.3	.9	3.2	314	.7%	.2%	.9%	.2%
Aspen Technology	5.8	.0	5.2	0	.7%	.0%	1.5%	.0%
Digital	5.7	5.1	.0	1,474	.7%	1.1%	.0%	1.2%
Graphisoft Software Dev	5.7	.0	5.7	0	.7%	.0%	1.6%	.0%
Seiko Instruments—No OEM	5.3	2.6	2.6	136	.6%	.6%	.8%	.1%

(Continued)

Table 16 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
mb Programme	5.1	2.5	1.8	122	.6%	.5%	.5%	.1%
Softdesk	5.0	.0	5.0	0	.6%	.0%	1.4%	.0%
CAD Distribution	4.7	2.4	1.9	73	.6%	.5%	.5%	.1%
Microway	4.7	2.9	1.4	60	.6%	.6%	.4%	.0%
International Software Systems	4.7	.0	4.7	0	.6%	.0%	1.4%	.0%
RIB/RZB	4.6	.4	3.8	32	.5%	.1%	1.1%	.0%
Andor	4.2	1.1	3.0	32	.5%	.2%	.9%	.0%
Computer Services Consultants	4.2	.0	4.2	0	.5%	.0%	1.2%	.0%
Micrografx	4.2	.0	4.2	0	.5%	.0%	1.2%	.0%
Research Machines	4.1	4.1	.0	654	.5%	.8%	.0%	.5%
Mutoh Industries—No OEM	3.9	2.3	1.2	79	.5%	.5%	.3%	.1%
RoboCAD Solutions	3.7	.0	3.0	0	.4%	.0%	.9%	.0%
Datagraphic	3.6	1.8	1.4	57	.4%	.4%	.4%	.0%
Hitachi	3.1	1.5	1.3	166	.4%	.3%	.4%	.1%
Sweet's Electronic Publishing	3.0	.0	2.4	0	.4%	.0%	.7%	.0%
Ground Modelling Systems	2.7	1.4	1.1	232	.3%	.3%	.3%	.2%
Toshiba—No OEM	2.6	1.3	1.0	204	.3%	.3%	.3%	.2%
Design Automation	2.5	.5	1.9	53	.3%	.1%	.6%	.0%
Innovative Data Design	2.5	.0	2.5	0	.3%	.0%	.7%	.0%
Sigma Design	2.5	.0	2.4	0	.3%	.0%	.7%	.0%

(Continued)

Table 16 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
 Platform: Personal Computer
 Region: Worldwide
 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
Olivetti	2.3	2.0	.0	281	.3%	.4%	.0%	.2%
Elstree Computing	2.2	1.0	1.2	62	.3%	.2%	.4%	.0%
CADKEY	2.1	.0	2.1	0	.2%	.0%	.6%	.0%
Carrier Corporation	2.0	.0	2.0	0	.2%	.0%	.6%	.0%
Ziegler Informatics	2.0	.0	2.0	0	.2%	.0%	.6%	.0%
Accugraph	2.0	.1	1.7	10	.2%	.0%	.5%	.0%
Claris	1.9	.0	1.9	0	.2%	.0%	.6%	.0%
CADWorks	1.9	.0	1.7	0	.2%	.0%	.5%	.0%
Moda CAD	1.9	.5	1.3	16	.2%	.1%	.4%	.0%
IMSI	1.8	.0	1.8	0	.2%	.0%	.5%	.0%
Engineered Software	1.6	.0	1.6	0	.2%	.0%	.5%	.0%
Integrated Computer Graphics	1.6	.6	.8	122	.2%	.1%	.2%	.1%
Research Engineers—Civilsoft	1.5	.0	1.5	0	.2%	.0%	.4%	.0%
American Small Business Comp.	1.4	.0	1.4	0	.2%	.0%	.4%	.0%
Mitsubishi Electric	1.4	.9	.5	135	.2%	.2%	.1%	.1%
ARKTEC	1.4	.1	1.2	32	.2%	.0%	.4%	.0%
Lamp Software	1.2	.2	1.0	68	.1%	.1%	.3%	.1%
Computervision	1.2	.0	1.2	34	.1%	.0%	.3%	.0%
Mucke Software	1.1	.6	.4	27	.1%	.1%	.1%	.0%
Serbi	1.1	.1	1.0	32	.1%	.0%	.3%	.0%

(Continued)

Table 16 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Softronics	1.1	.3	.8	101	.1%	.1%	.2%	.1%
CAE-link	1.1	.0	1.1	0	.1%	.0%	.3%	.0%
Foresight Resources	1.0	.0	.9	0	.1%	.0%	.3%	.0%
Evolution Computing:	.9	.0	.9	0	.1%	.0%	.2%	.0%
Han Dataport	.8	.2	.5	21	.1%	.0%	.1%	.0%
Mega CADD	.8	.0	.8	0	.1%	.0%	.2%	.0%
GRAPHISOFT	.8	.0	.8	0	.1%	.0%	.2%	.0%
CAD-Capture	.7	.2	.2	4	.1%	.0%	.1%	.0%
INS Engineering	.7	.4	.4	13	.1%	.1%	.1%	.0%
ECOM Associates	.7	.0	.7	4	.1%	.0%	.2%	.0%
Uchida Yoko	.5	.3	.2	24	.1%	.1%	.1%	.0%
Bechtel Software	.5	.0	.5	0	.1%	.0%	.2%	.0%
DAT Standard info ssystemes	.4	.0	.4	0	.0%	.0%	.1%	.0%
Engineering Systems Corp.	.4	.0	.4	0	.0%	.0%	.1%	.0%
Mc2 Engineering Software	.4	.0	.4	0	.0%	.0%	.1%	.0%
Aura CAD/CAM Systems	.3	.0	.3	0	.0%	.0%	.1%	.0%
Ashlar	.2	.0	.2	0	.0%	.0%	.1%	.0%
Mitsui Engineering	.2	.1	.0	3	.0%	.0%	.0%	.0%
ERDAS	.1	.0	.1	6	.0%	.0%	.0%	.0%
A.I. Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%

(Continued)

Table 16 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: AEC
 Platform: Personal Computer
 Region: Worldwide
 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
Radan Computational	.0	.0	.0	1	.0%	.0%	.0%	.0%
Other Companies	120.7	117.1	3.0	53,174	14.2%	24.4%	.9%	41.6%
All Companies	851.5	479.2	345.9	127,674	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	640.2	389.0	244.3	116,967	75.2%	81.2%	70.6%	91.6%
All Asian-Based Companies	93.0	54.3	31.2	6,219	10.9%	11.3%	9.0%	4.9%
All European-Based Companies	118.3	35.9	70.5	4,489	13.9%	7.5%	20.4%	3.5%
All Hardware Companies	398.5	393.9	.0	117,711	46.8%	82.2%	.0%	92.2%
All Turnkey & SW Companies	453.0	85.3	345.9	9,963	53.2%	17.8%	100.0%	7.8%

Source: Dataquest (July 1993)

Table 17
1992 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share		
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	60.6	60.6	.0	29.9%	.0%	24.2%
Autodesk	38.0	.0	38.0	.0%	25.8%	.0%
Apple Computer	35.6	35.6	.0	17.6%	.0%	14.5%
IBM	32.9	30.9	.0	15.3%	.0%	17.4%
ESRI	16.3	.0	15.0	.0%	10.2%	.0%
Strategic Mapping	11.5	.0	10.4	.0%	7.0%	.0%
MapInfo	10.6	.0	8.5	.0%	5.7%	.0%
Fujitsu	9.7	6.2	2.5	3.1%	1.7%	.5%
Infocel	8.3	1.2	6.3	.6%	4.3%	.3%
Intergraph	8.2	.0	8.2	.0%	5.5%	.0%
ETAK	7.6	.4	7.3	.2%	4.9%	.0%
Digital	7.5	6.8	.0	3.4%	.0%	3.6%
Enghouse Systems Ltd.	7.1	.0	6.2	.0%	4.2%	.0%
Hewlett-Packard	5.0	4.5	.0	2.2%	.0%	2.9%
Dell Computer	4.8	4.8	.0	2.4%	.0%	2.3%
GeoQuest	4.8	.0	4.8	.0%	3.3%	.0%
Ground Modelling Systems	4.3	2.3	1.7	1.1%	1.2%	.7%
Mitsubishi Electric	4.0	2.6	1.4	1.3%	.9%	.7%
GeoGraphix	3.4	.0	2.5	.0%	1.7%	.0%
PacSoft	3.2	.0	3.2	.0%	2.2%	.0%

(Continued)

**Table 17 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update**

Application: GIS/Mapping
 Platform: Personal Computer
 Region: Worldwide
 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
Hitachi	3.1	1.5	1.3	166	.9%	.7%	.9%	.3%
PCI Remote Sensing Corp	3.0	.0	3.0	0	.8%	.0%	2.0%	.0%
Generation 5 Technology	2.6	.0	2.6	0	.7%	.0%	1.8%	.0%
ERDAS	2.5	.7	1.7	133	.7%	.3%	1.1%	.2%
Facility Mapping Systems	2.3	.0	2.0	0	.6%	.0%	1.4%	.0%
Uchida Yoko	2.2	1.4	.9	99	.6%	.7%	.6%	.2%
Mutoh Industries—No OEM	2.0	1.2	.6	41	.6%	.6%	.4%	.1%
Kork Systems	2.0	.2	1.4	20	.5%	.1%	1.0%	.0%
Terra Sciences	1.9	.0	1.9	0	.5%	.0%	1.3%	.0%
Genasys II	1.9	.2	1.3	46	.5%	.1%	.9%	.1%
Ziegler Informatics	1.7	.0	1.7	0	.5%	.0%	1.2%	.0%
Intera Tydac	1.6	.0	1.6	0	.4%	.0%	1.1%	.0%
Radian Corporation	1.6	.0	.9	0	.4%	.0%	.6%	.0%
LandCadd	1.5	.0	1.4	0	.4%	.0%	1.0%	.0%
Softdesk	1.5	.0	1.5	0	.4%	.0%	1.0%	.0%
Mitsui Engineering	1.4	1.0	.3	23	.4%	.5%	.2%	.0%
RIB/RZB	1.3	.1	1.1	9	.4%	.1%	.7%	.0%
Geometria GIS Systems House	1.3	.2	.4	15	.3%	.1%	.3%	.0%
Research Machines	1.1	1.1	.0	176	.3%	.5%	.0%	.3%
Maptech	.9	.0	.9	0	.3%	.0%	.6%	.0%

(Continued)

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July 26, 1993

**Table 17 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update**

Application: GIS/Mapping
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Terr-Mar Resource Info Svcs	.9	.2	.5	24	.3%	.1%	.3%	.0%
Contract Data Research	.9	.0	.6	0	.2%	.0%	.4%	.0%
Olivetti	.9	.7	.0	103	.2%	.4%	.0%	.2%
CAD-Capture	.7	.2	.2	4	.2%	.1%	.1%	.0%
NEC	.7	.6	.1	104	.2%	.3%	.0%	.2%
Andor	.6	.2	.4	5	.2%	.1%	.3%	.0%
EME	.5	.1	.2	14	.1%	.1%	.2%	.0%
Softronics	.4	.1	.3	36	.1%	.1%	.2%	.1%
RoboCAD Solutions	.4	.0	.3	0	.1%	.0%	.2%	.0%
Geotrace Technologies	.3	.0	.3	0	.1%	.0%	.2%	.0%
CAD Distribution	.3	.1	.1	5	.1%	.1%	.1%	.0%
GEOVISION Inc.	.3	.2	.1	38	.1%	.1%	.0%	.1%
Engineering Systems Corp.	.3	.0	.3	0	.1%	.0%	.2%	.0%
American Small Business Comp.	.2	.0	.2	0	.0%	.0%	.1%	.0%
Sigma Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
Accugraph	.1	.0	.1	0	.0%	.0%	.0%	.0%
Foresight Resources	.1	.0	.1	0	.0%	.0%	.0%	.0%
Lamp Software	.1	.0	.1	4	.0%	.0%	.0%	.0%

(Continued)

Table 17 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: GIS/Mapping
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
A.I. Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%
Other Companies	37.6	36.8	.8	16,687	10.3%	18.2%	.6%	30.8%
All Companies	366.3	202.6	147.5	54,140	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	328.4	183.0	133.1	52,285	89.7%	90.3%	90.2%	96.6%
All Asian-Based Companies	23.8	14.7	7.5	1,105	6.5%	7.2%	5.1%	2.0%
All European-Based Companies	14.1	5.0	6.9	751	3.8%	2.5%	4.7%	1.4%
All Hardware Companies	185.0	181.7	.0	52,098	50.5%	89.7%	.0%	96.2%
All Turnkey & SW Companies	181.3	20.9	147.5	2,042	49.5%	10.3%	100.0%	3.8%

Source: Dataquest (July 1993)

Table 18
1992 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Worldwide
 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
Compaq	109.6	109.6	.0	23,730	21.0%	37.0%	.0%	32.2%
IBM	63.4	52.2	7.5	15,790	12.2%	17.6%	3.7%	21.4%
Wacom	31.2	6.2	21.6	601	6.0%	2.1%	10.8%	.8%
NEC	28.5	23.9	2.3	4,239	5.5%	8.1%	1.1%	5.8%
Apple Computer	22.5	22.5	.0	4,576	4.3%	7.6%	.0%	6.2%
Autodesk	20.7	.0	20.7	0	4.0%	.0%	10.4%	.0%
Hewlett-Packard	18.6	16.8	.0	5,884	3.6%	5.7%	.0%	8.0%
Viewlogic Systems	17.9	.0	14.1	0	3.4%	.0%	7.1%	.0%
Fujitsu	15.0	9.6	3.9	447	2.9%	3.2%	2.0%	.6%
Altera	13.0	.0	11.1	0	2.5%	.0%	5.5%	.0%
Xilinx	11.2	.0	10.1	0	2.1%	.0%	5.0%	.0%
Orcad	10.9	.0	10.9	0	2.1%	.0%	5.4%	.0%
Microsim	10.1	.0	9.5	0	1.9%	.0%	4.7%	.0%
Racal-Redac	9.6	.0	9.2	0	1.8%	.0%	4.6%	.0%
PADS Software	8.3	.0	7.1	0	1.6%	.0%	3.5%	.0%
ACTEL	7.5	.0	6.5	0	1.4%	.0%	3.2%	.0%
Data I/O	7.3	.0	7.3	0	1.4%	.0%	3.6%	.0%
Aurotec	6.8	2.7	2.7	437	1.3%	.9%	1.4%	.6%
Dell Computer	6.2	6.2	.0	1,622	1.2%	2.1%	.0%	2.2%
Ziegler Informatics	4.9	.0	4.9	0	.9%	.0%	2.5%	.0%
BETRONEX	4.8	.5	4.3	89	.9%	.2%	2.1%	.1%

(Continued)

**Table 18 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update**

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
EEsof	3.9	.0	3.3	0	.8%	.0%	1.7%	.0%
Accel Technologies	3.2	.0	2.9	0	.6%	.0%	1.4%	.0%
Research Machines	3.0	3.0	.0	478	.6%	1.0%	.0%	.6%
Harris EDA	2.6	.2	2.0	10	.5%	.1%	1.0%	.0%
Visionics	2.5	.0	2.4	10	.5%	.0%	1.2%	.0%
ALS Design	2.4	.1	2.1	20	.5%	.0%	1.1%	.0%
Neocad	2.3	.0	2.3	0	.4%	.0%	1.1%	.0%
Digital	2.2	1.4	.5	390	.4%	.5%	.2%	.5%
CAD-UL	2.1	.0	2.1	0	.4%	.0%	1.1%	.0%
Kloeckner-Moeller	1.8	.3	1.2	46	.3%	.1%	.6%	.1%
CAD Distribution	1.7	.8	.7	26	.3%	.3%	.3%	.0%
Massteck	1.6	.0	1.6	0	.3%	.0%	.8%	.0%
ALDEC	1.6	.0	1.4	0	.3%	.0%	.7%	.0%
Hitachi	1.6	.8	.7	83	.3%	.3%	.3%	.1%
Minc Software	1.5	.0	1.5	0	.3%	.0%	.7%	.0%
Technische Computer Systeme	1.5	.3	1.2	42	.3%	.1%	.6%	.1%
ISDATA	1.4	.0	1.3	0	.3%	.0%	.6%	.0%
Compact Software	1.3	.0	1.3	0	.2%	.0%	.6%	.0%
Tanner Research	1.3	.0	1.1	0	.2%	.0%	.6%	.0%
Aucos elektronische Gerate	1.2	.4	.9	121	.2%	.1%	.4%	.2%
Spectrum Software	1.1	.0	1.1	0	.2%	.0%	.6%	.0%

(Continued)

Table 18 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Worldwide
 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
Serbi	1.1	.1	1.0	32	.2%	.0%	.5%	.0%
Intrinsix	1.0	1.0	.0	10	.2%	.4%	.0%	.0%
Quicklogic	1.0	.0	1.0	0	.2%	.0%	.5%	.0%
Uchida Yoko	.9	.6	.4	39	.2%	.2%	.2%	.1%
DAT Standard info systemes	.8	.0	.7	0	.2%	.0%	.4%	.0%
Integrated Silicon Systems	.7	.0	.6	8	.1%	.0%	.3%	.0%
Infinite Graphics	.6	.0	.6	0	.1%	.0%	.3%	.0%
American Small Business Comp.	.6	.0	.6	0	.1%	.0%	.3%	.0%
Intergraph	.6	.0	.6	0	.1%	.0%	.3%	.0%
EME	.5	.1	.2	14	.1%	.0%	.1%	.0%
Inca	.5	.5	.0	2	.1%	.2%	.0%	.0%
Andor	.5	.1	.3	3	.1%	.0%	.2%	.0%
Phase Three Logic	.4	.0	.4	0	.1%	.0%	.2%	.0%
The CAD Group	.4	.0	.4	0	.1%	.0%	.2%	.0%
Foresight Resources	.4	.0	.3	0	.1%	.0%	.2%	.0%
Logic Modeling Systems	.4	.0	.3	0	.1%	.0%	.1%	.0%
debis Systemhaus	.4	.1	.2	6	.1%	.0%	.1%	.0%
Meta-Software	.3	.0	.2	0	.1%	.0%	.1%	.0%
SIMUCAD	.3	.0	.3	0	.1%	.0%	.1%	.0%
Innovative Data Design	.2	.0	.2	0	.0%	.0%	.1%	.0%
Genrad	.2	.0	.2	9	.0%	.0%	.1%	.0%

(Continued)

Table 18 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Worldwide
 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
Pacific Numerics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Softronics	.2	.1	.2	18	.0%	.0%	.1%	.0%
Olivetti	.2	.1	.0	19	.0%	.0%	.0%	.0%
Cimline	.1	.0	.1	0	.0%	.0%	.0%	.0%
Engineering Systems Corp.	.1	.0	.1	0	.0%	.0%	.1%	.0%
Exemplar Logic	.0	.0	.0	0	.0%	.0%	.0%	.0%
Teradyne	.0	.0	.0	0	.0%	.0%	.0%	.0%
Electrical Eng. Software	.0	.0	.0	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	38.8	36.3	6.1	14,855	7.5%	12.2%	3.0%	20.2%
All Companies	521.1	296.4	200.3	73,660	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	397.7	242.5	137.5	66,834	76.3%	81.8%	68.6%	90.7%
All Asian-Based Companies	77.6	41.2	29.1	5,412	14.9%	13.9%	14.5%	7.3%
All European-Based Companies	45.8	12.7	33.8	1,415	8.8%	4.3%	16.9%	1.9%
All Hardware Companies	250.1	244.8	.0	67,285	48.0%	82.6%	.0%	91.3%
All Turnkey & SW Companies	271.0	51.6	200.3	6,376	52.0%	17.4%	100.0%	8.7%

Source: Dataquest (July 1993)

Table 19
1992 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share			Market Share		
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Hardware Units Shipped
Compaq	86.0	86.0	.0	39.3%	22.0%	39.3%	.0%	18,612	33.4%
IBM	49.3	46.4	.0	21.2%	12.7%	21.2%	.0%	14,078	25.2%
Wacom	31.2	6.2	21.6	2.9%	8.0%	2.9%	14.5%	601	1.1%
Viewlogic Systems	17.9	.0	14.1	.0%	4.6%	.0%	9.5%	0	.0%
Autodesk	17.3	.0	17.3	.0%	4.4%	.0%	11.6%	0	.0%
NEC	16.3	13.7	1.3	6.3%	4.2%	6.3%	9%	2,425	4.3%
Apple Computer	14.2	14.3	.0	6.5%	3.6%	6.5%	.0%	2,890	5.2%
Altera	13.0	.0	11.1	.0%	3.3%	.0%	7.4%	0	.0%
Hewlett-Packard	11.7	10.5	.0	4.8%	3.0%	4.8%	.0%	3,699	6.6%
Xilinx	11.2	.0	10.1	.0%	2.9%	.0%	6.8%	0	.0%
Microsim	10.1	.0	9.5	.0%	2.6%	.0%	6.3%	0	.0%
Orcad	7.7	.0	7.7	.0%	2.0%	.0%	5.1%	0	.0%
ACTEL	7.5	.0	6.5	.0%	1.9%	.0%	4.4%	0	.0%
Data I/O	7.3	.0	7.3	.0%	1.9%	.0%	4.9%	0	.0%
Aucotec	6.8	2.7	2.7	1.2%	1.7%	1.2%	1.8%	437	.8%
Fujitsu	6.2	4.0	1.6	1.8%	1.6%	1.8%	1.1%	184	.3%
Dell Computer	4.9	4.9	.0	2.2%	1.2%	2.2%	.0%	1,262	2.3%
EEsof	3.9	.0	3.3	.0%	1.0%	.0%	2.2%	0	.0%
Racal-Redac	3.7	.0	3.6	.0%	.9%	.0%	2.4%	0	.0%
Ziegler Informatica	2.9	.0	2.9	.0%	.7%	.0%	1.9%	0	.0%
Harris EDA	2.6	.2	2.0	.1%	.7%	.1%	1.3%	10	.0%

(Continued)

Table 19 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
 Platform: Personal Computer
 Region: Worldwide
 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
Neocad	2.3	.0	2.3	0	.6%	.0%	1.5%	.0%
Digital	1.9	1.4	.3	390	.5%	.6%	.2%	.7%
Kloekner-Moeller	1.8	.3	1.2	46	.5%	.2%	.8%	.1%
ALS Design	1.8	.1	1.6	15	.5%	.0%	1.1%	.0%
Research Machines	1.7	1.7	.0	277	.4%	.8%	.0%	.5%
CAD Distribution	1.7	.8	.7	26	.4%	.4%	.4%	.0%
ALDEC	1.6	.0	1.4	0	.4%	.0%	.9%	.0%
Minc Software	1.5	.0	1.5	0	.4%	.0%	1.0%	.0%
Technische Computer Systeme	1.5	.3	1.2	42	.4%	.1%	.8%	.1%
ISDATA	1.4	.0	1.3	0	.4%	.0%	.9%	.0%
Aucos elektronische Gerate	1.2	.4	.9	121	.3%	.2%	.6%	.2%
Spectrum Software	1.1	.0	1.1	0	.3%	.0%	.8%	.0%
Serbi	1.1	.1	1.0	32	.3%	.1%	.7%	.1%
Compact Software	1.0	.0	1.0	0	.3%	.0%	.7%	.0%
Intrinsic	1.0	1.0	.0	10	.3%	.5%	.0%	.0%
Quicklogic	1.0	.0	1.0	0	.3%	.0%	.7%	.0%
PADS Software	.9	.0	.7	0	.2%	.0%	.5%	.0%
DAT Standard info ssystemes	.8	.0	.7	0	.2%	.0%	.5%	.0%
Visionics	.7	.0	.6	3	.2%	.0%	.4%	.0%
Accel Technologies	.6	.0	.5	0	.1%	.0%	.3%	.0%

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**Table 19 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update**

Application: Electronic CAE
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Inca	.5	.5	.0	2	.1%	.2%	.0%	.0%
Phase Three Logic	.4	.0	.4	0	.1%	.0%	.3%	.0%
The CAD Group	.4	.0	.4	0	.1%	.0%	.3%	.0%
Tanner Research	.4	.0	.3	0	.1%	.0%	.2%	.0%
American Small Business Comp.	.4	.0	.4	0	.1%	.0%	.2%	.0%
Logic Modeling Systems	.4	.0	.3	0	.1%	.0%	.2%	.0%
debis Systemhaus	.4	.1	.2	6	.1%	.0%	.1%	.0%
Meta-Software	.3	.0	.2	0	.1%	.0%	.1%	.0%
Foresight Resources	.3	.0	.3	0	.1%	.0%	.2%	.0%
Intergraph	.3	.0	.3	0	.1%	.0%	.2%	.0%
SIMUCAD	.3	.0	.3	0	.1%	.0%	.2%	.0%
Infinite Graphics	.2	.0	.2	0	.1%	.0%	.1%	.0%
Genrad	.2	.0	.2	9	.1%	.0%	.1%	.0%
Softronics	.2	.1	.2	18	.1%	.0%	.1%	.0%
Massteck	.2	.0	.2	0	.0%	.0%	.1%	.0%
Engineering Systems Corp.	.1	.0	.1	0	.0%	.0%	.1%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
Exemplar Logic	.0	.0	.0	0	.0%	.0%	.0%	.0%
Teradyne	.0	.0	.0	0	.0%	.0%	.0%	.0%
Electrical Eng. Software	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 19 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: Electronic CAE
 Platform: Personal Computer
 Region: Worldwide
 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
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	26.9	23.2	3.6	10,560	6.9%	10.6%	2.4%	18.9%
All Companies	389.9	218.8	149.0	55,757	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	308.4	187.8	106.1	51,496	79.1%	85.8%	71.2%	92.4%
All Asian-Based Companies	53.7	23.9	24.5	3,210	13.8%	10.9%	16.4%	5.8%
All European-Based Companies	27.9	7.1	18.4	1,051	7.1%	3.2%	12.4%	1.9%
All Hardware Companies	193.0	188.7	.0	51,742	49.5%	86.3%	.0%	92.8%
All Turnkey & SW Companies	197.0	30.1	149.0	4,014	50.5%	13.7%	100.0%	7.2%

Source: Dataquest (July 1993)

Table 20
1992 CAD/CAM/CAE/GIS Market Share Update

Application: IC Layout
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Fujitsu	2.7	1.7	.7	79	44.8%	51.8%	32.2%	10.0%
Tanner Research	.9	.0	.8	0	14.9%	.0%	37.4%	.0%
Integrated Silicon Systems	.7	.0	.6	8	12.2%	.0%	26.6%	1.1%
Hewlett-Packard	.1	.1	.0	15	.8%	1.5%	.0%	1.9%
Intergraph	.0	.0	.0	0	.7%	.0%	1.9%	.0%
Other Companies	1.6	1.5	.0	690	26.6%	46.6%	1.9%	87.1%
All Companies	5.9	3.3	2.1	792	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.3	1.6	1.5	713	55.2%	48.2%	67.8%	90.0%
All Asian-Based Companies	2.7	1.7	.7	79	44.8%	51.8%	32.2%	10.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.6	1.6	.0	705	26.7%	48.2%	.0%	89.0%
All Turnkey & SW Companies	4.3	1.7	2.1	87	73.3%	51.8%	100.0%	11.0%

Source: Dataquest (July 1993)

Table 21
1992 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	23.6	23.6	.0	5,118	18.9%	31.8%	.0%	29.9%
IBM	14.1	5.8	7.5	1,712	11.2%	7.8%	15.2%	10.0%
NEC	12.2	10.2	1.0	1,814	9.7%	13.8%	2.0%	10.6%
Apple Computer	8.3	8.3	.0	1,686	6.6%	11.1%	.0%	9.9%
PADS Software	7.5	.0	6.3	0	5.9%	.0%	12.9%	.0%
Hewlett-Packard	6.8	6.2	.0	2,170	5.5%	8.3%	.0%	12.7%
Fujitsu	6.2	4.0	1.6	184	4.9%	5.3%	3.3%	1.1%
Racal-Redac	5.9	.0	5.7	0	4.7%	.0%	11.5%	.0%
BETRONEX	4.8	.5	4.3	89	3.8%	.6%	8.7%	.5%
Autodesk	3.5	.0	3.5	0	2.8%	.0%	7.0%	.0%
Orcad	3.2	.0	3.2	0	2.6%	.0%	6.5%	.0%
Accel Technologies	2.6	.0	2.4	0	2.1%	.0%	4.8%	.0%
CAD-UL	2.1	.0	2.1	0	1.7%	.0%	4.4%	.0%
Ziegler Informatics	2.0	.0	2.0	0	1.6%	.0%	4.1%	.0%
Visionics	1.8	.0	1.7	8	1.4%	.0%	3.5%	.0%
Hitachi	1.6	.8	.7	83	1.3%	1.0%	1.3%	.5%
Massteck	1.5	.0	1.5	0	1.2%	.0%	3.0%	.0%
Dell Computer	1.4	1.4	.0	360	1.1%	1.9%	.0%	2.1%
Research Machines	1.2	1.2	.0	201	1.0%	1.7%	.0%	1.2%
Uchida Yoko	.9	.6	.4	39	.7%	.7%	.8%	.2%
ALS Design	.6	.0	.5	5	.5%	.0%	1.1%	.0%

(Continued)

Table 21 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
EME	.5	.1	.2	14	.4%	.2%	.5%	.1%
Andor	.5	.1	.3	3	.4%	.2%	.7%	.0%
Infinite Graphics	.4	.0	.4	0	.3%	.0%	.9%	.0%
Digital	.3	.0	.3	0	.3%	.0%	.5%	.0%
Intergraph	.3	.0	.3	0	.2%	.0%	.5%	.0%
Compact Software	.3	.0	.3	0	.2%	.0%	.5%	.0%
American Small Business Comp.	.2	.0	.2	0	.2%	.0%	.4%	.0%
Pacific Numerics	.2	.0	.2	0	.2%	.0%	.4%	.0%
Olivetti	.2	.1	.0	19	.1%	.2%	.0%	.1%
Cimline	.1	.0	.1	0	.1%	.0%	.2%	.0%
Innovative Data Design	.1	.0	.1	0	.1%	.0%	.2%	.0%
Foresight Resources	.1	.0	.1	0	.1%	.0%	.2%	.0%
Other Companies	10.4	11.5	2.4	3,605	8.3%	15.5%	5.0%	21.1%
All Companies	125.3	74.3	49.2	17,112	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	86.1	53.1	29.9	14,625	68.7%	71.5%	60.8%	85.5%
All Asian-Based Companies	21.3	15.6	3.9	2,123	17.0%	21.0%	8.0%	12.4%
All European-Based Companies	17.9	5.6	15.3	364	14.3%	7.5%	31.1%	2.1%
All Hardware Companies	55.6	54.5	.0	14,837	44.3%	73.3%	.0%	86.7%
All Turnkey & SW Companies	69.7	19.9	49.2	2,274	55.7%	26.7%	100.0%	13.3%

Source: Dataquest (July 1993)

Table 22
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company	Total			Market Share			Hardware Units Shipped	Total Factory Revenue	Market Share		
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Hardware Revenue			Hardware Units Shipped	Hardware Revenue	Software Revenue
Compaq	293.1	293.1	.0	63,467	25.3%	44.3%	36.5%	25.3%	.0%	.0%	36.5%
Autodesk	158.3	.0	158.3	0	13.7%	.0%	.0%	13.7%	33.9%	.0%	.0%
Apple Computer	150.8	150.8	.0	33,506	13.0%	22.8%	19.3%	13.0%	.0%	.0%	19.3%
IBM	114.6	68.6	39.5	22,053	9.9%	10.4%	12.7%	9.9%	8.5%	.0%	12.7%
Hewlett-Packard	32.1	28.9	.0	11,178	2.8%	4.4%	6.4%	2.8%	.0%	.0%	6.4%
Dell Computer	25.3	25.3	.0	6,597	2.2%	3.8%	3.8%	2.2%	.0%	.0%	3.8%
Intergraph	23.4	.0	23.4	0	2.0%	.0%	.0%	2.0%	5.0%	.0%	.0%
Digital	18.8	16.5	.4	4,710	1.6%	2.5%	2.7%	1.6%	.1%	.0%	2.7%
ESRI	12.0	.0	11.1	0	1.0%	.0%	.0%	1.0%	2.4%	.0%	.0%
Viewlogic Systems	11.1	.0	8.8	0	1.0%	.0%	.0%	1.0%	1.9%	.0%	.0%
MapInfo	8.8	.0	7.0	0	.8%	.0%	.0%	.8%	1.5%	.0%	.0%
CADKEY	8.4	.0	8.4	0	.7%	.0%	.0%	.7%	1.8%	.0%	.0%
Strategic Mapping	8.2	.0	7.4	0	.7%	.0%	.0%	.7%	1.6%	.0%	.0%
Altera	7.5	.0	6.4	0	.7%	.0%	.0%	.7%	1.4%	.0%	.0%
Infocel	7.4	1.0	5.7	168	.6%	.2%	.1%	.6%	1.2%	.1%	.1%
Xilinx	7.3	.0	6.6	0	.6%	.0%	.0%	.6%	1.4%	.0%	.0%
Microsim	6.8	.0	6.4	0	.6%	.0%	.0%	.6%	1.4%	.0%	.0%
Softdesk	6.5	.0	6.5	0	.6%	.0%	.0%	.6%	1.4%	.0%	.0%
ASG	6.1	.0	6.1	0	.5%	.0%	.0%	.5%	1.3%	.0%	.0%
Point Control	5.9	.0	4.6	0	.5%	.0%	.0%	.5%	1.0%	.0%	.0%
ETAK	5.7	.3	5.5	14	.5%	.0%	.0%	.5%	1.2%	.0%	.0%

(Continued)

Table 22 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Swanson Analysis	5.1	.0	4.9	0	.4%	.0%	1.1%	.0%
American Small Business Comp.	4.7	.0	4.7	0	.4%	.0%	1.0%	.0%
ISICAD	4.7	.0	4.7	0	.4%	.0%	1.0%	.0%
Aspen Technology	4.6	.0	4.2	0	.4%	.0%	.9%	.0%
ACTEL	4.4	.0	3.8	0	.4%	.0%	.8%	.0%
Enghouse Systems Ltd.	4.4	.0	3.8	0	.4%	.0%	.8%	.0%
PADS Software	4.2	.0	3.5	0	.4%	.0%	.8%	.0%
CNC Software	4.1	.0	4.1	0	.4%	.0%	.9%	.0%
Micrografx	4.0	.0	4.0	0	.3%	.0%	.9%	.0%
Moda CAD	4.0	1.0	2.8	33	.3%	.2%	.6%	.0%
Algor Interactive Systems	4.0	.0	3.5	0	.3%	.0%	.7%	.0%
Computervision	3.9	.0	3.9	90	.3%	.0%	.8%	.1%
Orcad	3.8	.0	3.8	0	.3%	.0%	.8%	.0%
GeoQuest	3.6	.0	3.6	0	.3%	.0%	.8%	.0%
Innovative Data Design	3.5	.0	3.5	0	.3%	.0%	.8%	.0%
PacSoft	3.2	.0	3.2	0	.3%	.0%	.7%	.0%
Racal-Redac	3.2	.0	3.1	0	.3%	.0%	.7%	.0%
GeoGraphix	3.2	.0	2.4	0	.3%	.0%	.5%	.0%
Data I/O	3.1	.0	3.1	0	.3%	.0%	.7%	.0%
MCS	3.1	.0	2.8	0	.3%	.0%	.6%	.0%
PCI Remote Sensing Corp	3.0	.0	3.0	0	.3%	.0%	.6%	.0%

(Continued)

Table 22 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sweet's Electronic Publishing	2.7	.0	2.2	0	.2%	.0%	.5%	.0%
ADRA Systems	2.7	.0	2.1	0	.2%	.0%	.5%	.0%
Visionics	2.5	.0	2.4	10	.2%	.0%	.5%	.0%
International Software Systems	2.4	.0	2.4	0	.2%	.0%	.5%	.0%
Claris	2.3	.0	2.3	0	.2%	.0%	.5%	.0%
Neocad	2.3	.0	2.3	0	.2%	.0%	.5%	.0%
Accel Technologies	2.2	.0	2.0	0	.2%	.0%	.4%	.0%
Generation 5 Technology	2.2	.0	2.2	0	.2%	.0%	.5%	.0%
Foresight Resources	2.1	.0	1.9	0	.2%	.0%	.4%	.0%
Accugraph	2.0	.1	1.7	10	.2%	.0%	.4%	.0%
Facility Mapping Systems	2.0	.0	1.7	0	.2%	.0%	.4%	.0%
EEsof	1.8	.0	1.5	0	.2%	.0%	.3%	.0%
IMSI	1.8	.0	1.8	0	.2%	.0%	.4%	.0%
Cimatron	1.6	.7	.7	84	.1%	.1%	.2%	.0%
ERDAS	1.6	.4	1.1	86	.1%	.1%	.2%	.0%
Rasna Corporation	1.6	.0	1.5	0	.1%	.0%	.3%	.0%
Intera Tydac	1.6	.0	1.6	0	.1%	.0%	.3%	.0%
Evolution Computing	1.6	.0	1.6	0	.1%	.0%	.3%	.0%
Integrated Computer Graphics	1.6	.6	.8	122	.1%	.1%	.2%	.1%
Research Engineers—Civilsoft	1.5	.0	1.5	0	.1%	.0%	.3%	.0%
Sigma Design	1.5	.0	1.4	0	.1%	.0%	.3%	.0%
Terra Sciences	1.5	.0	1.5	0	.1%	.0%	.3%	.0%

(Continued)

Table 22 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
GRAPHISOFT	1.4	.0	1.4	0	.1%	.0%	.3%	.0%
Harris EDA	1.4	.1	1.1	5	.1%	.0%	.2%	.0%
BETRONEX	1.2	.1	1.1	22	.1%	.0%	.2%	.0%
Investronica SA	1.2	1.0	.1	48	.1%	.1%	.0%	.0%
Engineering Mechanics	1.2	.1	1.0	143	.1%	.0%	.2%	.1%
Massteck	1.1	.0	1.1	0	.1%	.0%	.2%	.0%
Graphisoft Software Dev	1.1	.0	1.1	0	.1%	.0%	.2%	.0%
Engineering Systems Corp.	1.1	.0	1.1	0	.1%	.0%	.2%	.0%
Minc Software	1.1	.0	1.1	0	.1%	.0%	.2%	.0%
Intrinsix	1.0	1.0	.0	10	.1%	.2%	.0%	.0%
Spectrum Software	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Engineered Software	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Carrier Corporation	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Tanner Research	1.0	.0	.9	0	.1%	.0%	.2%	.0%
LandCadd	1.0	.0	.9	0	.1%	.0%	.2%	.0%
Pathtrace	1.0	.2	.6	14	.1%	.0%	.1%	.0%
CAE-link	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Aries Technology	.9	.0	.9	0	.1%	.0%	.2%	.0%
Maptech	.9	.0	.9	0	.1%	.0%	.2%	.0%
Quicklogic	.9	.0	.9	0	.1%	.0%	.2%	.0%
ALDEC	.9	.0	.8	0	.1%	.0%	.2%	.0%
Aura CAD/CAM Systems	.9	.0	.8	0	.1%	.0%	.2%	.0%

(Continued)

Table 22 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Application: All Applications
 Platform: Personal Computer
 Region: North America
 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
Cimline	.8	.0	.6	0	.1%	.0%	.1%	.0%
Kork Systems	.8	.1	.6	15	.1%	.0%	.1%	.0%
Radian Corporation	.8	.0	.5	0	.1%	.0%	.1%	.0%
Mega CADD	.8	.0	.8	0	.1%	.0%	.2%	.0%
Genasys II	.7	.1	.5	18	.1%	.0%	.1%	.0%
CADWorks	.7	.0	.6	0	.1%	.0%	.1%	.0%
A.I. Systems	.7	.0	.7	0	.1%	.0%	.1%	.0%
ECOM Associates	.7	.0	.7	4	.1%	.0%	.1%	.0%
Ground Modelling Systems	.7	.4	.3	57	.1%	.1%	.1%	.0%
MacNeal-Schwendler	.6	.0	.6	0	.1%	.0%	.1%	.0%
Mc2 Engineering Software	.6	.0	.6	0	.0%	.0%	.1%	.0%
Infinite Graphics	.6	.0	.6	0	.0%	.0%	.1%	.0%
Integrated Silicon Systems	.5	.0	.4	5	.0%	.0%	.1%	.0%
Terr-Mar Resource Info Svs	.5	.1	.3	14	.0%	.0%	.1%	.0%
Ashlar	.5	.0	.5	0	.0%	.0%	.1%	.0%
CADSI	.5	.1	.4	9	.0%	.0%	.1%	.0%
Compact Software	.5	.0	.5	0	.0%	.0%	.1%	.0%
Applicon	.5	.2	.2	16	.0%	.0%	.0%	.0%
Bechtel Software	.5	.0	.5	0	.0%	.0%	.1%	.0%
Delcam International	.5	.2	.2	15	.0%	.0%	.0%	.0%
Phase Three Logic	.4	.0	.4	0	.0%	.0%	.1%	.0%
The CAD Group	.4	.0	.4	0	.0%	.0%	.1%	.0%

(Continued)

Table 22 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
GEOVISION Inc.	.3	.2	.1	36	.0%	.0%	.0%	.0%
Geotrace Technologies	.3	.0	.3	0	.0%	.0%	.1%	.0%
SIMUCAD	.2	.0	.2	0	.0%	.0%	.0%	.0%
Logic Modeling Systems	.2	.0	.2	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.2	.0	.2	6	.0%	.0%	.0%	.0%
Pacific Numerics	.2	.0	.2	0	.0%	.0%	.0%	.0%
BATISOFT	.2	.0	.1	7	.0%	.0%	.0%	.0%
Meta-Software	.2	.0	.1	0	.0%	.0%	.0%	.0%
Areon	.1	.0	.0	0	.0%	.0%	.0%	.0%
Genrad	.1	.0	.1	4	.0%	.0%	.0%	.0%
Exemplar Logic	.0	.0	.0	0	.0%	.0%	.0%	.0%
Electrical Eng. Software	.0	.0	.0	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	77.6	69.9	8.4	31,459	6.7%	10.6%	1.8%	18.1%
All Companies	1,159.2	661.2	466.9	174,035	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1,148.2	657.8	459.3	173,778	99.0%	99.5%	98.4%	99.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	11.0	3.4	7.6	257	1.0%	.5%	1.6%	.1%
All Hardware Companies	661.8	652.4	.0	172,966	57.1%	98.7%	.0%	99.4%
All Turnkey & SW Companies	497.4	8.8	466.9	1,070	42.9%	1.3%	100.0%	.6%

Source: Dataquest (July 1993)

Table 23
1992 CAD/CAM/CAE/GIS Market Share Update

Company	Application: Platform: Region: Units:	Market Share													
		Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Hardware Revenue	Software Revenue				
Autodesk	All Applications	128.9	.0	128.9	0	13.4%	.0%	33.7%	.0%						
Compaq	Personal Computer	116.1	116.1	.0	25,126	12.1%	21.9%	.0%	17.7%						
IBM	Europe	86.7	69.9	11.8	19,947	9.0%	13.2%	3.1%	14.1%						
Apple Computer	Millions of U.S. Dollars/Actual Units	46.1	46.2	.0	8,381	4.8%	8.7%	.0%	5.9%						
Hewlett-Packard		35.7	32.1	.0	10,348	3.7%	6.1%	.0%	7.3%						
Nemetschek		31.3	11.6	17.5	1,288	3.3%	2.2%	4.6%	.9%						
Investronica SA		27.6	22.1	2.8	1,102	2.9%	4.2%	.7%	.8%						
Digital		21.0	18.9	.0	5,431	2.2%	3.6%	.0%	3.8%						
Wiechers Datentechnik		20.1	5.0	9.4	714	2.1%	.9%	2.5%	.5%						
Tebis		19.6	3.0	13.7	112	2.0%	.6%	3.6%	.1%						
CAD Distribution		16.9	8.4	6.7	261	1.8%	1.6%	1.8%	.2%						
Research Machines		15.6	15.6	.0	2,517	1.6%	2.9%	.0%	1.8%						
Ziegler Informatics		14.3	.0	14.3	0	1.5%	.0%	3.7%	.0%						
Soft-Tech Software Technologies		13.8	2.1	10.4	932	1.4%	.4%	2.7%	.7%						
Dell Computer		9.3	9.3	.0	2,415	1.0%	1.7%	.0%	1.7%						
Cimatron		8.3	3.8	3.7	381	.9%	.7%	1.0%	.3%						
DAT Standard info ssystemes		7.9	.0	7.5	0	.8%	.0%	2.0%	.0%						
Olivetti		7.3	6.2	.0	877	.8%	1.2%	.0%	.6%						
RoboCAD Solutions		7.3	.0	5.9	0	.8%	.0%	1.5%	.0%						
Serbi		7.0	.7	6.3	200	.7%	.1%	1.6%	.1%						
Aucotec		6.8	2.7	2.7	437	.7%	.5%	.7%	.3%						

(Continued)

Table 23 (Continued)
1992 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			Market Share		Hardware Units Shipped
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	
Hochtief	6.5	1.0	4.6	2%	1.2%	82
Racal-Redac	6.4	.0	6.1	.0%	1.6%	0
Ground Modelling Systems	6.3	3.4	2.5	.6%	.7%	554
ISCAD	6.2	.0	6.2	.0%	1.6%	0
BATISOFT	6.0	.9	3.0	.2%	.8%	300
RIB/RZB	6.0	.5	4.9	.1%	1.3%	41
Orcad	5.1	.0	5.1	.0%	1.3%	0
mib Programme	5.1	2.5	1.8	.5%	.5%	122
Microway	4.7	2.9	1.4	.5%	.4%	60
Graphisoft Software Dev	4.6	.0	4.6	.0%	1.2%	0
Kloekner-Moeller	4.5	.9	3.1	.2%	.8%	46
Computer Services Consultants	4.2	.0	4.2	.0%	1.1%	0
Softronics	4.0	1.1	3.0	.2%	.8%	361
Viewlogic Systems	3.9	.0	3.1	.0%	.8%	0
Datagraphic	3.6	1.8	1.4	.3%	.4%	57
Altera	3.5	.0	3.0	.0%	.8%	0
Microtrak	3.3	.0	3.3	.0%	.9%	0
Swanson Analysis	3.1	.0	2.9	.0%	.8%	0
ComputerVision	3.0	.0	3.0	.0%	.8%	80
ESRI	2.9	.0	2.7	.0%	.7%	0
CAD Lab	2.8	.0	2.5	.0%	.7%	0

(Continued)

Table 23 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share			
					Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Xilinx	2.6	.0	2.3	0	.3%	.0%	.6%	.0%
Pathtrace	2.5	.5	1.6	37	.3%	.1%	.4%	.0%
ALS Design	2.4	.1	2.1	20	.2%	.0%	.6%	.0%
Superdraft	2.3	1.1	1.1	132	.2%	.2%	.3%	.1%
Elstree Computing	2.2	1.0	1.2	62	.2%	.2%	.3%	.0%
Whessoe Computing Systems	2.2	.0	2.2	0	.2%	.0%	.6%	.0%
Delcam International	2.2	.8	.9	44	.2%	.2%	.2%	.0%
Autlam Electronics	2.2	.4	1.6	70	.2%	.1%	.4%	.0%
BETRONEX	2.2	.2	1.9	40	.2%	.0%	.5%	.0%
Vero International Software	2.2	.0	2.0	0	.2%	.0%	.5%	.0%
CAD-UL	2.1	.0	2.1	0	.2%	.0%	.6%	.0%
Microslm	2.0	.0	1.9	0	.2%	.0%	.5%	.0%
CAD-Capture	2.0	.4	.6	10	.2%	.1%	.2%	.0%
CADKEY	1.9	.0	1.9	0	.2%	.0%	.5%	.0%
PAFEC	1.9	.0	1.9	0	.2%	.0%	.5%	.0%
Data I/O	1.7	.0	1.7	0	.2%	.0%	.4%	.0%
Han Dataport	1.7	.5	.9	41	.2%	.1%	.2%	.0%
PAIDS Software	1.6	.0	1.4	0	.2%	.0%	.4%	.0%
Point Control	1.6	.0	1.3	0	.2%	.0%	.3%	.0%
Moda CAD	1.6	.4	1.1	13	.2%	.1%	.3%	.0%
CAMTEK	1.6	.3	1.0	118	.2%	.1%	.3%	.1%

(Continued)

Table 23 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
FEA	1.5	.4	.4	0	.2%	.1%	.1%	.0%
Strategic Mapping	1.5	.0	1.4	0	.2%	.0%	.4%	.0%
EME	1.5	.4	.7	41	.2%	.1%	.2%	.0%
ISDATA	1.4	.0	1.3	0	.1%	.0%	.3%	.0%
ARKTEC	1.4	.1	1.2	32	.1%	.0%	.3%	.0%
Enghouse Systems Ltd.	1.4	.0	1.2	0	.1%	.0%	.3%	.0%
Lamp Software	1.4	.3	1.1	76	.1%	.0%	.3%	.1%
ACTEL	1.3	.0	1.1	0	.1%	.0%	.3%	.0%
EEsof	1.3	.0	1.1	0	.1%	.0%	.3%	.0%
Geometria GIS Systems House	1.3	.2	.4	15	.1%	.0%	.1%	.0%
Technische Computer Systeme	1.2	.2	1.0	36	.1%	.0%	.3%	.0%
Aucos elektronische Gerate	1.2	.4	.9	121	.1%	.1%	.2%	.1%
ADRA Systems	1.2	.0	1.0	0	.1%	.0%	.3%	.0%
ETAK	1.1	.1	1.1	3	.1%	.0%	.3%	.0%
Mucke Software	1.1	.6	.4	27	.1%	.1%	.1%	.0%
CADWorks	1.0	.0	.9	0	.1%	.0%	.2%	.0%
CNC Software	.9	.0	.9	0	.1%	.0%	.2%	.0%
Contract Data Research	.9	.0	.6	0	.1%	.0%	.2%	.0%
Aspen Technology	.9	.0	.8	0	.1%	.0%	.2%	.0%
Areon	.8	.4	.2	6	.1%	.1%	.0%	.0%
Applicon	.8	.2	.3	24	.1%	.0%	.1%	.0%

(Continued)

Table 23 (Continued)
1992 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	Hardware Revenue	Software Revenue	Hardware Units Shipped
GeoQuest	.7	.0	.7	0	.1%	.0%	.2%	.0%
debis Systemhaus	.7	.2	.4	13	.1%	.0%	.1%	.0%
Algor Interactive Systems	.7	.0	.6	0	.1%	.0%	.1%	.0%
Caroline Informatique	.7	.1	.3	10	.1%	.0%	.1%	.0%
MCS	.7	.0	.6	0	.1%	.0%	.2%	.0%
Engineered Software	.6	.0	.6	0	.1%	.0%	.2%	.0%
Sigma Design	.6	.0	.6	0	.1%	.0%	.2%	.0%
ASCAD/ASCAM	.6	.4	.2	14	.1%	.1%	.0%	.0%
Carrier Corporation	.6	.0	.6	0	.1%	.0%	.2%	.0%
ERDAS	.6	.2	.4	32	.1%	.0%	.1%	.0%
Genasys II	.6	.0	.4	14	.1%	.0%	.1%	.0%
Harris EDA	.6	.0	.4	2	.1%	.0%	.1%	.0%
Evolution Computing	.5	.0	.5	0	.1%	.0%	.1%	.0%
Inca	.5	.5	.0	2	.1%	.1%	.0%	.0%
S.T.L.D. s.r.l.	.5	.0	.5	0	.1%	.0%	.1%	.0%
Accel Technologies	.5	.0	.4	0	.0%	.0%	.1%	.0%
Terra Sciences	.4	.0	.4	0	.0%	.0%	.1%	.0%
Massteck	.4	.0	.4	0	.0%	.0%	.1%	.0%
Cimlinc	.4	.0	.3	0	.0%	.0%	.1%	.0%
Kork Systems	.4	.0	.3	4	.0%	.0%	.1%	.0%
LandCadd	.4	.0	.4	0	.0%	.0%	.1%	.0%

(Continued)

Table 23 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
American Small Business Comp.	.4	.0	.4	0	.0%	.0%	.1%	.0%
Foresight Resources	.4	.0	.3	0	.0%	.0%	.1%	.0%
Compact Software	.3	.0	.3	0	.0%	.0%	.1%	.0%
Minc Software	.3	.0	.3	0	.0%	.0%	.1%	.0%
Rasna Corporation	.3	.0	.3	0	.0%	.0%	.1%	.0%
Softdesk	.3	.0	.3	0	.0%	.0%	.1%	.0%
Sweet's Electronic Publishing	.3	.0	.2	0	.0%	.0%	.1%	.0%
ALDEC	.3	.0	.3	0	.0%	.0%	.1%	.0%
Generation 5 Technology	.3	.0	.3	0	.0%	.0%	.1%	.0%
IMSI	.2	.0	.2	0	.0%	.0%	.1%	.0%
Mega CADD	.2	.0	.2	0	.0%	.0%	.1%	.0%
Facility Mapping Systems	.2	.0	.2	0	.0%	.0%	.0%	.0%
Catalpa	.2	.0	.1	10	.0%	.0%	.0%	.0%
Tanner Research	.2	.0	.2	0	.0%	.0%	.0%	.0%
CADSI	.2	.0	.1	3	.0%	.0%	.0%	.0%
Radan Computational	.2	.1	.1	6	.0%	.0%	.0%	.0%
Aries Technology	.1	.0	.1	0	.0%	.0%	.0%	.0%
ASG	.1	.0	.1	0	.0%	.0%	.0%	.0%
A.I. Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%
Terr-Mar Resource Info Sys	.1	.0	.1	3	.0%	.0%	.0%	.0%
Logic Modeling Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%
Genrad	.1	.0	.1	4	.0%	.0%	.0%	.0%

(Continued)

Table 23 (Continued)
1992 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	Hardware Revenue	Software Revenue	Hardware Units Shipped
Accugraph	.1	.0	.1	0	.0%	.0%	.0%	.0%
GeoGraphix	.1	.0	.1	0	.0%	.0%	.0%	.0%
CAE-link	.1	.0	.1	0	.0%	.0%	.0%	.0%
Geotrace Technologies	.1	.0	.1	0	.0%	.0%	.0%	.0%
Quicklogic	.1	.0	.1	0	.0%	.0%	.0%	.0%
Bechtel Software	.0	.0	.0	0	.0%	.0%	.0%	.0%
Integrated Silicon Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
Infinite Graphics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Meta-Software	.0	.0	.0	0	.0%	.0%	.0%	.0%
GEOVISION Inc.	.0	.0	.0	2	.0%	.0%	.0%	.0%
Phase Three Logic	.0	.0	.0	0	.0%	.0%	.0%	.0%
Exemplar Logic	.0	.0	.0	0	.0%	.0%	.0%	.0%
Pacific Numerics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	133.6	131.3	3.9	58,595	13.9%	24.8%	1.0%	41.3%
All Companies	961.4	530.1	382.5	141,855	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	642.4	422.1	204.4	130,353	66.8%	79.6%	53.4%	91.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	319.0	107.9	178.1	11,502	33.2%	20.4%	46.6%	8.1%
All Hardware Companies	454.5	443.4	.0	133,565	47.3%	83.6%	.0%	94.2%
All Turnkey & SW Companies	506.9	86.7	382.5	8,290	52.7%	16.4%	100.0%	5.8%

Source: Dataquest (July 1993)

Table 24
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company	Market Share											
	Total			Factory			Hardware			Software		
	Revenue	Hardware Revenue	Software Revenue	Revenue	Hardware Revenue	Software Revenue	Revenue	Hardware Revenue	Software Revenue	Revenue	Hardware Revenue	Software Revenue
NEC	112.9	94.8	9.0	14.0%	20.1%	3.1%	16,805	14.0%	20.1%	3.1%	16,805	16.1%
IBM	106.5	45.1	55.6	13.2%	9.6%	19.1%	12,650	13.2%	9.6%	19.1%	12,650	12.1%
Fujitsu	88.4	56.6	23.0	11.0%	12.0%	7.9%	2,627	11.0%	12.0%	7.9%	2,627	2.5%
Autodesk	51.5	.0	51.5	6.4%	.0%	17.7%	0	6.4%	.0%	17.7%	0	.0%
Mutoh Industries—No OEM	40.0	24.0	12.0	5.0%	5.1%	4.1%	809	5.0%	5.1%	4.1%	809	.8%
Wacom	38.9	7.8	26.8	4.8%	1.6%	9.2%	748	4.8%	1.6%	9.2%	748	.7%
Hakuto	37.9	22.8	15.2	4.7%	4.8%	5.2%	827	4.7%	4.8%	5.2%	827	.8%
Hitachi	31.3	15.0	13.2	3.9%	3.2%	4.5%	1,656	3.9%	3.2%	4.5%	1,656	1.6%
Apple Computer	30.7	30.7	.0	3.8%	6.5%	.0%	5,581	3.8%	6.5%	.0%	5,581	5.4%
Toshiba—No OEM	27.1	13.5	10.8	3.4%	2.9%	3.7%	2,165	3.4%	2.9%	3.7%	2,165	2.1%
Andor	15.7	3.9	11.1	1.9%	.8%	3.8%	121	1.9%	.8%	3.8%	121	.1%
Compaq	12.9	12.9	.0	1.6%	2.7%	.0%	2,792	1.6%	2.7%	.0%	2,792	2.7%
Design Automation	12.7	2.5	9.5	1.6%	.5%	3.3%	267	1.6%	.5%	3.3%	267	.3%
CPU	10.5	.0	9.5	1.3%	.0%	3.3%	0	1.3%	.0%	3.3%	0	.0%
Mitsubishi Electric	9.5	6.3	3.2	1.2%	1.3%	1.1%	900	1.2%	1.3%	1.1%	900	.9%
Hewlett-Packard	6.5	5.9	.0	.8%	1.2%	.0%	1,647	.8%	1.2%	.0%	1,647	1.6%
Seiko Instruments—No OEM	5.3	2.6	2.6	.7%	.6%	.9%	136	.7%	.6%	.9%	136	.1%
Uchida Yoko	3.8	2.4	1.6	.5%	.5%	.6%	171	.5%	.5%	.6%	171	.2%
Mitsui Engineering	3.6	2.5	.7	.4%	.5%	.2%	60	.4%	.5%	.2%	60	.1%
Digital	3.3	2.9	.1	.4%	.6%	.0%	832	.4%	.6%	.0%	832	.8%
Intergraph	3.0	.0	3.0	.4%	.0%	1.0%	0	.4%	.0%	1.0%	0	.0%

(Continued)

Table 24 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Viewlogic Systems	2.9	.0	2.3	0	.4%	.0%	.8%	.0%
Swanson Analysis	2.5	.0	2.4	0	.3%	.0%	.8%	.0%
PADS Software	2.5	.0	2.1	0	.3%	.0%	.7%	.0%
Data I/O	2.2	.0	2.2	0	.3%	.0%	.8%	.0%
ACTEL	1.5	.0	1.3	0	.2%	.0%	.5%	.0%
Anilam Electronics	1.5	.5	1.0	18	.2%	.1%	.4%	.0%
Altera	1.3	.0	1.1	0	.2%	.0%	.4%	.0%
Microsim	1.2	.0	1.1	0	.1%	.0%	.4%	.0%
Xilinx	1.1	.0	1.0	0	.1%	.0%	.3%	.0%
Cimatron	1.1	.5	.5	56	.1%	.1%	.2%	.1%
Point Control	1.0	.0	.8	0	.1%	.0%	.3%	.0%
Enghouse Systems Ltd.	1.0	.0	.9	0	.1%	.0%	.3%	.0%
ADRA Systems	1.0	.0	.8	0	.1%	.0%	.3%	.0%
BETRONEX	1.0	.1	.9	18	.1%	.0%	.3%	.0%
CADKEY	.9	.0	.9	0	.1%	.0%	.3%	.0%
CADWorks	.8	.0	.7	0	.1%	.0%	.2%	.0%
EEsof	.7	.0	.6	0	.1%	.0%	.2%	.0%
INS Engineering	.7	.4	.4	13	.1%	.1%	.1%	.0%
CNC Software	.7	.0	.7	0	.1%	.0%	.2%	.0%
ESRI	.7	.0	.6	0	.1%	.0%	.2%	.0%
Moda CAD	.6	.2	.4	5	.1%	.0%	.1%	.0%

(Continued)

Table 24 (Continued)
1992 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	Hardware Revenue	Software Revenue	Hardware Units Shipped
Harris EDA	.6	.1	.5	2	.1%	.0%	.2%	.0%
Sharp System Products—No OEM	.6	.3	.3	17	.1%	.1%	.1%	.0%
Computervision	.5	.0	.5	0	.1%	.0%	.2%	.0%
Accel Technologies	.5	.0	.4	0	.1%	.0%	.1%	.0%
GeoQuest	.5	.0	.5	0	.1%	.0%	.2%	.0%
Whessoe Computing Systems	.5	.0	.5	0	.1%	.0%	.2%	.0%
Softdesk	.5	.0	.5	0	.1%	.0%	.2%	.0%
Sigma Design	.4	.0	.4	0	.1%	.0%	.1%	.0%
ALDEC	.4	.0	.4	0	.0%	.0%	.1%	.0%
Carrier Corporation	.4	.0	.4	0	.0%	.0%	.1%	.0%
ETAK	.4	.0	.4	1	.0%	.0%	.1%	.0%
Compact Software	.3	.0	.3	0	.0%	.0%	.1%	.0%
Investronica SA	.3	.2	.0	12	.0%	.0%	.0%	.0%
Aspen Technology	.3	.0	.3	0	.0%	.0%	.1%	.0%
ISICAD	.3	.0	.3	0	.0%	.0%	.1%	.0%
MacNeal-Schwendler	.3	.0	.3	0	.0%	.0%	.1%	.0%
MCS	.3	.0	.3	0	.0%	.0%	.1%	.0%
Superdraft	.3	.1	.1	14	.0%	.0%	.0%	.0%
ERDAS	.2	.1	.2	12	.0%	.0%	.1%	.0%
Graphisoft Software Dev	.2	.0	.2	0	.0%	.0%	.1%	.0%
Aries Technology	.2	.0	.2	0	.0%	.0%	.1%	.0%

(Continued)

Table 24 (Continued)
1992 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	Hardware Revenue	Software Revenue	Hardware Units Shipped
IMSI	.2	.0	.2	0	.0%	.0%	.1%	.0%
Terr-Mar Resource Info Svs	.2	.1	.1	6	.0%	.0%	.0%	.0%
Wiechers Datentechnik	.2	.1	.1	7	.0%	.0%	.0%	.0%
Genasys II	.2	.0	.1	5	.0%	.0%	.0%	.0%
BATISOFT	.2	.0	.1	7	.0%	.0%	.0%	.0%
Rasna Corporation	.2	.0	.2	0	.0%	.0%	.1%	.0%
GeoGraphix	.2	.0	.1	0	.0%	.0%	.0%	.0%
Minc Software	.2	.0	.2	0	.0%	.0%	.1%	.0%
Integrated Silicon Systems	.1	.0	.1	3	.0%	.0%	.0%	.0%
ASG	.1	.0	.1	0	.0%	.0%	.0%	.0%
CADSI	.1	.0	.1	2	.0%	.0%	.0%	.0%
Cimlinc	.1	.0	.1	0	.0%	.0%	.0%	.0%
Pathtrace	.1	.0	.1	2	.0%	.0%	.0%	.0%
Mega CADD	.1	.0	.1	0	.0%	.0%	.0%	.0%
Meta-Software	.1	.0	.1	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.1	.0	.1	0	.0%	.0%	.0%	.0%
Algor Interactive Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%
Tanner Research	.1	.0	.1	0	.0%	.0%	.0%	.0%
Infinite Graphics	.1	.0	.1	0	.0%	.0%	.0%	.0%
Facility Mapping Systems	.1	.0	.0	0	.0%	.0%	.0%	.0%
Logic Modeling Systems	.1	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 24 (Continued)
1992 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	Hardware Revenue	Software Revenue	Hardware Units Shipped
Quicklogic	.1	.0	.1	0	.0%	.0%	.0%	.0%
Accugraph	.0	.0	.0	0	.0%	.0%	.0%	.0%
Massteck	.0	.0	.0	0	.0%	.0%	.0%	.0%
SIMUCAD	.0	.0	.0	0	.0%	.0%	.0%	.0%
The CAD Group	.0	.0	.0	0	.0%	.0%	.0%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.0%	.0%
Geotrace Technologies	.0	.0	.0	0	.0%	.0%	.0%	.0%
PAFEC	.0	.0	.0	0	.0%	.0%	.0%	.0%
Bechtel Software	.0	.0	.0	0	.0%	.0%	.0%	.0%
Electrical Eng. Software	.0	.0	.0	0	.0%	.0%	.0%	.0%
Exemplar Logic	.0	.0	.0	0	.0%	.0%	.0%	.0%
Kork Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	117.2	117.6	.2	53,167	14.5%	24.9%	.1%	51.0%
All Companies	807.1	472.3	290.7	104,161	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	362.8	214.8	138.1	76,706	45.0%	45.5%	47.5%	73.6%
All Asian-Based Companies	438.9	255.4	149.0	27,321	54.4%	54.1%	51.3%	26.2%
All European-Based Companies	5.4	2.1	3.6	134	.7%	.4%	1.2%	.1%
All Hardware Companies	218.3	214.5	.0	76,669	27.0%	45.4%	.0%	73.6%
All Turnkey & SW Companies	588.8	257.9	290.7	27,492	73.0%	54.6%	100.0%	26.4%

Source: Dataquest (July 1993)

Table 25
1992 CAD/CAM/CAE/GIS Market Share Update

Company	Application: Platform: Region: Units:	All Applications Personal Computer Rest of World Millions of U.S. Dollars/Actual Units	Market Share											
			Total		Hardware		Software		Total		Hardware		Software	
			Factory Revenue	Hardware Revenue	Hardware Revenue	Hardware Units Shipped	Software Revenue	Software Revenue	Factory Revenue	Hardware Revenue	Hardware Revenue	Hardware Units Shipped	Software Revenue	Software Revenue
Apple Computer			11.4	11.4	.0	2,539	.0	14.4%	27.3%	.0%	19.8%			
IBM			10.2	9.6	.0	3,090	.0	12.9%	23.0%	.0%	24.2%			
Compaq			7.7	7.7	.0	1,675	.0	9.8%	18.5%	.0%	13.1%			
Autodesk			6.9	.0	6.9	0	6.9	8.7%	.0%	20.2%	.0%			
Intergraph			3.1	.0	3.1	0	3.1	3.9%	.0%	9.0%	.0%			
International Software Systems			2.4	.0	2.4	0	2.4	3.0%	.0%	6.9%	.0%			
Clarix			2.3	.0	2.3	0	2.3	2.9%	.0%	6.7%	.0%			
Engineering Mechanics			2.2	.1	1.8	265	1.8	2.7%	.2%	5.3%	2.1%			
Orcad			1.9	.0	1.9	0	1.9	2.4%	.0%	5.6%	.0%			
Strategic Mapping			1.8	.0	1.7	0	1.7	2.3%	.0%	4.9%	.0%			
MapInfo			1.8	.0	1.4	0	1.4	2.3%	.0%	4.2%	.0%			
Digital			1.3	1.2	.0	338	.0	1.7%	2.8%	.0%	2.6%			
CNC Software			1.2	.0	1.2	0	1.2	1.5%	.0%	3.4%	.0%			
Hewlett-Packard			1.0	.9	.0	347	.0	1.2%	2.2%	.0%	2.7%			
Verco International Software			1.0	.0	.9	0	.9	1.2%	.0%	2.6%	.0%			
Cimatron			.9	.4	.4	47	.4	1.2%	1.0%	1.2%	.4%			
Infocel			.8	.1	.6	19	.6	1.0%	.3%	1.8%	.1%			
Kork Systems			.8	.1	.6	1	.6	1.0%	.2%	1.6%	.0%			
Radian Corporation			.8	.0	.5	0	.5	1.0%	.0%	1.4%	.0%			
Altera			.7	.0	.6	0	.6	.8%	.0%	1.6%	.0%			
ESRI			.6	.0	.6	0	.6	.8%	.0%	1.7%	.0%			

(Continued)

Table 25 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Pathtrace	.6	.1	.4	9	.7%	.3%	1.1%	.1%
Point Control	.5	.0	.4	0	.6%	.0%	1.1%	.0%
BETRONEX	.5	.1	.4	9	.6%	.1%	1.3%	.1%
ETAK	.4	.0	.4	1	.5%	.0%	1.1%	.0%
Genasys II	.4	.0	.3	9	.5%	.1%	.8%	.1%
Softdesk	.4	.0	.4	0	.5%	.0%	1.1%	.0%
Swanson Analysis	.3	.0	.3	0	.4%	.0%	.9%	.0%
Data I/O	.3	.0	.3	0	.4%	.0%	.8%	.0%
Enghouse Systems Ltd.	.3	.0	.3	0	.4%	.0%	.7%	.0%
Hochtief	.3	.0	.2	2	.4%	.1%	.6%	.0%
ACTEL	.3	.0	.2	0	.3%	.0%	.7%	.0%
Superdraft	.3	.1	.1	14	.3%	.2%	.3%	.1%
Whessoe Computing Systems	.3	.0	.3	0	.3%	.0%	.7%	.0%
Graphisoft Software Dev	.2	.0	.2	0	.3%	.0%	.7%	.0%
Engineering Systems Corp.	.2	.0	.2	0	.3%	.0%	.6%	.0%
Xilinx	.2	.0	.2	0	.3%	.0%	.6%	.0%
Computervision	.2	.0	.2	0	.3%	.0%	.6%	.0%
Investronica SA	.2	.2	.0	8	.3%	.4%	.1%	.1%
ADRA Systems	.2	.0	.2	0	.3%	.0%	.5%	.0%
Generation 5 Technology	.2	.0	.2	0	.2%	.0%	.6%	.0%
ERDAS	.2	.0	.1	8	.2%	.1%	.3%	.1%

(Continued)

Table 25 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Aura CAD/CAM Systems	.2	.0	.1	0	.2%	.0%	.4%	.0%
LandCadd	.2	.0	.1	0	.2%	.0%	.4%	.0%
American Small Business Comp.	.1	.0	.1	0	.2%	.0%	.4%	.0%
Mc2 Engineering Software	.1	.0	.1	0	.2%	.0%	.4%	.0%
Compact Software	.1	.0	.1	0	.2%	.0%	.4%	.0%
Innovative Data Design	.1	.0	.1	0	.2%	.0%	.4%	.0%
CADWorks	.1	.0	.1	0	.2%	.0%	.3%	.0%
EEsof	.1	.0	.1	0	.2%	.0%	.3%	.0%
Sigma Design	.1	.0	.1	0	.1%	.0%	.3%	.0%
Spectrum Software	.1	.0	.1	0	.1%	.0%	.3%	.0%
ISICAD	.1	.0	.1	0	.1%	.0%	.3%	.0%
Ziegler Informatics	.1	.0	.1	0	.1%	.0%	.3%	.0%
PADS Software	.1	.0	.1	0	.1%	.0%	.2%	.0%
Accel Technologies	.1	.0	.1	0	.1%	.0%	.2%	.0%
ASG	.1	.0	.1	0	.1%	.0%	.2%	.0%
Moda CAD	.1	.0	.0	1	.1%	.0%	.1%	.0%
Rasna Corporation	.1	.0	.1	0	.1%	.0%	.2%	.0%
Aries Technology	.1	.0	.1	0	.1%	.0%	.1%	.0%
CAE-link	.1	.0	.1	0	.1%	.0%	.1%	.0%
Facility Mapping Systems	.1	.0	.0	0	.1%	.0%	.1%	.0%
Terr-Mar Resource Info Svs	.1	.0	.0	1	.1%	.0%	.1%	.0%

(Continued)

Table 25 (Continued)
1992 CAD/CAM/CAE/GIS Market Share Update

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Accugraph	.0	.0	.0	0	.1%	.0%	.1%	.0%
Algor Interactive Systems	.0	.0	.0	0	.1%	.0%	.1%	.0%
Massteck	.0	.0	.0	0	.1%	.0%	.1%	.0%
Teradyne	.0	.0	.0	0	.1%	.0%	.1%	.0%
Engineered Software	.0	.0	.0	0	.0%	.0%	.1%	.0%
MacNeal-Schwendler	.0	.0	.0	0	.0%	.0%	.1%	.0%
ALDEC	.0	.0	.0	0	.0%	.0%	.0%	.0%
Areon	.0	.0	.0	0	.0%	.0%	.0%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.1%	.0%
Genrad	.0	.0	.0	1	.0%	.0%	.1%	.0%
FEA	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	10.0	9.7	.2	4,412	12.6%	23.2%	.7%	34.5%
All Companies	79.3	41.8	34.2	12,796	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	74.8	40.9	31.1	12,702	94.4%	97.9%	90.9%	99.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	4.4	.9	3.1	94	5.6%	2.1%	9.1%	.7%
All Hardware Companies	41.4	40.5	.0	12,396	52.2%	96.9%	.0%	96.9%
All Turnkey & SW Companies	37.9	1.3	34.2	400	47.8%	3.1%	100.0%	3.1%

Source: Dataquest (July 1993)

For More Information...

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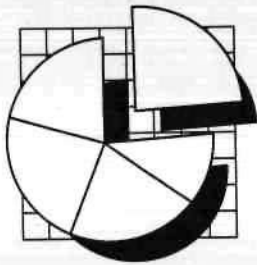
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Software

CAD/CAM/CAE and GIS Personal CAD Forecast



Market Statistics

1993

Program: Personal CAD and Distribution Channels Worldwide

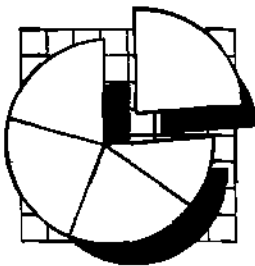
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Software

CAD/CAM/CAE and GIS Personal CAD Forecast



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Table of Contents

	Page
Worldwide Forecast Assumptions.....	1
Worldwide Forecast Drivers	1
Macro Economy.....	2
Currency.....	2
Technology.....	5
Indispensability	5
Late Buyers.....	5
Desktop Dominance.....	5
Unbundling of Software.....	5
Replacement Market	5
Software	5
North American Forecast Drivers	7
Capital Spending.....	7
Cuts in Defense Spending.....	7
European Forecast Drivers	8
Recession.....	8
Growth	8
Asian Forecast Drivers	8
Capital Spending.....	8
Business Confidence	8
Software Leads Hardware	9
Application Forecast Assumptions	9
Mechanical Forecast Assumptions.....	9
Software Price	9
Hardware Price Erosion	10
Second-Tier Products	11
Hardware Performance	11
Modeling Technologies.....	11
Technology Dependence	11
Manufacturing Industry.....	11
Europe	12

Table of Contents (Continued)

	Page
AEC Forecast Assumptions	12
Untapped Users	12
Mandates for CAD.....	12
Electronic Partnering	12
Competitive Advantage.....	12
Software Leverage	12
New Functionality	13
Europe.....	13
Growth Inhibitors to the AEC CAD Industry	13
Low Payoff to Users	13
Lack of Interoperability.....	13
Low-Cost Solutions.....	13
Late Adopters	13
GIS Forecast Assumptions	13
Low Penetration.....	14
New Technologies.....	14
New Applications in Industries Such As Retail and Insurance Will Drive Growth.....	14
Easier and Less Expensive GIS.....	14
Solutions Filling a Need	14
The U.S. Government.....	15
Growth Inhibitors to the GIS Market.....	15
High Cost	15
Stuck Projects.....	15
Price Pressure	15
Europe.....	15
EDA Forecast Assumptions.....	16
New Tool Technologies	16
Analysis Tools.....	16
Migration of IC Layout.....	16
Europe.....	16
Growth Inhibitors to the EDA Market.....	16
Transition and Shifts.....	16

Table of Contents (Continued)

	Page
Legal Issues	16
Use of PC-Based Tools Will Drop Significantly	17
Forecast Methodology	17
Forecast Accuracy	17
Segmentation Definitions	21
Applications.....	22
Mechanical.....	22
Architecture, Engineering, and Construction (AEC).....	22
Geographic Information Systems (GIS)/Mapping	22
Electronic Design Automation (EDA).....	22
Regions	23
North America	23
Europe	23
Asia	23
Rest of World.....	23
Platforms	23
Technical Workstation.....	23
Host-Dependent.....	23
Server.....	23
Personal Computer	24
Line Items.....	24

List of Figures

Figure		Page
1	Worldwide and Regional Revenue Forecast, All Applications and All Platforms	3
2	Worldwide Revenue Forecast, by Platform, All Applications	4
3	Unit Seat Shipments versus Retirements Forecast	7
4	Software Revenue Distribution Forecast, by Application	9
5	Worldwide Software Revenue Forecast, by Application	10
6	1992 Actual Total Revenue versus Dataquest 1988 Forecast for 1992	18
7	1992 Actual Unit Shipments versus Dataquest 1988 Forecast for 1992	19
8	1992 Actual Installed Base versus Dataquest 1988 Forecast for 1992	20
9	CAD/CAM/CAE and GIS Forecasting Model	21

List of Tables

Table	Page
1 CAD/CAM/CAE and GIS Forecast, by Region.....	2
2 CAD/CAM/CAE and GIS Software Revenue Forecast, by Application	6
Personal Computer	
All Applications	
3 Worldwide	26
4 North America	27
5 Europe	28
6 Asia	29
7 Rest of World.....	30
Mechanical	
8 Worldwide	31
9 North America	32
10 Europe	33
11 Asia	34
12 Rest of World.....	35
AEC	
13 Worldwide	36
14 North America	37
15 Europe	38
16 Asia	39
17 Rest of World.....	40
GIS/Mapping	
18 Worldwide	41
19 North America	42
20 Europe	43
21 Asia	44
22 Rest of World.....	45
Electronic Design Automation	
23 Worldwide	46
24 North America	47

Note: All tables show estimated data.

List of Tables (Continued)

Table	Page
25 Europe.....	48
26 Asia.....	49
27 Rest of World	50
Electronic CAE	
28 Worldwide.....	51
29 North America.....	52
30 Europe.....	53
31 Asia.....	54
32 Rest of World	55
IC Layout	
33 Worldwide.....	56
34 North America.....	57
35 Europe.....	58
36 Asia.....	59
37 Rest of World	60
PCB/Hybrid/MCM	
38 Worldwide.....	61
39 North America.....	62
40 Europe.....	63
41 Asia.....	64
42 Rest of World	65

Note: All tables show estimated data.

CAD/CAM/CAE and GIS Personal CAD Forecast

Sluggish world economic activity in 1992 caused decelerating growth in the CAD/CAM/CAE and GIS market. Dataquest expects this decelerating trend to continue in 1993. A recent survey by The Dun & Bradstreet Corporation of more than 11,000 executives in 16 countries indicated that, on a worldwide basis, optimism for sales and profits holds steady. On a regional basis, however, executives in the United States and United Kingdom measured heightened optimism, offsetting the weaker optimism of continental Europe, particularly Germany and France, and the continued pessimism of Japan. High interest rates are aggravating optimism in the European community, while Japan is suffering from weaker domestic demand and increased competitive pressures.

Despite the economy, the CAD/CAM/CAE and GIS market grew an anticipated 3.2 percent to \$15.5 billion, in part because of the devaluation of the yen and ECU against the U.S. dollar (see Table 1). On the basis of the yen, the Japanese market showed a decline of 5.9 percent. Dataquest is forecasting total revenue in the worldwide market to grow 2.7 percent in 1993, with a compound annual growth rate (CAGR) of 4.6 percent through 1997. We forecast worldwide software revenue to grow 9.5 percent in 1993, with a CAGR of 9.0 percent through 1997. This forecast is based on the market share information published in March (though changed slightly as new information became available) and will be updated in July, following an update to our market share in May. It should be noted that the forecast assumes stable currency exchange rates.

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 our client inquiry service, which can provide custom analysis of the multidimensional database.

Worldwide Forecast Assumptions

The following sections describe the main forces, worldwide, that drive the CAD/CAM/CAE and GIS forecast.

Worldwide Forecast Drivers

The worldwide CAD/CAM/CAE and GIS market will maintain consistent, steady growth during the next five years. Figure 1 shows the forecast of hardware, software, and service revenue worldwide and by region. Figure 2 shows the worldwide forecast by platform.

The following paragraphs describe the main forces driving the CAD/CAM/CAE and GIS worldwide forecast.

Table 1
CAD/CAM/CAE and GIS Forecast, by Region
(Revenue in Millions of Dollars; Actual Shipments)

	1992	1993	1994	1995	1996	1997	CAGR (%) 1992-1997
Worldwide							
Total Factory Revenue	15,485	15,909	16,602	17,432	18,371	19,346	4.6
Software Revenue	4,885	5,350	5,860	6,390	6,920	7,470	8.9
Unit/Seat Shipments	647,716	708,400	777,500	841,800	892,800	939,100	7.7
North America							
Total Factory Revenue	5,224	5,443	5,737	6,081	6,441	6,816	5.5
Software Revenue	1,669	1,870	2,070	2,270	2,460	2,660	9.8
Unit/Seat Shipments	270,345	298,900	323,500	347,300	365,700	385,200	7.3
Europe							
Total Factory Revenue	5,862	6,078	6,389	6,702	7,060	7,386	4.7
Software Revenue	1,793	1,990	2,190	2,370	2,570	2,750	8.9
Unit/Seat Shipments	234,935	257,100	287,200	312,500	330,000	342,000	7.8
Asia							
Total Factory Revenue	4,104	4,055	4,086	4,195	4,341	4,531	2.0
Software Revenue	1,327	1,380	1,460	1,580	1,690	1,810	6.4
Unit/Seat Shipments	125,922	133,000	143,200	153,200	162,600	171,300	6.3
Rest of World							
Total Factory Revenue	296	332	390	454	528	614	15.7
Software Revenue	96	120	150	170	200	240	20.1
Unit/Seat Shipments	16,514	19,400	23,600	28,800	34,500	40,600	19.7

Source: Dataquest (May 1993)

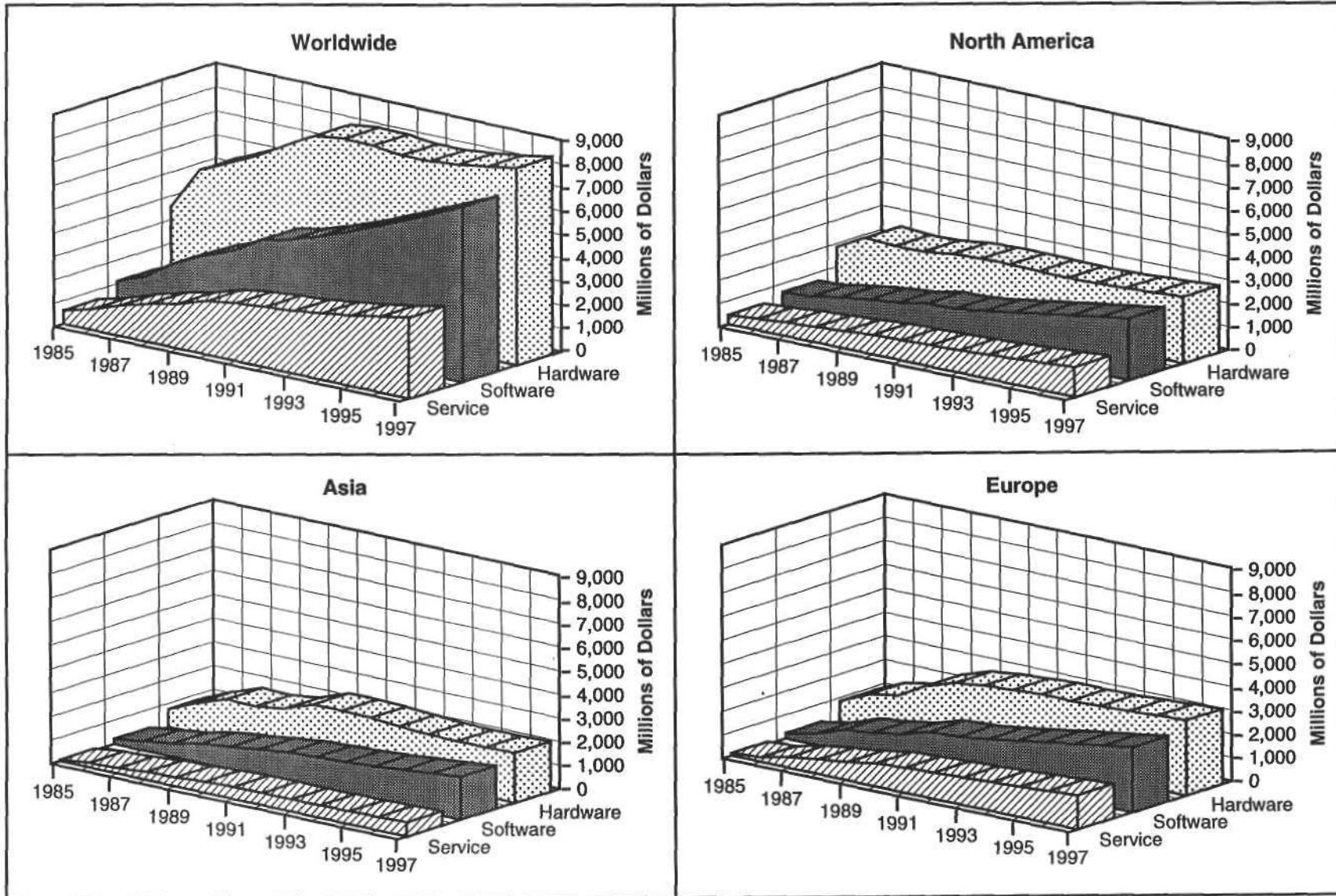
Macro Economy

The recovery with renewed optimism from worldwide recession and increased capital spending will fuel growth gradually, beginning in the United States and the United Kingdom, and in Asian countries other than Japan.

Currency

The decline of the U.S. dollar compared to the ECU and yen from 1991 to 1992 offset sluggish economic growth for multinational corporations, particularly those with a high percentage of costs denominated in dollars. Some companies are utilizing the changes in exchange rates to lower overseas prices effectively, thus stimulating demand. This is particularly true of PC companies striving to increase unit volume gains rapidly in Japan, where the local companies are vulnerable to price competition.

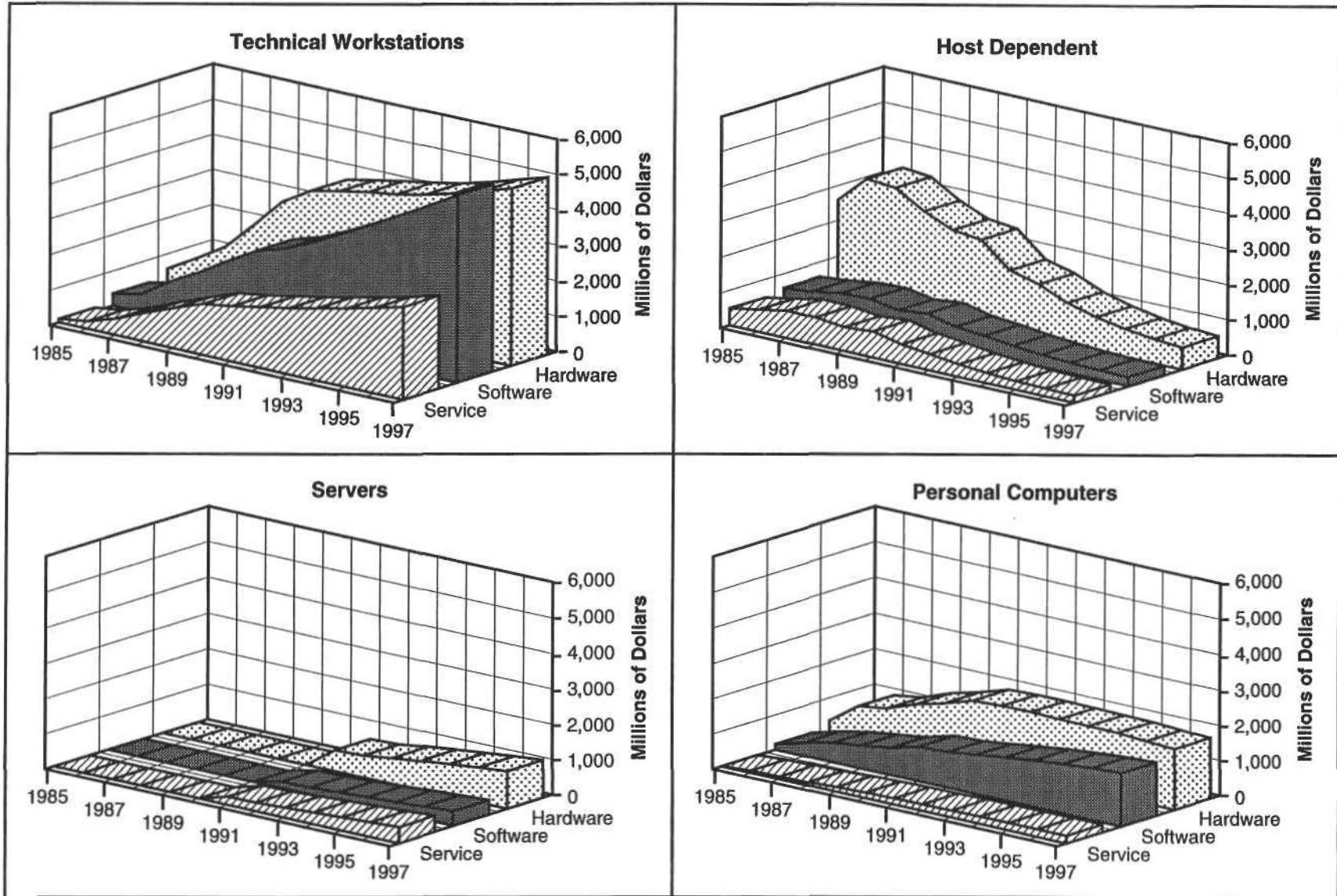
Figure 1
Worldwide and Regional Revenue Forecast, All Applications and All Platforms



Source: Dataquest (May 1993)

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Figure 2
Worldwide Revenue Forecast, by Platform, All Applications



Source: Dataquest (May 1993)

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Technology

Computing performance will continue to improve at an exponential rate in the foreseeable future. Dataquest has forecast the growth in millions of instructions per second (mips) shipments. The results show that the total mips shipped through 1992 will be matched by the shipments made in 1993. In other words, the total mips shipped will double in 1993, almost double again in 1994, and double again in 1995. This enabling resource will fuel the next-generation software tools focused on integrated solutions at the enterprise level.

Indispensability

As the complexity of the design, the need to share information, and the need to store information electronically all increase, the benefits of automation improve dramatically and the level of indispensability goes up. CAD/CAM/CAE and GIS are becoming a necessity as these factors are coupled with market pressure to produce higher quality and to reduce production cycles.

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 also is continuing, with replacements going to networked, desktop systems. The former threatens vendors whose business models depend upon high-priced workstations, while the latter provides opportunity.

Unbundling of Software

With software vendors porting to multiple platforms, software is no longer the hinge upon which hardware swings. The market is moving quickly from proprietary to open systems, resulting in a shift from bundled to unbundled software (see Table 2).

Replacement Market

The replacement market is gaining importance as replacement seats exceed 50 percent of unit sales in 1993 (see Figure 3). This saturation implies that many parallel manual systems can be eliminated and new applications developed if everyone in a company that needs access to the engineering database can have it in electronic format. The savings potential is tremendous. This saturation also implies a growing sophistication in buyers that are more informed of this technology's strategic importance.

Software

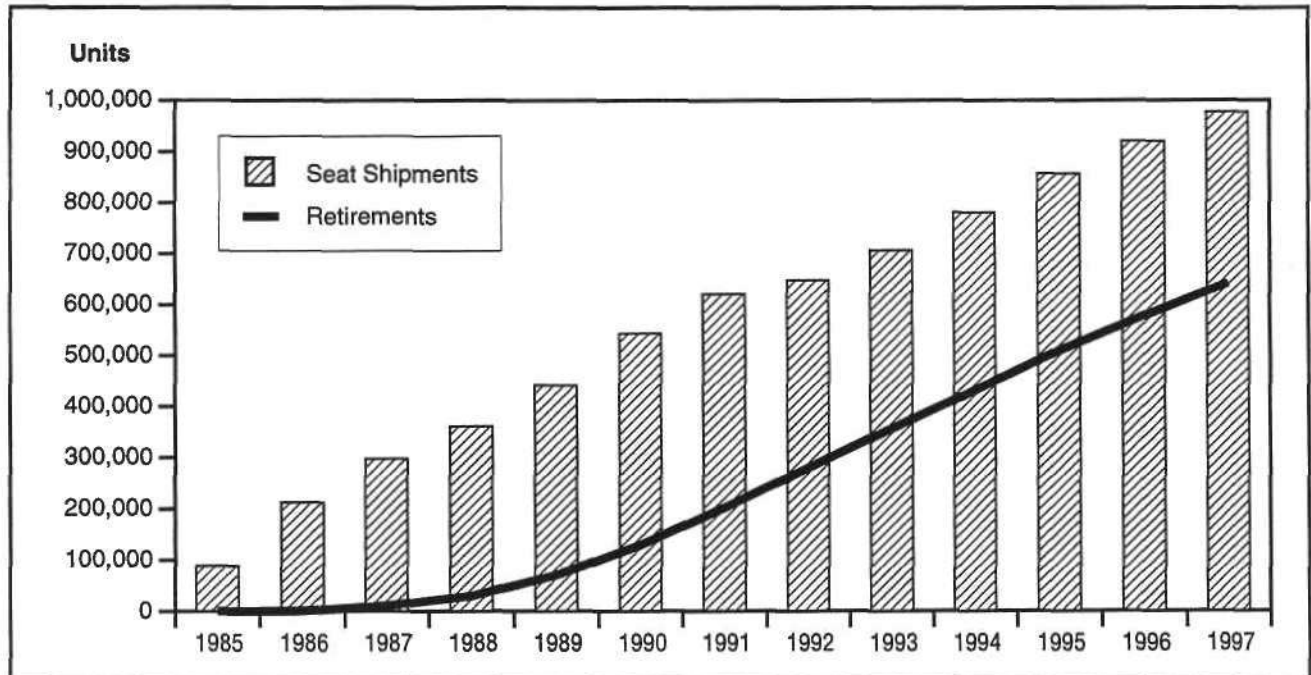
With technological advances, growing sophistication of users, and competitive pressures, the demand for software with greater ease of

Table 2
CAD/CAM/CAE and GIS Software Revenue Forecast, by Application (Millions of Dollars)

	Revenue						CAGR (%)	Percentage Distribution (%)					
	1992	1993	1994	1995	1996	1997	1992-1997	1992	1993	1994	1995	1996	1997
All Applications													
Total Software	4,885	5,352	5,862	6,389	6,923	7,467	8.9	100.0	100.0	100.0	100.0	100.0	100.0
Bundled Software	1,917	1,935	1,973	2,037	2,118	2,201	2.8	39.3	36.2	33.6	31.9	30.6	29.5
Unbundled Software	2,968	3,416	3,890	4,352	4,804	5,266	12.2	60.7	63.8	66.4	68.1	69.4	70.5
Mechanical													
Total Software	2,233	2,469	2,688	2,868	3,007	3,154	7.2	100.0	100.0	100.0	100.0	100.0	100.0
Bundled Software	1,111	1,119	1,127	1,129	1,123	1,107	-0.1	49.8	45.3	42.0	39.4	37.3	35.1
Unbundled Software	1,122	1,350	1,561	1,739	1,883	2,048	12.8	50.2	54.7	58.0	60.6	62.7	64.9
AEC													
Total Software	730	796	875	966	1,072	1,178	10.0	100.0	100.0	100.0	100.0	100.0	100.0
Bundled Software	327	347	372	404	444	483	8.1	44.8	43.8	42.5	41.7	41.1	41.0
Unbundled Software	403	449	503	562	628	695	11.5	55.2	56.3	57.5	58.3	58.9	59.0
GIS/Mapping													
Total Software	616	700	810	956	1,128	1,317	16.4	100.0	100.0	100.0	100.0	100.0	100.0
Bundled Software	297	325	364	417	482	553	13.2	48.3	45.7	44.4	43.8	42.5	42.0
Unbundled Software	318	375	447	539	646	764	19.2	51.7	54.3	55.6	56.3	57.5	58.0
Electronic CAE													
Total Software	752	812	884	945	1,005	1,057	7.0	100.0	100.0	100.0	100.0	100.0	100.0
Bundled Software	75	61	51	43	37	35	-14.1	9.9	7.4	5.7	4.3	4.0	3.8
Unbundled Software	677	751	834	902	969	1,022	8.6	90.1	92.6	94.3	95.7	96.0	96.2
IC Layout													
Total Software	225	243	269	303	341	378	10.9	100.0	100.0	100.0	100.0	100.0	100.0
Bundled Software	17	13	9	7	6	5	-21.7	7.4	4.2	3.7	3.2	2.9	0.0
Unbundled Software	209	230	260	296	335	373	12.3	92.6	95.8	96.3	96.8	97.1	100.0
PCB/Hybrid/MCM													
Total Software	330	332	336	351	370	383	3.0	100.0	100.0	100.0	100.0	100.0	100.0
Bundled Software	91	71	51	38	26	19	-26.9	27.6	21.2	14.7	11.4	8.1	5.3
Unbundled Software	239	261	286	314	343	364	8.8	72.4	78.8	85.3	88.6	91.9	94.7

Source: Dataquest (May 1993)

Figure 3
Unit Seat Shipments versus Retirements Forecast



Source: Dataquest (May 1993)

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use, flexibility, and interoperability is growing. This demand is driving the growth in business alliances between small innovative software niche players and major software vendors with resources to sell to both the new and replacement markets.

North American Forecast Drivers

Of the three major worldwide regions, North America CAD/CAM/CAE and GIS revenue growth was an anemic 3.4 percent to \$5.2 billion in 1992 and is forecast to grow at 5.5 percent CAGR through 1997. The following paragraphs describe the main factors driving the North American forecast.

Capital Spending

According to Dun & Bradstreet's latest monthly survey of 1,000 manufacturers nationwide, optimism is at a three-year high and capital spending is expected to increase 12 percent in 1993 because of competitive global pressures, need for improved productivity, and cost of capital, which is at a three-year low. This bodes well for increased investment in CAD/CAM/CAE and GIS systems, particularly mechanical applications.

Cuts in Defense Spending

Cuts in defense spending will tend to soften the market. However, a focus on fewer, more sophisticated weapons systems will promote use of the latest design optimization and simulation capabilities.

European Forecast Drivers

The European market grew 5.3 percent in 1992 to \$5.9 billion, making Europe the fastest growing region worldwide. However, the outlook for 1993 is not quite as positive, with growth expected to be 3.7 percent. The major factor behind this slowing growth is the sluggish German economy, which accounts for 34 percent of the European market. A slowdown in Germany ripples through all other European industries. The following paragraphs describe the main factors driving the European forecast.

Recession

The general recessionary economic climate throughout much of Europe during 1991 and 1992 depressed capital investment and orders for information technology products. Most of the European countries are in or near a recession. The picture for 1993 does not look good. Many individual countries face a slowdown in domestic activity, while there is little hope of strong demand pressures from the United States or Japan to help in any economic upturn anytime soon.

Growth

On average, gross domestic product growth in Europe in 1993 is expected to be only 0.3 percent, with an upturn of 1.9 percent growth expected in 1994. Major European economies such as Germany, United Kingdom, Italy, Spain, and Sweden also have accumulated massive budget deficits that will influence governments to reduce public spending even further and to increase taxes, which in turn will reduce consumer spending. Even the recent falls in interest rates will not change this fact.

Asian Forecast Drivers

The Asian market grew 1.2 percent in 1992 to \$4.1 billion. However, the Japanese market declined 6 percent on a yen basis. With 94 percent of the Asian CAD/CAM/CAE and GIS market in Japan, the Japanese economy dominates this segment. Further contraction of the market expected in 1993 will result in a CAGR through 1997 of 2.0 percent. The following paragraphs describe the main factors driving the Asian forecast.

Capital Spending

Dataquest estimates that capital spending by Japanese companies will fall 12.7 percent in 1993, following a precipitous drop of 28.7 percent in 1992. However, signs of recovery in the macro economy are starting to show.

Business Confidence

According to the Sakura Institute of Research in Japan (January 1993), business confidence is expected to brighten some in fall 1993. Recovery is expected to be fueled by small and medium-size manufacturing companies.

Software Leads Hardware

The preference for Japanese companies investing in CAD/CAM/CAE and GIS has been for low-cost, decentralized networked systems and big central mainframes. Japan- and U.S.-supplied technical workstations are emerging as the platform of choice for most CAD/CAM/CAE and GIS applications. Strong interest in the latest high-end software offerings is dragging the necessary hardware.

Application Forecast Assumptions

Expected growth in AEC and GIS applications during the next three or four years will add significantly to the total growth of the industry and will exceed growth forecasts for all mechanical and electronic applications (see Figures 4 and 5). Factors in this shift in the total market application mix include market penetration, new application development, and shifting trends in average selling prices.

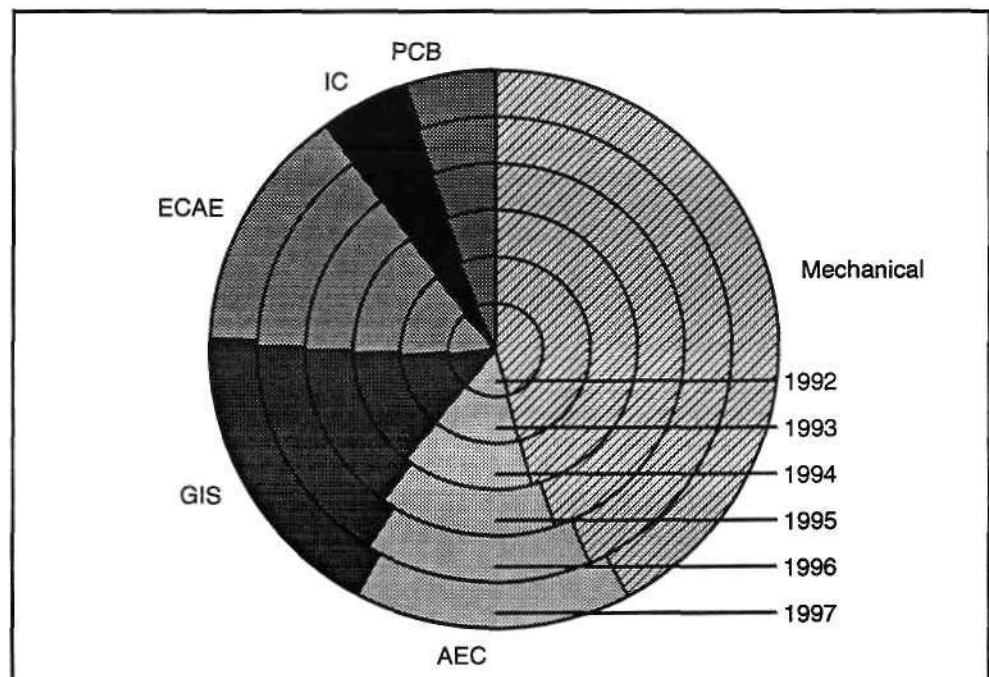
Mechanical Forecast Assumptions

The mechanical application area is the largest of the CAD/CAM/CAE and GIS market, with 49 percent share and software revenue growth of 9.3 percent in 1992. The following paragraphs describe the main issues driving the mechanical forecast.

Software Price

Dataquest expects software prices to stabilize or increase slightly for leading products. The average value of software shipped per seat has increased slowly. In 1987, total software revenue divided by

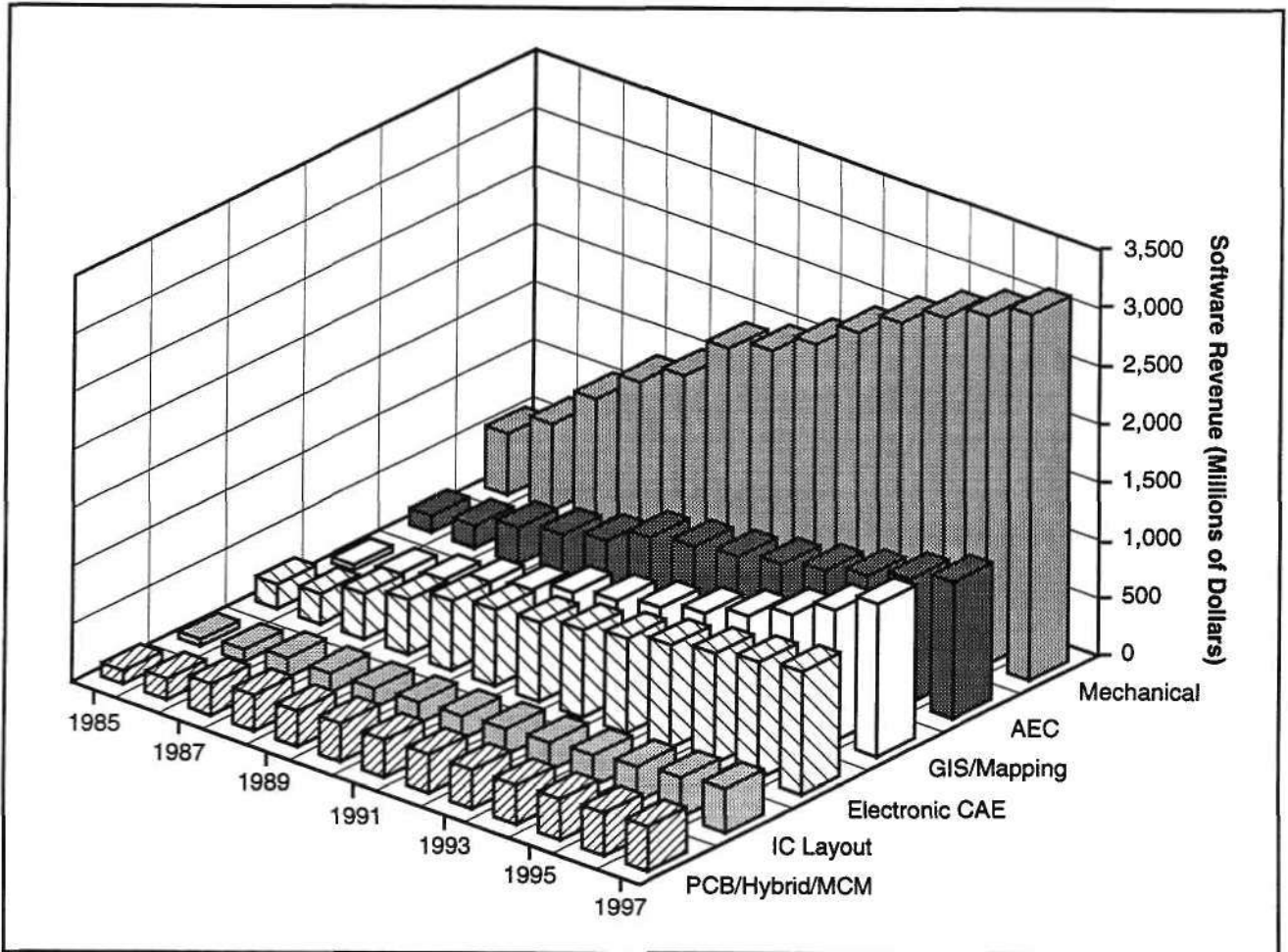
Figure 4
Software Revenue Distribution Forecast, by Application



Source: Dataquest (May 1993)

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Figure 5
Worldwide Software Revenue Forecast, by Application



Source: Dataquest (May 1993)

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total number of seats shipped was \$6,740. The average value rose to \$8,140 in 1992 and is forecast to rise to \$9,390 by 1997. Corresponding numbers in 1992 are \$17,040 for technical workstation-based software, \$2,470 for the PC, and \$16,270 for host-based terminals. Leading vendors on all platforms have been raising prices directly or indirectly with new pricing structures for network licensing or site licensing.

Hardware Price Erosion

Dataquest expects hardware price erosion to continue, but at a slower rate as package complexity increases and accelerates demand for hardware purchases that provide speed, memory, and storage. This trend can be expected on all platform configurations. Supercomputers increasingly are being used for high-end simulation and analysis applications. Technical workstations range from very expensive, high-performance, real-time imaging systems to lower-cost, two-dimensional documentation systems. The need for integrated applications across platforms will cause significant upgrade and system replacements.

Second-Tier Products

Dataquest expects second-tier products with "stale" technology to fight price erosion. These second-tier vendors are struggling to build market share in an atmosphere of rampant price cutting, particularly on the PC platform.

Hardware Performance

With enabling technology providing increased mips, software vendors can redefine the concept of interactive design. For example, designers will simulate the crash of one car into another and test to see if the doors still open. The value of this level of computing will change the nature of mechanical CAD/CAM/CAE. The result will allow anyone in the design and manufacturing process to simulate real problems, to evaluate potential solutions, and to communicate the change instantly to all involved.

Modeling Technologies

Core modeling technologies will evolve slowly to support a product data structure growing in complexity. Three-dimensional solutions are replacing two-dimensional solutions, which will be replaced by next-generation, integrated, and solid-modeling-based solutions. The more complete data structure with improvements in performance is rapidly building strong interest with end users. Progress is being made in integration between the model and analysis applications, between the model and documentation, and further into manufacturing applications.

Technology Dependence

The major applications in mechanical applications are defined: Product conception, development, production, operation and support will be necessary applications areas a hundred years from now. The dramatic changes taking place in the discrete manufacturing world because of competitive pressures are forcing shorter development cycles, localization, and need for improved quality, resulting in a complexity that forces the users to be fully dependent upon this technology.

Manufacturing Industry

The growth opportunity in each country depends upon the success and health of the local manufacturing industries. Multinational corporations will fuel the growth in newly industrialized countries. Each country has a dominant industry or market segment that sets the tone for CAD/CAM/CAE use. The evolution of these industries has had an important impact on the growth of the CAD/CAM/CAE market in each region and has directed the success of many vendors trying to serve these markets. As an example, the automotive industries in Japan, the United States, Germany, Italy, and France have a major influence on these local CAD/CAM/CAE markets. Aerospace, a major force in the U.S. market, is less of a force in Europe and a minor but growing interest in Japan. All of the other manufacturing industries, such as fabricated metal, machinery, and consumer products, have strongholds in various locations around the world.

For example, the machinery industry represents a significant local CAD/CAM/CAE opportunity in Japan and Germany.

Europe

The automotive and aerospace industries, which are the largest customers of mechanical CAD/CAM/CAE tools, are suffering during the ongoing recession in Europe and experiencing budget and staff cuts. On top of this, 34 percent of the European mechanical market is in Germany, where the economy is now in recession and manufacturing output is down. Growth for mechanical CAD in 1992 was only 3.2 percent and is expected to be 3.0 percent in 1993 because the German economy is not expected to get out of its recession before mid-1994 at the earliest.

AEC Forecast Assumptions

The AEC application area had software revenue growth of 7.1 percent in 1992. The five-year CAGR for software is forecast to be 10 percent. The following paragraphs describe the main factors driving the AEC forecast.

Untapped Users

A significant pool of untapped users still exists. The current relatively low market penetration of AEC CAD systems should allow steady worldwide growth during the next five years, despite constant volatility in demand for the building and infrastructure products to be designed.

Mandates for CAD

Electronic design data is increasingly required by the designer's client, from the U.S. federal government to the small commercial developer. Design firms also are growing at the expense of smaller firms. These large end users will increasingly require their employees and suppliers to adopt automation tools in the design and construction process.

Electronic Partnering

Designers in the AEC industry are finding themselves in markets that are more regionally and globally competitive, markets that favor partnering across design disciplines. Smaller design firms will increasingly buy CAD systems, or risk being dropped from consideration as a partner.

Competitive Advantage

CAD purchases are increasingly justified as a competitive advantage in both sales and design reviews. The architect that cannot produce the fourth iteration of a proposed design before signing up a client will lose out to the group that can use changes in a proposal to ratchet a prospect gradually toward closure.

Software Leverage

AEC CAD vendors can fuel upgrade revenue among sophisticated users by leveraging software advances first developed in mechanical design, such as faster structural analysis tools or incorporation of design rules.

New Functionality

Data and database functions (versus graphics functions) will increase in importance in AEC design systems, creating opportunities to sell users significant new functionality.

Europe

AEC growth in Western Europe is tied to the improvement of the infrastructure, manufacturing plants, and power stations in Eastern Europe. In particular, German construction companies are involved in projects in the former East Germany and in Central and Eastern Europe. The encouraging signs that the U.K. economy is picking up also positively affect the construction industry.

Growth Inhibitors to the AEC CAD Industry

The following paragraphs describe trends that will inhibit growth in the AEC CAD industry.

Low Payoff to Users

AEC's one-design/one-build structure means that CAD provides fewer economic benefits to these users than does the one-design/build-many structure of manufacturing. Construction, which is essentially a prototype build, is fraught with uncertainties and delays that are hard to change using current design systems.

Lack of Interoperability

Designs are often split among several different companies representing different aspects of the design process. User companies often have different CAD systems that do not communicate well, and alliances and consolidations in user organizations will only highlight the issue.

Low-Cost Solutions

Because most AEC design is still focused on drafting, which requires relatively little computing power, PC-based growth will be strong for the foreseeable future and PC-based solutions will produce less revenue for the vendor than will other platforms.

Late Adopters

Attitudes of potential users inhibit market growth. Many experienced architects resist change in both the design and construction processes. As this self-destructive mode of operating erodes the viability of the profession, the CAD market is also impacted because many architects that were once prospects for CAD systems are now unemployed.

GIS Forecast Assumptions

The GIS application area had software revenue growth of 12.4 percent in 1992. The five-year CAGR for software revenue is forecast to be 16.4 percent. The assumptions behind the GIS forecast are built both on optimism that the world economy will gradually improve during the forecast period, and on an expectation that global competition will increase. The following paragraphs describe assumptions used to build Dataquest's GIS market forecast.

Low Penetration

Bread-and-butter prospects in government and utilities are charged with maintaining information on land and assets in perpetuity. A large number of utilities, and sovereign and local governments all over the world, are still stuck with tabular data and paper maps (which will degrade over time). These create a plentiful supply of prospective buyers of the more readily changed and renewed computer maps—a first step to building a GIS system.

New Technologies

Faster, cheaper computers and developments in open, distributed systems open the door to an expanded user base. Advances in global positioning systems (GPSs) and aerial photography are making it possible to create GISs significantly more accurate and complete than existing paper maps, giving experienced users some compelling reasons to reinvest. Portable computers, multimedia, cheaper storage, and better compression of satellite imagery will create more opportunities to develop richer, more accurate, and more useful GIS systems. Although many markets will take advantage of these technologies, there is no other market as ready, willing, and able to put to work such a wide range of technology enhancements. A number of users invested in image-oriented GIS systems in the last year or two, either supplementing or completely bypassing conversion of existing paper data. This has helped provide a "mid-life kick" to a market that has been slowed by troubled pilot projects.

New Applications in Industries Such As Retail and Insurance Will Drive Growth

Wherever there is competition for a limited prize—whether the prize is a political or economic reward—GIS can create a competitive edge. Wherever assets or investments are geographically dispersed, GIS offers significant management capabilities. Revenue is growing at more than 50 percent per year among new applications. However, there is a wide band of uncertainty surrounding revenue opportunities. Several new applications in GIS are destined to become embedded as a feature that will produce relatively little revenue in other software programs (and markets), rather than as a standalone product in the GIS market.

Easier and Less Expensive GIS

Inexpensive spatial data, both public and private, is accumulating and can be passed on to new users. Successful multiparticipant projects are growing, creating larger data sets that can be profitably resold by government/industry consortia. Also, although Dataquest does not envision the technology miracle that will eliminate development costs, implementation of GIS in new sites will be easier and less expensive than it previously has been.

Solutions Filling a Need

GIS addresses the information age's growing problem of overload. Any product that addresses a visible problem is more certain to grow than are solutions still looking for the problem.

The U.S. Government

GIS is one of the rare markets where relatively simple government action can directly fuel industry growth. In fact, the GIS industry depends on government cooperation for base data development. Governments all around the world are cooperating by developing spatial data standards, more sophisticated mapping goals, and increased cooperation across federal and local governments. The U.S. federal government is in a particularly influential position, and all stars are favorably positioned. The LANDSAT program appears to be headed toward making satellite imagery more affordable. GPS satellites are proving extremely valuable outside of defense applications. Freedom of information remains a viable U.S. federal concept, creating opportunities to exploit low-cost, government-generated spatial data. The stage could not be set better for the tenure of a new U.S. president known to appreciate the importance of information technology.

Growth Inhibitors to the GIS Market

High Cost

No silver bullet will emerge to create a low-cost, meaningful data set for traditional customers in government and utilities. Data conversion will remain costly, despite substantially lower scanning costs and increasingly improved automated conversion products. The high cost will remain because, as existing paper records head toward computerization, widespread minor inaccuracies begin to be examined, often for the first time. The significant cost of correcting prior errors and omissions is inevitably bundled into the cost of "conversion." At the same time, increasingly complex applications require increasingly accurate data, also raising conversion costs.

Stuck Projects

The significant number of traditional GIS/mapping projects stuck in the pilot phase will reduce demand for new products, as users struggle to implement existing purchases. Even worse, the negative publicity created by these projects will chill the buying impulse among nonusers, reducing the ability of GIS projects to compete with other applications for capital equipment dollars.

Price Pressure

Computer prices will certainly drop, even in technical applications such as GIS, where higher-performance hardware will command a premium price. Software prices are likely to come under increasing pressure, despite the industry's current ability to hold overall seat prices relatively even. Our current forecast is built on declining hardware and steady software prices, primarily because of opportunities to add significant software data and functionality content to new sales among core, noncommodity buyers. Any significant deviation from this model would affect the forecast.

Europe

GIS data in Europe is prohibitively expensive and not readily available, slowing down the potential growth. Also holding back the

development of GIS are the current state of the various European economies; the enormous budget deficits of major economies such as Germany, Italy, and Great Britain; and major cuts in public spending.

EDA Forecast Assumptions

The year 1992 showed a glimmer of hope in the EDA industry, with software revenue year-to-year growth rates climbing back to 8.3 percent, driven by the continued strength of the IC layout software industry and a resurgence in the CAE market. Dataquest expects EDA software revenue growth to decrease slightly to 6.1 percent year-to-year for 1993. Printed circuit board (PCB) software in particular will remain stagnant until multichip module (MCM) technologies begin to affect the market, which Dataquest anticipates will take effect in the 1994-to-1995 time frame. The following paragraphs describe the factors that will help spur EDA software growth.

New Tool Technologies

New tool technologies, including electronic system level design automation (ESDA), signal integrity, and design automation are becoming available, fueling growth.

Analysis Tools

Increasing clock frequencies require tighter design tolerances that require sophisticated analysis tools to ensure proper operation.

Migration of IC Layout

Migration of IC layout technologies to system designers in the form of floor planners may prove to be the vehicle to expand physical IC design into the larger ASIC design community.

Europe

The EDA industry in Europe is now characterized by two or three big players jockeying for position. Furthermore, following the merger of Cadence Design Systems Inc. and Valid Logic Systems Inc., and several large end-user mergers, some strategic account changes have occurred and will continue. The total software revenue is unaffected, but market share is the prize for the winning EDA company.

Growth Inhibitors to the EDA Market

Dataquest expects the factors described in the following paragraphs to have a detrimental effect on the health of the EDA market in the short term.

Transition and Shifts

Product transition and strategy shifts will have a short-term downward effect. Difficulties at the No. 1 supplier of EDA software, Cadence, may cause a stall in the purchases of new tools as users ponder their options. Ongoing consolidations of key EDA technologies, including simulation and signal integrity, will also protract buying decisions.

Legal Issues

Legal issues may induce fear, uncertainty, and doubt in buyers' minds. The recent spate of legal actions (for example, Synopsys

versus Cadence, Analogy versus Anacad/Mentor Graphics, and stockholders versus Cadence) may divert the attention of the buying public and will definitely garner the attention of top management at the EDA vendors.

Use of PC-Based Tools Will Drop Significantly

Looking to EDA's future, Dataquest anticipates the use of what have classically been called PC-based tools to drop significantly. The Dataquest factors determining the differentiation of technical workstations from PCs are a virtual multitasking operating system (UNIX, VMS, and DOMAIN), the ability to run high-performance graphic applications in a multiuser environment, and the user's potential range of expansion on the platform. Windows NT on the Pentium chip will challenge this differentiation.

Dataquest anticipates that use of "classical" PCs as EDA platforms will begin to diminish significantly in 1995. At that time, classes of tools will be differentiated not upon hardware platform or operating system, but rather upon the features and functionality of the tools themselves. The emergence of Windows NT will have a minimal impact upon the overall revenue of the EDA software industry. However, its effect upon competing operating systems, average selling prices, distributing practices, and business and marketing practices will be far-reaching.

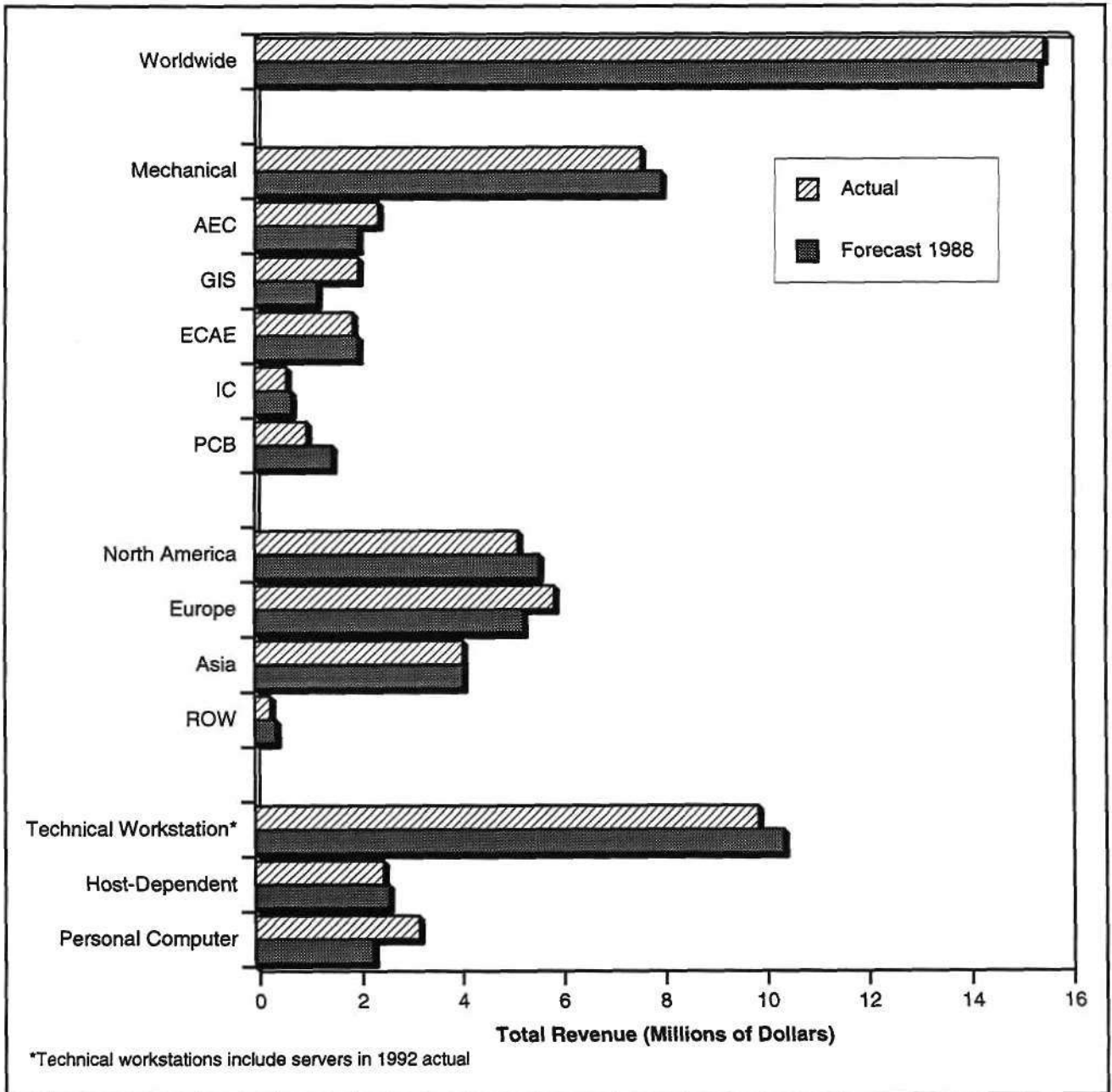
Forecast Methodology

Forecast Accuracy

This forecast model for the CAD/CAM/CAE and GIS markets has withstood the test of time. Figures 6, 7, and 8 compare the 1992 market share revenue, shipments, and computed installed base with a forecast of 1992 from 1988 market share numbers. These 1988 forecast numbers were used because they were found intact (in a computer) and untouched since 1989. Comparison is shown worldwide, for each application, each world region, and each platform (servers, which were not followed in 1988, were added to workstations for the 1992 market share numbers). These figures demonstrate Dataquest's history of successfully forecasting multiple elements of the CAD/CAM/CAE and GIS markets.

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.

Figure 6
1992 Actual Total Revenue versus Dataquest 1988 Forecast for 1992

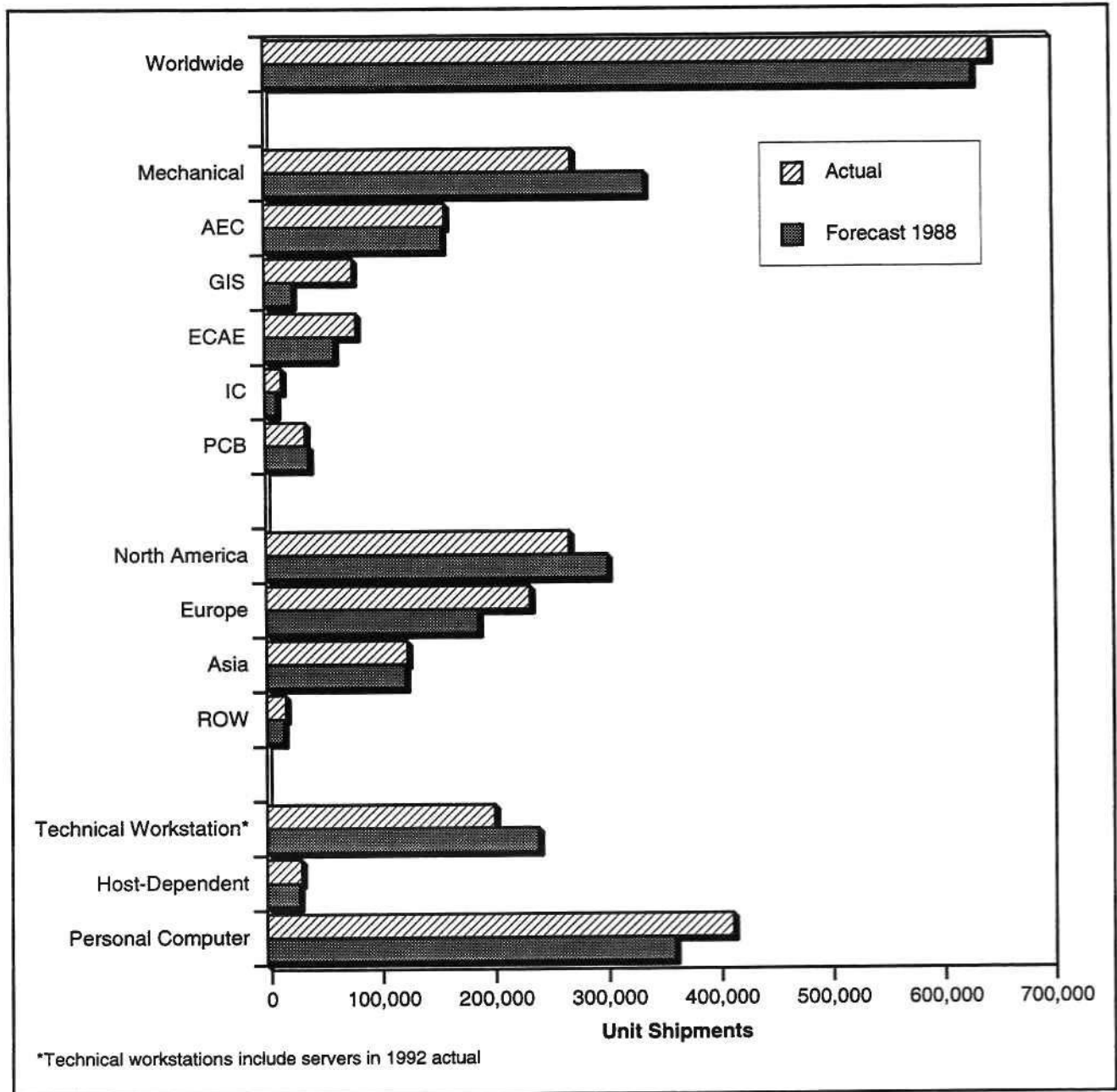


Source: Dataquest (May 1993)

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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 from the events of 1993.

Figure 7
1992 Actual Unit Shipments versus Dataquest 1988 Forecast for 1992



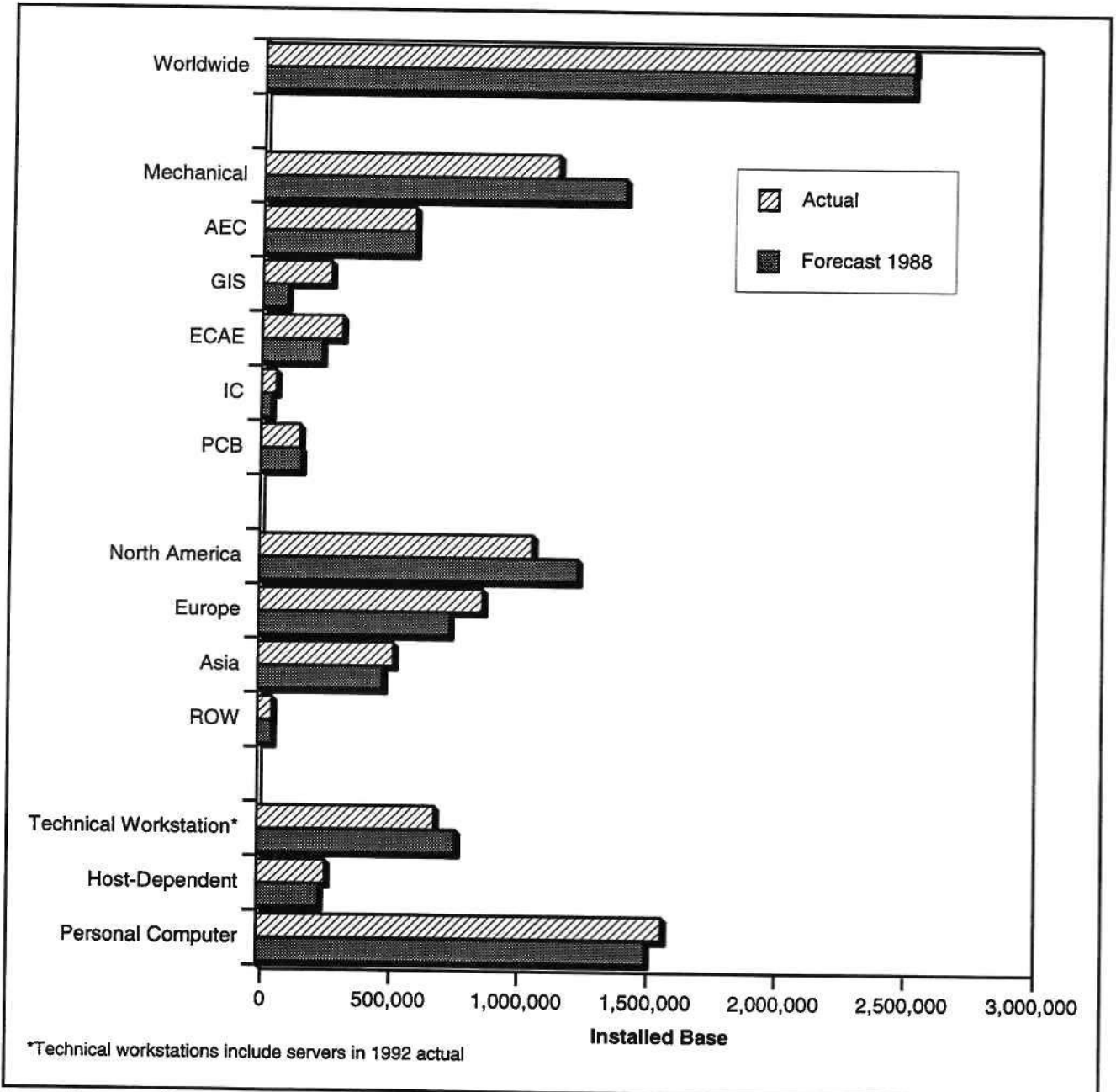
Source: Dataquest (May 1993)

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Figure 9 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.

Figure 8
1992 Actual Installed Base versus Dataquest 1988 Forecast for 1992

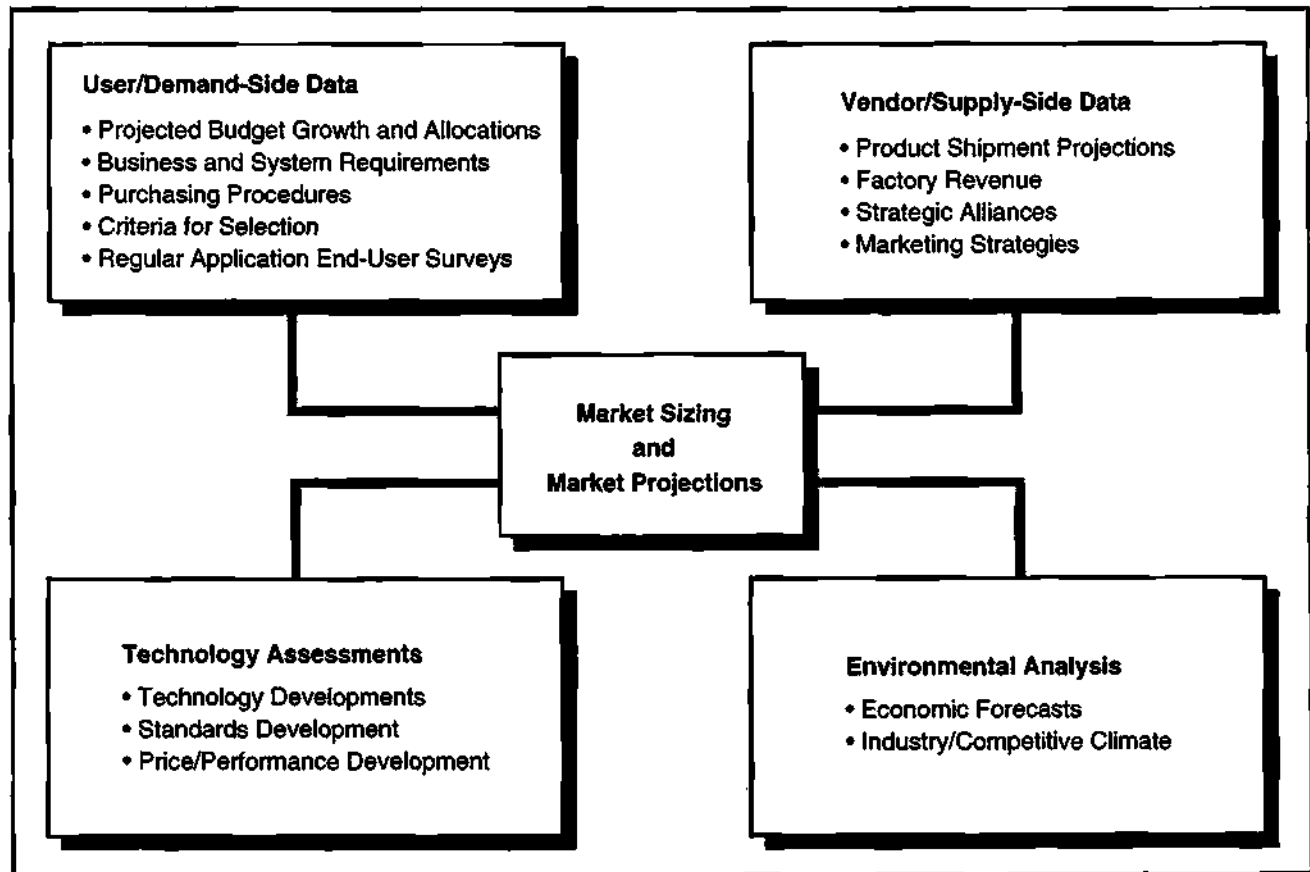


Source: Dataquest (May 1993)

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- **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.

Figure 9
CAD/CAM/CAE and GIS Forecasting Model



Source: Dataquest (May 1993)

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- **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.
- **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 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 (CAE)**—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.
- **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.
- **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.

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 bundle (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).

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

Application: All Applications
Region: Worldwide
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	249,085	280,309	347,993	402,103	414,095	452,610	493,300	525,230	541,500	553,100	14	6
Unit Shipments or Seats	249,085	280,309	347,993	402,103	414,095	452,040	492,790	524,780	541,110	552,650	14	6
CPU Installed Base	646,426	875,632	1,125,509	1,371,724	1,572,925	1,761,520	1,943,700	2,112,030	2,255,140	2,374,450	25	9
Installed Seats	646,426	875,632	1,125,509	1,371,724	1,572,925	1,761,520	1,943,700	2,112,030	2,255,140	2,374,450	25	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	20.8	19.5	19.5	14.1	14.2	12.6	11.4	10.7	10.3	10.0	-9	-7
Hardware-Only ASP	4.7	4.8	4.6	4.1	4.0	3.7	3.4	3.2	3.0	2.9	-4	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,302	1,570	1,828	1,861	1,872	1,854	1,838	1,824	1,771	1,721	10	-2
CPU Revenue	1,163	1,458	1,697	1,736	1,743	1,737	1,728	1,721	1,678	1,637	11	-1
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	139	112	131	126	129	117	110	102	93	84	-2	-8
Software Revenue	658	767	984	1,011	1,117	1,225	1,329	1,407	1,471	1,508	14	6
Bundled	156	140	139	150	152	147	137	129	121	112	-1	-6
Unbundled	501	627	844	860	964	1,078	1,193	1,278	1,351	1,395	18	8
Service Revenue	88	130	155	170	181	190	204	209	214	216	20	4
Total Factory Revenue	2,047	2,466	2,967	3,042	3,170	3,270	3,371	3,440	3,456	3,444	12	2
Increase over Prior Year (%)	23	20	20	3	4	3	3	2	0	-0		

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

Source: Dataquest (May 1993)

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

Application: All Applications
Region: North America
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	141,725	129,427	144,118	175,300	187,953	207,490	220,560	231,580	237,470	243,870	7	5
Unit Shipments or Seats	141,725	129,427	144,118	175,300	187,953	207,000	220,170	231,280	237,240	243,690	7	5
CPU Installed Base	364,235	463,171	551,078	640,295	716,401	793,340	869,900	942,820	1,003,610	1,053,210	18	8
Installed Seats	364,235	463,171	551,078	640,295	716,401	793,340	869,900	942,820	1,003,610	1,053,210	18	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	25.7	17.1	19.4	14.7	10.7	9.4	8.3	7.7	7.0	6.6	-20	-9
Hardware-Only ASP	4.0	4.8	4.5	4.0	3.9	3.6	3.3	3.1	3.0	2.8	-1	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	572	625	657	712	741	754	737	726	706	696	7	-1
CPU Revenue	569	608	637	696	719	732	716	707	689	680	6	-1
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	3	17	20	17	22	22	20	19	17	16	60	-6
Software Revenue	260	305	364	393	447	499	555	594	625	645	15	8
Bundled	7	6	5	4	4	4	3	3	3	3	-13	-5
Unbundled	253	299	359	389	443	496	552	590	622	642	15	8
Service Revenue	33	43	48	50	58	64	70	72	74	76	15	5
Total Factory Revenue	866	974	1,069	1,156	1,246	1,317	1,362	1,392	1,406	1,417	10	3
Increase over Prior Year (%)	24	12	10	8	8	6	3	2	1	1		

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

Source: Dataquest (May 1993)

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

Application: All Applications
Region: Europe
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	66,843	93,225	118,221	144,215	148,879	162,100	181,810	195,420	199,820	199,820	22	6
Unit Shipments or Seats	66,843	93,225	118,221	144,215	148,879	162,100	181,820	195,430	199,830	199,840	22	6
CPU Installed Base	172,447	253,322	346,103	447,679	534,943	615,750	695,260	767,590	826,250	869,930	33	10
Installed Seats	172,447	253,322	346,103	447,679	534,943	615,750	695,260	767,590	826,250	869,930	33	10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	13.9	24.9	25.4	19.6	19.3	16.7	15.1	14.4	14.1	13.8	9	-6
Hardware-Only ASP	5.3	5.0	4.9	4.3	4.2	3.9	3.5	3.3	3.1	3.0	-6	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	398	530	641	675	685	677	692	694	671	641	15	-1
CPU Revenue	370	481	583	619	628	627	644	649	630	604	14	-1
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	28	49	58	56	58	50	48	45	41	37	20	-8
Software Revenue	207	258	377	341	377	411	442	467	490	502	16	6
Bundled	33	33	29	31	42	46	46	45	44	43	6	1
Unbundled	174	225	348	310	335	364	396	422	446	459	18	7
Service Revenue	33	44	54	65	69	71	78	80	82	83	21	4
Total Factory Revenue	637	832	1,072	1,081	1,131	1,159	1,212	1,241	1,243	1,226	15	2
Increase over Prior Year (%)	24	30	29	1	5	3	5	2	0	-1		

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

Source: Dataquest (May 1993)

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

Application: All Applications
Region: Asia
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	36,568	51,762	77,314	70,428	64,241	67,720	72,220	75,430	77,090	77,690	15	4
Unit Shipments or Seats	36,568	51,762	77,314	70,428	64,241	67,630	72,090	75,280	76,930	77,400	15	4
CPU Installed Base	98,542	142,895	205,408	251,413	280,249	301,250	315,980	325,840	334,370	343,120	30	4
Installed Seats	98,542	142,895	205,408	251,413	280,249	301,250	315,980	325,840	334,370	343,120	30	4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	28.4	18.2	18.2	13.1	13.2	11.7	10.5	9.9	9.4	9.0	-17	-7
Hardware-Only ASP	7.0	4.7	4.2	4.0	3.7	3.4	3.1	2.9	2.8	2.7	-15	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	310	384	492	422	393	367	345	330	311	291	6	-6
CPU Revenue	202	339	439	370	345	322	305	293	277	261	14	-5
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	107	45	53	52	48	44	40	37	33	29	-18	-9
Software Revenue	184	190	226	250	264	280	290	297	298	291	9	2
Bundled	116	100	105	114	106	96	87	80	73	66	-2	-9
Unbundled	68	90	121	136	158	184	203	217	226	226	23	7
Service Revenue	20	40	50	52	51	51	51	51	50	49	25	-1
Total Factory Revenue	514	615	768	724	708	697	686	678	659	630	8	-2
Increase over Prior Year (%)	21	20	25	-6	-2	-2	-2	-1	-3	-4		

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

Source: Dataquest (May 1993)

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

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

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	3,949	5,894	8,340	12,161	13,022	15,310	18,710	22,790	27,120	31,720	35	19
Unit Shipments or Seats	3,949	5,894	8,340	12,161	13,022	15,310	18,710	22,790	27,120	31,720	35	19
CPU Installed Base	11,202	16,244	22,919	32,336	41,332	51,170	62,570	75,780	90,900	108,190	39	21
Installed Seats	11,202	16,244	22,919	32,336	41,332	51,170	62,570	75,780	90,900	108,190	39	21
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	11.4	16.3	9.4	6.6	5.8	5.3	4.9	4.7	4.4	4.2	-16	-6
Hardware-Only ASP	5.5	5.0	4.6	4.3	4.0	3.7	3.4	3.2	3.1	2.9	-8	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	22	30	39	52	52	57	64	73	83	93	24	12
CPU Revenue	22	30	38	51	52	56	63	72	82	92	24	12
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	14	6
Software Revenue	7	13	17	26	29	35	43	50	58	69	46	19
Bundled	1	1	0	1	1	1	1	1	1	1	18	-10
Unbundled	6	12	16	25	28	34	42	49	57	69	47	19
Service Revenue	1	2	2	3	3	4	5	6	7	9	26	22
Total Factory Revenue	30	46	58	81	85	96	112	129	148	171	30	15
Increase over Prior Year (%)	7	52	26	40	5	13	16	16	15	15		

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

Source: Dataquest (May 1993)

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

Application: Mechanical
Region: Worldwide
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	125,231	123,360	152,081	160,147	165,938	174,180	183,420	189,180	190,470	188,870	7	3
Unit Shipments or Seats	125,231	123,360	152,081	160,147	165,938	174,120	183,330	189,080	190,360	188,730	7	3
CPU Installed Base	330,205	428,119	530,198	611,171	672,063	722,670	768,780	808,080	837,680	857,020	19	5
Installed Seats	330,205	428,119	530,198	611,171	672,063	722,670	768,780	808,080	837,680	857,020	19	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	23.2	20.9	20.2	15.6	15.3	13.7	12.4	11.8	11.3	10.9	-10	-7
Hardware-Only ASP	4.4	4.8	4.5	4.1	4.0	3.7	3.4	3.2	3.0	2.9	-2	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	645	693	819	776	786	747	713	684	649	613	5	-5
CPU Revenue	551	631	745	710	716	685	656	631	600	567	7	-5
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	94	63	75	65	70	62	57	53	49	46	-7	-8
Software Revenue	287	324	376	386	410	437	452	453	453	450	9	2
Bundled	104	88	81	93	86	84	77	71	66	60	-5	-7
Unbundled	182	236	295	293	325	353	375	382	387	390	16	4
Service Revenue	33	56	68	72	79	80	82	81	81	80	24	0
Total Factory Revenue	965	1,073	1,263	1,233	1,275	1,264	1,247	1,219	1,183	1,143	7	-2
Increase over Prior Year (%)	15	11	18	-2	3	-1	-1	-2	-3	-3		

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

Source: Dataquest (May 1993)

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

Application: Mechanical
 Region: North America
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	70,289	56,133	61,231	67,582	73,142	78,270	81,460	84,380	84,870	84,020	1	3
Unit Shipments or Seats	70,289	56,133	61,231	67,582	73,142	78,270	81,460	84,380	84,870	84,020	1	3
CPU Installed Base	183,239	225,051	258,575	283,007	300,989	318,330	337,070	356,440	371,910	381,640	13	5
Installed Seats	183,239	225,051	258,575	283,007	300,989	318,330	337,070	356,440	371,910	381,640	13	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	13.8	10.8	19.7	12.3	10.8	9.7	8.7	8.2	7.8	7.5	-6	-7
Hardware-Only ASP	3.7	4.7	4.4	4.0	3.9	3.6	3.3	3.1	2.9	2.8	1	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	267	267	274	275	287	282	270	263	251	239	2	-4
CPU Revenue	266	259	265	268	277	273	261	254	243	231	1	-4
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	8	9	6	9	9	9	8	8	8	67	-4
Software Revenue	78	104	114	117	132	141	148	149	149	146	14	2
Bundled	2	3	3	2	1	1	1	1	1	1	-9	-5
Unbundled	76	101	111	115	130	139	147	148	148	145	14	2
Service Revenue	8	16	18	16	19	20	21	21	21	21	24	2
Total Factory Revenue	353	386	406	408	437	443	439	433	421	406	5	-1
Increase over Prior Year (%)	10	10	5	1	7	1	-1	-1	-3	-4		

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

Source: Dataquest (May 1993)

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

Application: Mechanical
 Region: Europe
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	32,722	40,662	50,430	56,202	58,467	61,050	66,470	69,100	70,520	70,520	16	4
Unit Shipments or Seats	32,722	40,662	50,430	56,202	58,467	61,050	66,470	69,100	70,520	70,520	16	4
CPU Installed Base	85,121	119,419	156,994	192,307	221,779	246,270	268,910	287,540	302,320	313,080	27	7
Installed Seats	85,121	119,419	156,994	192,307	221,779	246,270	268,910	287,540	302,320	313,080	27	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	14.3	28.6	25.4	24.0	21.9	19.4	17.5	16.5	15.8	15.2	11	-7
Hardware-Only ASP	4.5	4.9	4.8	4.3	4.2	3.9	3.6	3.4	3.2	3.1	-2	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	178	242	279	272	280	266	265	258	250	240	12	-3
CPU Revenue	160	212	245	243	248	240	239	233	226	217	12	-3
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	18	30	34	29	32	26	26	25	24	23	14	-6
Software Revenue	88	107	136	129	140	152	159	161	162	161	12	3
Bundled	18	18	12	17	21	24	24	23	23	23	4	2
Unbundled	70	89	124	112	119	128	135	137	138	138	14	3
Service Revenue	13	20	24	30	33	34	36	36	36	36	26	2
Total Factory Revenue	279	369	439	431	453	452	459	455	448	438	13	-1
Increase over Prior Year (%)	22	32	19	-2	5	-0	2	-1	-1	-2		

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

Source: Dataquest (May 1993)

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

Application: Mechanical
 Region: Asia
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	20,266	24,129	36,901	31,512	29,264	29,330	29,450	29,230	28,200	27,090	10	-2
Unit Shipments or Seats	20,266	24,129	36,901	31,512	29,264	29,260	29,360	29,130	28,100	26,940	10	-2
CPU Installed Base	56,421	76,183	104,434	122,120	132,365	138,030	139,820	138,520	135,640	132,480	24	0
Installed Seats	56,421	76,183	104,434	122,120	132,365	138,030	139,820	138,520	135,640	132,480	24	0
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	33.2	19.7	19.2	14.5	14.3	12.7	11.4	10.8	10.2	9.8	-19	-7
Hardware-Only ASP	7.0	4.7	4.2	4.0	3.6	3.3	3.1	2.9	2.7	2.6	-15	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	191	172	251	209	200	178	158	143	127	113	1	-11
CPU Revenue	117	148	220	179	171	152	136	123	110	99	10	-10
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	74	25	31	30	29	26	22	20	17	14	-21	-13
Software Revenue	119	109	121	131	130	134	132	127	122	116	2	-2
Bundled	84	66	66	73	63	58	52	46	41	36	-7	-11
Unbundled	35	42	55	58	67	76	81	81	81	80	18	4
Service Revenue	12	20	25	24	25	25	24	23	21	20	21	-4
Total Factory Revenue	322	300	397	364	355	337	315	293	271	250	2	-7
Increase over Prior Year (%)	16	-7	32	-8	-3	-5	-7	-7	-8	-8		

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

Source: Dataquest (May 1993)

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

Application: Mechanical
Region: Rest of World
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	1,954	2,436	3,518	4,850	5,066	5,530	6,020	6,470	6,870	7,250	27	7
Unit Shipments or Seats	1,954	2,436	3,518	4,850	5,066	5,530	6,020	6,470	6,870	7,250	27	7
CPU Installed Base	5,423	7,466	10,194	13,736	16,930	20,030	22,980	25,570	27,810	29,820	33	12
Installed Seats	5,423	7,466	10,194	13,736	16,930	20,030	22,980	25,570	27,810	29,820	33	12
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	10.0	9.7	6.2	4.8	4.8	4.3	3.9	3.7	3.5	3.3	-17	-7
Hardware-Only ASP	4.5	5.1	4.5	4.2	4.0	3.7	3.4	3.2	3.0	2.9	-3	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	9	12	16	20	20	20	20	20	20	21	21	1
CPU Revenue	9	12	16	20	20	20	20	20	20	20	22	1
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-1	-5
Software Revenue	2	5	5	9	10	11	13	16	20	27	48	23
Bundled	0	1	0	1	1	1	1	0	0	0	15	-11
Unbundled	2	4	5	8	9	10	13	15	20	26	54	24
Service Revenue	0	1	1	1	1	1	1	2	2	2	54	19
Total Factory Revenue	11	18	22	30	31	32	35	38	42	50	28	10
Increase over Prior Year (%)	-15	54	23	38	2	5	8	8	12	18		

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

Source: Dataquest (May 1993)

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

Application: AEC
 Region: Worldwide
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	62,271	81,183	101,933	127,542	128,999	146,960	165,700	184,290	203,290	220,100	20	11
Unit Shipments or Seats	62,271	81,183	101,933	127,542	128,999	146,950	165,680	184,260	203,260	220,010	20	11
CPU Installed Base	164,074	231,392	307,969	395,614	468,850	543,530	619,270	695,700	774,540	855,170	30	13
Installed Seats	164,074	231,392	307,969	395,614	468,850	543,530	619,270	695,700	774,540	855,170	30	13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	17.7	17.3	17.9	11.3	13.8	12.0	10.8	10.1	9.6	9.2	-6	-8
Hardware-Only ASP	4.8	4.7	4.4	4.1	3.9	3.6	3.3	3.1	3.0	2.9	-5	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	319	446	510	562	557	579	598	622	649	671	15	4
CPU Revenue	300	420	482	536	531	554	572	597	624	646	15	4
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue: (Turnkey)	19	26	29	26	26	25	25	25	26	25	8	-0
Software Revenue	154	202	300	303	345	386	433	482	533	580	22	11
Bundled	23	27	28	27	35	36	37	38	39	39	11	2
Unbundled	131	175	272	276	310	350	396	444	494	541	24	12
Service Revenue	25	35	41	40	41	45	51	56	62	68	13	11
Total Factory Revenue	499	683	852	905	942	1,011	1,082	1,161	1,244	1,319	17	7
Increase over Prior Year (%)	38	37	25	6	4	7	7	7	7	6		

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

Source: Dataquest (May 1993)

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

Application: AEC
Region: North America
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	37,574	39,277	44,467	59,323	62,457	71,810	80,410	88,450	97,280	105,050	14	11
Unit Shipments or Seats	37,574	39,277	44,467	59,323	62,457	71,810	80,410	88,450	97,280	105,050	14	11
CPU Installed Base	99,599	129,974	158,723	194,332	225,624	259,900	296,610	334,360	372,840	411,010	23	13
Installed Seats	99,599	129,974	158,723	194,332	225,624	259,900	296,610	334,360	372,840	411,010	23	13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	9.9	18.4	21.6	14.9	13.6	12.2	11.0	10.4	9.8	9.4	8	-7
Hardware-Only ASP	3.8	4.6	4.4	4.0	3.9	3.6	3.3	3.1	2.9	2.8	1	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	143	182	196	236	243	258	266	275	287	298	14	4
CPU Revenue	143	178	191	233	238	254	262	270	282	293	14	4
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	4	5	3	4	5	5	5	5	5	151	3
Software Revenue	70	81	106	122	136	153	172	191	212	234	18	11
Bundled	0	1	1	1	1	1	1	1	1	1	42	-1
Unbundled	70	80	105	121	136	152	172	191	212	233	18	11
Service Revenue	11	12	13	12	13	15	17	18	20	22	3	12
Total Factory Revenue	224	276	314	370	392	426	455	484	520	554	15	7
Increase over Prior Year (%)	33	23	14	18	6	9	7	6	7	7		

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

Source: Dataquest (May 1993)

Table 15
CAD/CAM/CAE/GIS History and Forecast

Application: AEC
Region: Europe
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	15,851	25,078	32,945	43,746	44,382	48,940	55,220	62,160	69,400	76,180	29	11
Unit Shipments or Seats	15,851	25,078	32,945	43,746	44,382	48,940	55,220	62,160	69,400	76,180	29	11
CPU Installed Base	41,603	63,491	90,177	123,527	152,545	180,230	207,210	233,910	261,510	290,660	38	14
Installed Seats	41,603	63,491	90,177	123,527	152,545	180,230	207,210	233,910	261,510	290,660	38	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	14.9	24.7	25.7	17.0	19.9	16.6	14.9	14.0	13.3	12.8	8	-8
Hardware-Only ASP	6.3	4.9	4.7	4.2	4.0	3.7	3.4	3.2	3.0	2.9	-11	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	107	136	173	198	199	199	205	216	227	239	17	4
CPU Revenue	102	126	161	187	187	189	195	205	217	228	16	4
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	5	10	12	12	12	11	10	10	10	11	25	-2
Software Revenue	57	78	142	121	138	152	166	184	205	224	25	10
Bundled	8	9	12	10	17	17	17	17	18	18	21	1
Unbundled	49	69	131	111	121	134	149	167	187	206	25	11
Service Revenue	9	11	16	17	17	18	20	23	25	28	17	11
Total Factory Revenue	173	225	331	336	354	369	392	423	457	490	20	7
Increase over Prior Year (%)	48	30	47	1	6	4	6	8	8	7		

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

Source: Dataquest (May 1993)

Table 16
CAD/CAM/CAE/GIS History and Forecast

Application: AEC
Region: Asia
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	7,615	15,382	22,344	20,977	18,427	21,810	24,880	27,710	30,040	31,780	25	12
Unit Shipments or Seats	7,615	15,382	22,344	20,977	18,427	21,800	24,860	27,680	30,000	31,690	25	11
CPU Installed Base	19,575	33,463	52,929	68,898	79,195	88,990	97,830	106,490	116,040	126,340	42	10
Installed Seats	19,575	33,463	52,929	68,898	79,195	88,990	97,830	106,490	116,040	126,340	42	10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	21.7	15.9	15.5	9.8	11.5	10.3	9.3	8.7	8.3	7.9	-15	-7
Hardware-Only ASP	7.2	4.5	4.1	4.0	3.7	3.4	3.1	3.0	2.8	2.7	-15	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	61	121	132	112	100	106	108	113	114	114	13	3
CPU Revenue	47	109	120	101	90	96	99	102	104	104	18	3
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	14	12	12	11	10	10	10	10	10	10	-9	-0
Software Revenue	26	40	48	53	63	73	84	95	103	109	25	12
Bundled	15	17	16	16	17	18	19	20	21	20	3	4
Unbundled	11	23	32	37	46	55	65	75	82	89	42	14
Service Revenue	4	10	12	12	10	12	14	15	16	17	26	10
Total Factory Revenue	91	171	191	177	173	191	206	222	233	240	17	7
Increase over Prior Year (%)	32	87	12	-8	-2	10	8	8	5	3		

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

Source: Dataquest (May 1993)

Table 17
CAD/CAM/CAE/GIS History and Forecast

Application: AEC
Region: Rest of World
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	1,231	1,445	2,178	3,496	3,733	4,400	5,200	5,980	6,570	7,100	32	14
Unit Shipments or Seats	1,231	1,445	2,178	3,496	3,733	4,400	5,200	5,980	6,570	7,100	32	14
CPU Installed Base	3,297	4,464	6,140	8,857	11,487	14,410	17,610	20,940	24,140	27,160	37	19
Installed Seats	3,297	4,464	6,140	8,857	11,487	14,410	17,610	20,940	24,140	27,160	37	19
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	15.2	20.8	16.9	31.2	30.0	27.0	24.3	22.8	21.7	20.8	19	-7
Hardware-Only ASP	6.7	4.9	4.5	4.2	4.0	3.7	3.4	3.2	3.0	2.9	-12	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	8	7	10	15	15	16	18	19	20	21	16	7
CPU Revenue	8	7	10	15	15	16	18	19	20	20	16	7
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	0	0	0	0	0	0	0	0	0	NA	6
Software Revenue	2	3	4	7	7	9	10	12	13	14	48	14
Bundled	0	0	0	0	0	0	0	0	0	0	19	-6
Unbundled	2	3	4	7	7	9	10	12	13	14	48	14
Service Revenue	1	0	0	0	0	0	1	1	1	1	-12	18
Total Factory Revenue	10	11	15	22	23	26	29	32	34	36	21	9
Increase over Prior Year (%)	64	2	38	48	5	12	12	11	7	6		

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

Source: Dataquest (May 1993)

Table 18
CAD/CAM/CAE/GIS History and Forecast

Application: GIS/Mapping
Region: Worldwide
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	14,446	28,980	40,547	47,396	49,238	59,370	72,880	86,090	99,040	109,580	36	17
Unit Shipments or Seats	14,446	28,980	40,547	47,396	49,238	59,370	72,870	86,080	99,020	109,540	36	17
CPU Installed Base	26,479	54,577	92,308	132,948	168,944	206,460	247,870	293,520	344,350	397,810	59	19
Installed Seats	26,479	54,577	92,308	132,948	168,944	206,460	247,870	293,520	344,350	397,810	59	19
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	25.4	25.5	21.3	18.9	15.2	13.0	11.9	11.3	10.8	10.3	-12	-7
Hardware-Only ASP	4.9	4.9	4.6	4.2	4.0	3.7	3.4	3.2	3.0	2.9	-5	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	82	152	201	212	210	232	260	287	312	330	27	9
CPU Revenue	76	147	192	204	203	224	252	279	304	322	28	10
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	5	5	9	9	7	7	8	8	8	8	9	0
Software Revenue	54	69	105	108	136	167	203	246	290	330	26	19
Bundled	8	7	9	9	9	9	10	10	10	9	5	0
Unbundled	46	62	95	99	126	158	194	236	280	321	29	21
Service Revenue	5	9	15	16	19	23	28	34	40	45	37	19
Total Factory Revenue	141	230	321	337	365	422	492	567	641	705	27	14
Increase over Prior Year (%)	57	64	40	5	8	16	17	15	13	10		

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

Source: Dataquest (May 1993)

Table 19
CAD/CAM/CAE/GIS History and Forecast

Application: GIS/Mapping
Region: North America
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	8,120	13,785	16,907	21,212	23,715	29,360	35,990	41,280	46,140	50,680	31	16
Unit Shipments or Seats	8,120	13,785	16,907	21,212	23,715	29,360	35,990	41,280	46,140	50,680	31	16
CPU Installed Base	13,755	27,078	42,547	60,357	77,645	96,740	118,340	141,240	164,980	188,800	54	19
Installed Seats	13,755	27,078	42,547	60,357	77,645	96,740	118,340	141,240	164,980	188,800	54	19
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	37.4	69.8	15.5	14.7	7.2	6.5	5.8	5.5	5.2	5.0	-34	-7
Hardware-Only ASP	4.6	4.9	4.6	4.1	4.0	3.7	3.4	3.2	3.0	2.9	-3	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	39	72	80	89	95	109	122	132	140	147	25	9
CPU Revenue	38	70	78	88	92	106	120	129	137	145	25	9
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	2	2	1	2	2	2	3	3	3	17	6
Software Revenue	33	43	58	66	83	103	126	153	180	207	26	20
Bundled	2	1	1	1	1	1	1	1	1	1	-8	-4
Unbundled	31	42	57	65	82	102	124	152	179	206	27	20
Service Revenue	2	5	7	7	10	13	16	19	22	25	42	20
Total Factory Revenue	74	119	144	163	187	224	264	303	342	379	26	15
Increase over Prior Year (%)	67	61	21	13	15	20	17	15	13	11		

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

Source: Dataquest (May 1993)

Table 20
CAD/CAM/CAE/GIS History and Forecast

Application: GIS/Mapping
 Region: Europe
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	4,316	10,047	14,431	17,826	17,898	20,930	25,710	31,300	36,880	40,530	43	18
Unit Shipments or Seats	4,316	10,047	14,431	17,826	17,898	20,940	25,720	31,310	36,890	40,550	43	18
CPU Installed Base	8,545	18,315	31,828	47,415	60,834	74,220	88,810	105,540	124,970	145,330	63	19
Installed Seats	8,545	18,315	31,828	47,415	60,834	74,220	88,810	105,540	124,970	145,330	63	19
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	19.2	99.1	73.4	51.2	23.7	18.0	16.2	15.2	14.5	14.5	5	-9
Hardware-Only ASP	5.3	5.0	4.9	4.3	4.1	3.8	3.5	3.3	3.1	3.0	-6	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	25	53	73	79	76	81	91	104	116	122	32	10
CPU Revenue	23	51	70	77	75	80	90	103	115	121	34	10
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	2	2	3	3	1	1	1	1	1	1	-8	-8
Software Revenue	14	16	31	23	29	35	43	52	63	69	21	19
Bundled	3	2	2	1	2	2	2	2	2	2	-7	-4
Unbundled	11	14	29	22	27	33	42	51	61	68	25	20
Service Revenue	2	3	5	5	5	5	7	8	10	11	24	19
Total Factory Revenue	41	72	109	107	110	122	141	164	188	202	28	13
Increase over Prior Year (%)	27	76	51	-1	3	11	16	16	14	8		

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

Source: Dataquest (May 1993)

Table 21
CAD/CAM/CAE/GIS History and Forecast

Application: GIS/Mapping
Region: Asia
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	1,740	4,326	8,065	6,705	5,860	6,970	8,620	10,330	12,050	13,630	35	18
Unit Shipments or Seats	1,740	4,326	8,065	6,705	5,860	6,960	8,600	10,300	12,020	13,570	35	18
CPU Installed Base	3,451	7,663	15,357	21,148	25,048	28,580	32,190	36,310	41,630	48,160	64	14
Installed Seats	3,451	7,663	15,357	21,148	25,048	28,580	32,190	36,310	41,630	48,160	64	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	27.9	13.5	19.0	17.4	17.7	15.4	13.9	13.1	12.4	11.8	-11	-8
Hardware-Only ASP	5.9	4.5	4.2	4.0	3.7	3.4	3.1	3.0	2.8	2.7	-11	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	16	23	43	36	32	34	38	41	44	46	20	7
CPU Revenue	14	21	39	32	28	30	34	37	40	42	20	8
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	2	1	4	4	4	4	4	4	4	4	15	-0
Software Revenue	6	7	13	13	16	19	23	27	31	34	29	17
Bundled	3	3	6	6	6	6	6	7	7	7	16	2
Unbundled	3	4	6	7	10	13	16	20	24	28	41	23
Service Revenue	1	1	3	3	3	3	4	5	5	6	35	16
Total Factory Revenue	22	30	59	52	51	56	64	73	80	86	23	11
Increase over Prior Year (%)	116	37	93	-11	-3	11	14	13	10	8		

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

Source: Dataquest (May 1993)

Table 22
CAD/CAM/CAE/GIS History and Forecast

Application: GIS/Mapping
Region: Rest of World
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	269	822	1,145	1,653	1,765	2,110	2,560	3,190	3,960	4,740	60	22
Unit Shipments or Seats	269	822	1,145	1,653	1,765	2,110	2,560	3,190	3,960	4,740	60	22
CPU Installed Base	729	1,521	2,576	4,029	5,418	6,910	8,540	10,440	12,760	15,530	65	23
Installed Seats	729	1,521	2,576	4,029	5,418	6,910	8,540	10,440	12,760	15,530	65	23
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	35.1	64.1	24.1	22.3	9.3	8.4	7.5	7.1	6.7	6.5	-28	-7
Hardware-Only ASP	5.9	4.9	4.6	4.3	4.1	3.8	3.5	3.3	3.1	3.0	-9	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	5	6	8	7	8	9	10	12	14	44	14
CPU Revenue	2	4	6	7	7	8	9	10	12	14	44	14
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	11	4
Software Revenue	1	3	3	6	8	9	11	14	16	20	57	20
Bundled	0	0	0	0	0	0	0	0	0	0	24	-8
Unbundled	1	3	3	6	8	9	11	14	16	20	58	21
Service Revenue	0	1	1	1	1	2	2	3	3	4	75	21
Total Factory Revenue	3	8	10	15	16	19	23	27	32	38	51	18
Increase over Prior Year (%)	15	166	17	48	13	17	17	18	19	18		

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

Source: Dataquest (May 1993)

Table 23
CAD/CAM/CAE/GIS History and Forecast

Application: Electronic Design Automation
Region: Worldwide
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	47,137	46,786	53,431	67,018	69,920	72,100	71,300	65,670	48,710	34,540	10	-13
Unit Shipments or Seats	47,137	46,786	53,431	67,018	69,920	71,610	70,910	65,360	48,470	34,370	10	-13
CPU Installed Base	125,668	161,544	195,034	231,991	263,067	288,870	307,790	314,740	298,580	264,450	20	0
Installed Seats	125,668	161,544	195,034	231,991	263,067	288,870	307,790	314,740	298,580	264,450	20	0
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	14.5	18.2	19.4	13.0	11.4	10.0	8.7	7.9	7.2	6.8	-6	-10
Hardware-Only ASP	5.3	5.1	5.0	4.3	4.2	3.8	3.5	3.3	3.2	3.0	-6	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	255	278	297	312	319	297	267	230	161	107	6	-20
CPU Revenue	235	260	278	286	293	273	247	214	151	102	6	-19
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	20	18	19	26	25	23	20	16	10	6	6	-26
Software Revenue	163	171	203	214	226	234	241	225	196	147	8	-8
Bundled	21	19	20	22	22	17	13	9	6	3	1	-32
Unbundled	142	153	182	192	204	217	228	216	190	143	9	-7
Service Revenue	24	30	31	42	43	43	42	38	31	22	16	-12
Total Factory Revenue	443	480	531	568	588	573	550	494	388	276	7	-14
Increase over Prior Year (%)	18	8	11	7	3	-2	-4	-10	-21	-29		

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

Source: Dataquest (May 1993)

Table 24
CAD/CAM/CAE/GIS History and Forecast

Application: Electronic Design Automation
Region: North America
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%)	CAGR (%)
											1988-1992	1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	25,742	20,232	21,513	27,183	28,640	28,050	22,690	17,480	9,170	4,120	3	-32
Unit Shipments or Seats	25,742	20,232	21,513	27,183	28,640	27,560	22,300	17,170	8,940	3,940	3	-33
CPU Installed Base	67,642	81,068	91,233	102,599	112,144	118,370	117,870	110,790	93,880	71,760	13	-9
Installed Seats	67,642	81,068	91,233	102,599	112,144	118,370	117,870	110,790	93,880	71,760	13	-9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	98.7	28.3	24.7	22.6	22.2	19.5	16.2	14.5	9.9	9.4	-31	-16
Hardware-Only ASP	4.6	5.1	4.9	4.1	4.0	3.7	3.4	3.2	3.0	2.9	-3	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	124	104	107	112	117	105	78	56	28	12	-1	-37
CPU Revenue	123	101	103	106	111	99	73	53	26	11	-3	-37
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	3	4	6	7	6	5	3	2	1	61	-34
Software Revenue	79	77	86	88	96	103	109	100	83	59	5	-9
Bundled	3	1	0	0	0	0	0	0	0	0	-40	-28
Unbundled	76	77	86	87	95	102	109	100	83	59	6	-9
Service Revenue	12	11	12	15	17	17	17	15	11	8	9	-14
Total Factory Revenue	214	192	205	215	230	225	204	171	123	78	2	-19
Increase over Prior Year (%)	30	-10	7	5	7	-2	-9	-16	-28	-36		

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

Source: Dataquest (May 1993)

Table 25
CAD/CAM/CAE/GIS History and Forecast

Application: Electronic Design Automation
Region: Europe
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	13,953	17,438	20,415	26,440	28,132	31,180	34,410	32,860	23,020	12,590	19	-15
Unit Shipments or Seats	13,953	17,438	20,415	26,440	28,132	31,180	34,410	32,850	23,020	12,590	19	-15
CPU Installed Base	37,179	52,097	67,104	84,430	99,785	115,030	130,340	140,590	137,450	120,860	28	4
Installed Seats	37,179	52,097	67,104	84,430	99,785	115,030	130,340	140,590	137,450	120,860	28	4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	10.8	14.6	21.0	12.4	10.7	9.6	8.4	7.6	6.9	6.0	-0	-11
Hardware-Only ASP	5.9	5.3	5.2	4.5	4.4	4.1	3.7	3.5	3.3	3.2	-7	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	87	99	116	125	130	131	131	117	77	41	11	-21
CPU Revenue	84	92	107	112	117	119	120	108	72	38	9	-20
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	3	7	9	13	13	12	11	9	6	3	47	-27
Software Revenue	49	56	68	68	70	72	73	69	61	48	9	-7
Bundled	5	4	3	2	2	3	3	2	1	1	-19	-25
Unbundled	44	53	64	66	67	69	71	67	60	47	11	-7
Service Revenue	9	10	9	14	14	14	15	14	11	7	13	-12
Total Factory Revenue	144	165	193	207	213	217	219	200	149	95	10	-15
Increase over Prior Year (%)	6	15	16	7	3	2	1	-9	-25	-36		

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

Source: Dataquest (May 1993)

Table 26
CAD/CAM/CAE/GIS History and Forecast

Application: Electronic Design Automation
 Region: Asia
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	6,947	7,924	10,004	11,233	10,690	9,600	9,270	8,170	6,800	5,200	11	-13
Unit Shipments or Seats	6,947	7,924	10,004	11,233	10,690	9,610	9,270	8,180	6,800	5,200	11	-13
CPU Installed Base	19,095	25,586	32,689	39,248	43,641	45,640	46,140	44,530	41,060	36,140	23	-4
Installed Seats	19,095	25,586	32,689	39,248	43,641	45,640	46,140	44,530	41,060	36,140	23	-4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	13.6	19.4	18.7	12.9	11.3	9.8	8.6	7.8	7.2	6.8	-5	-10
Hardware-Only ASP	7.1	4.8	4.4	4.1	3.6	3.3	3.0	2.8	2.7	2.6	-16	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	42	69	66	65	61	49	41	33	25	17	10	-22
CPU Revenue	25	61	61	58	55	44	37	30	23	16	22	-22
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	17	7	5	7	6	5	4	3	2	1	-23	-24
Software Revenue	33	35	45	53	56	53	51	48	43	32	14	-11
Bundled	14	14	17	19	20	14	10	7	5	3	9	-33
Unbundled	20	21	28	34	36	40	41	41	38	29	16	-4
Service Revenue	4	9	10	13	12	11	10	9	8	6	36	-14
Total Factory Revenue	79	113	121	131	129	113	101	90	76	54	13	-16
Increase over Prior Year (%)	16	44	7	8	-1	-13	-10	-11	-16	-28		

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

Source: Dataquest (May 1993)

Table 27
CAD/CAM/CAE/GIS History and Forecast

Application: Electronic Design Automation
 Region: Rest of World
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	495	1,192	1,499	2,162	2,458	3,270	4,930	7,160	9,700	12,630	49	39
Unit Shipments or Seats	495	1,192	1,499	2,162	2,458	3,270	4,930	7,160	9,700	12,630	49	39
CPU Installed Base	1,753	2,793	4,009	5,714	7,497	9,820	13,440	18,830	26,190	35,680	44	37
Installed Seats	1,753	2,793	4,009	5,714	7,497	9,820	13,440	18,830	26,190	35,680	44	37
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	21.3	25.9	16.1	10.3	10.0	9.3	8.2	7.8	7.8	7.4	-17	-6
Hardware-Only ASP	6.2	5.2	4.9	4.5	4.2	3.8	3.5	3.3	3.1	3.0	-9	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	6	7	10	10	13	17	24	30	38	35	30
CPU Revenue	3	6	7	10	10	12	17	23	30	37	34	30
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	1	1	121	18
Software Revenue	2	2	4	5	5	6	7	8	9	9	28	13
Bundled	0	0	0	0	0	0	0	0	0	0	41	-13
Unbundled	2	2	4	5	5	6	7	8	9	9	28	13
Service Revenue	0	0	0	1	1	1	1	1	2	2	13	30
Total Factory Revenue	5	9	12	15	15	19	26	33	41	48	32	26
Increase over Prior Year (%)	-11	78	26	29	3	25	32	29	23	19		

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

Source: Dataquest (May 1993)

Table 28
CAD/CAM/CAE/GIS History and Forecast

Application: Electronic CAE
 Region: Worldwide
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	23,601	34,705	40,717	49,287	52,140	52,970	53,910	50,230	36,600	26,510	22	-13
Unit Shipments or Seats	23,601	34,705	40,717	49,287	52,140	52,970	53,900	50,220	36,600	26,510	22	-13
CPU Installed Base	73,262	99,988	127,608	158,566	187,387	211,270	229,090	236,510	225,090	200,480	26	1
Installed Seats	73,262	99,988	127,608	158,566	187,387	211,270	229,090	236,510	225,090	200,480	26	1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	19.3	24.0	21.7	14.1	11.8	10.5	9.1	8.2	7.3	7.0	-12	-10
Hardware-Only ASP	5.2	5.1	4.9	4.2	4.1	3.8	3.5	3.3	3.1	3.0	-6	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	129	200	216	221	228	209	194	169	116	80	15	-19
CPU Revenue	120	186	206	208	216	198	184	161	111	77	16	-19
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	9	13	10	13	12	11	10	8	5	3	7	-26
Software Revenue	96	122	153	164	171	176	182	171	147	113	15	-8
Bundled	11	15	16	18	17	11	7	4	2	1	11	-42
Unbundled	85	106	137	146	154	165	175	166	145	112	16	-6
Service Revenue	15	22	23	31	31	30	31	28	23	17	21	-12
Total Factory Revenue	240	344	392	416	430	415	406	367	286	210	16	-13
Increase over Prior Year (%)	28	43	14	6	3	-4	-2	-10	-22	-27		

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

Source: Dataquest (May 1993)

**Table 29
CAD/CAM/CAE/GIS History and Forecast**

Application: Electronic CAE
 Region: North America
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	13,290	14,900	16,080	19,964	21,428	20,360	16,590	13,110	6,420	2,690	13	-34
Unit Shipments or Seats	13,290	14,900	16,080	19,964	21,428	20,360	16,590	13,110	6,420	2,690	13	-34
CPU Installed Base	41,590	51,202	59,328	69,202	79,010	85,970	87,010	82,510	69,820	53,160	17	-8
Installed Seats	41,590	51,202	59,328	69,202	79,010	85,970	87,010	82,510	69,820	53,160	17	-8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	88.0	32.1	59.7	54.0	57.5	51.8	46.6	43.8	41.6	39.9	-10	-7
Hardware-Only ASP	4.6	5.1	4.9	4.1	4.0	3.7	3.4	3.2	3.0	2.9	-3	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	65	76	79	82	87	76	57	42	19	8	8	-38
CPU Revenue	64	74	76	78	83	72	54	40	19	7	7	-38
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	3	3	4	4	4	3	2	1	0	55	-39
Software Revenue	48	56	68	69	76	83	89	82	67	50	12	-8
Bundled	2	0	0	0	0	0	0	0	0	0	-43	-100
Unbundled	46	56	68	69	76	82	89	82	67	50	13	-8
Service Revenue	8	8	9	11	12	13	13	12	9	6	14	-13
Total Factory Revenue	121	141	156	163	176	171	159	136	95	64	10	-18
Increase over Prior Year (%)	38	17	11	4	8	-3	-7	-15	-30	-32		

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

Source: Dataquest (May 1993)

Table 30
CAD/CAM/CAE/GIS History and Forecast

Application: Electronic CAE
Region: Europe
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	7,040	13,184	15,586	19,659	21,158	23,860	27,410	26,100	17,370	8,690	32	-16
Unit Shipments or Seats	7,040	13,184	15,586	19,659	21,158	23,860	27,400	26,100	17,370	8,690	32	-16
CPU Installed Base	20,188	31,754	44,182	58,645	72,228	85,790	99,650	108,950	106,560	92,930	38	5
Installed Seats	20,188	31,754	44,182	58,645	72,228	85,790	99,650	108,950	106,560	92,930	38	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	14.5	27.0	25.0	9.8	8.2	7.7	6.9	6.5	6.2	5.9	-13	-6
Hardware-Only ASP	6.0	5.2	5.1	4.4	4.4	4.0	3.7	3.5	3.3	3.1	-7	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	46	75	85	89	93	96	101	90	57	27	19	-22
CPU Revenue	44	69	81	83	88	90	95	85	54	26	19	-22
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	2	6	5	6	5	6	6	5	3	2	32	-22
Software Revenue	27	36	47	50	49	50	51	48	43	34	15	-7
Bundled	3	3	3	2	1	2	2	2	1	1	-20	-18
Unbundled	24	33	44	48	47	48	49	47	42	34	18	-7
Service Revenue	5	7	7	10	10	10	11	10	8	5	20	-13
Total Factory Revenue	78	118	139	149	152	156	163	149	108	67	18	-15
Increase over Prior Year (%)	19	51	17	7	2	3	5	-9	-28	-38		

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

Source: Dataquest (May 1993)

Table 31
CAD/CAM/CAE/GIS History and Forecast

Application: Electronic CAE
 Region: Asia
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	3,018	5,692	7,853	7,990	7,638	6,070	5,590	4,510	3,630	2,920	26	-17
Unit Shipments or Seats	3,018	5,692	7,853	7,990	7,638	6,070	5,590	4,510	3,630	2,920	26	-17
CPU Installed Base	10,512	15,229	21,266	26,482	30,420	31,760	31,360	28,850	25,190	21,270	30	-7
Installed Seats	10,512	15,229	21,266	26,482	30,420	31,760	31,360	28,850	25,190	21,270	30	-7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	16.4	23.0	20.5	14.7	12.2	10.9	9.9	9.3	8.8	8.4	-7	-7
Hardware-Only ASP	6.3	4.6	4.4	4.1	3.7	3.3	3.1	2.9	2.7	2.6	-12	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	17	44	46	43	40	27	21	15	11	8	24	-27
CPU Revenue	10	39	44	39	38	26	20	14	10	8	40	-27
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	7	5	3	3	2	1	1	1	0	0	-23	-39
Software Revenue	20	27	35	41	42	39	37	35	32	24	21	-11
Bundled	6	12	13	16	15	9	5	3	1	1	27	-47
Unbundled	14	15	21	26	27	30	32	33	31	23	18	-3
Service Revenue	2	7	7	9	8	7	6	5	5	4	41	-16
Total Factory Revenue	38	78	89	93	91	73	64	55	48	35	24	-17
Increase over Prior Year (%)	21	102	14	6	-3	-19	-13	-13	-14	-26		

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

Source: Dataquest (May 1993)

**Table 32
CAD/CAM/CAE/GIS History and Forecast**

Application: Electronic CAE
 Region: Rest of World
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	253	928	1,198	1,674	1,916	2,680	4,310	6,510	9,180	12,210	66	45
Unit Shipments or Seats	253	928	1,198	1,674	1,916	2,680	4,310	6,510	9,180	12,210	66	45
CPU Installed Base	972	1,802	2,833	4,238	5,729	7,750	11,070	16,200	23,520	33,130	56	42
Installed Seats	972	1,802	2,833	4,238	5,729	7,750	11,070	16,200	23,520	33,130	56	42
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	29.4	32.2	8.1	6.9	6.9	6.2	5.6	5.3	5.0	4.8	-30	-7
Hardware-Only ASP	6.1	5.2	4.8	4.4	4.1	3.8	3.5	3.3	3.1	3.0	-9	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	5	6	7	8	10	15	21	28	36	50	36
CPU Revenue	2	5	6	7	8	10	15	21	28	36	49	36
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	1	82	36
Software Revenue	1	2	3	3	3	4	5	5	5	5	39	8
Bundled	0	0	0	0	0	0	0	0	0	0	0	0
Unbundled	1	2	3	3	3	4	5	5	5	5	39	8
Service Revenue	0	0	0	0	0	1	1	1	1	2	27	34
Total Factory Revenue	3	7	9	11	12	15	21	27	35	43	45	30
Increase over Prior Year (%)	-12	176	25	23	5	27	38	33	28	24		

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

Source: Dataquest (May 1993)

Table 33
CAD/CAM/CAE/GIS History and Forecast

Application: IC Layout
 Region: Worldwide
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	1,503	487	342	536	107	580	470	360	270	190	-48	12
Unit Shipments or Seats	1,503	487	342	536	107	90	80	60	40	10	-48	-38
CPU Installed Base	3,861	4,157	3,997	3,662	2,680	1,770	1,140	740	470	290	-9	-36
Installed Seats	3,861	4,157	3,997	3,662	2,680	1,770	1,140	740	470	290	-9	-36
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	11.6	23.6	27.0	26.8	29.7	26.7	24.2	22.7	21.6	20.3	26	-7
Hardware-Only ASP	5.0	3.7	3.1	2.3	2.0	1.9	1.8	1.7	1.6	1.5	-20	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	9	3	3	3	2	3	2	1	1	0	-31	-25
CPU Revenue	8	3	2	3	2	2	2	1	1	0	-34	-25
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-1	-28
Software Revenue	5	3	1	1	2	2	1	1	1	1	-20	-23
Bundled	1	1	0	0	1	1	1	0	0	0	-4	-35
Unbundled	4	2	1	1	1	1	1	0	0	0	-26	-19
Service Revenue	0	0	0	0	0	0	0	0	0	0	10	-32
Total Factory Revenue	14	6	4	5	4	5	4	2	2	1	-26	-25
Increase over Prior Year (%)	-45	-53	-36	14	-11	14	-25	-32	-29	-42		

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

Source: Dataquest (May 1993)

Table 34
CAD/CAM/CAE/GIS History and Forecast

Application: IC Layout
 Region: North America
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	575	273	254	403	5	490	390	300	230	180	-69	104
Unit Shipments or Seats	575	273	254	403	5	0	0	0	0	0	-69	-100
CPU Installed Base	1,727	1,880	1,867	1,851	1,377	940	590	320	130	40	-6	-51
Installed Seats	1,727	1,880	1,867	1,851	1,377	940	590	320	130	40	-6	-51
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	25.8	49.0	24.7	24.7	23.8	21.4	19.3	18.1	17.2	16.5	-2	-7
Hardware-Only ASP	5.3	3.5	3.1	2.3	.0	.0	.0	.0	.0	.0	-100	NA
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	1	1	1	0	1	1	1	0	0	-57	20
CPU Revenue	3	1	1	1	0	1	1	0	0	0	-57	17
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-100	NA
Software Revenue	2	1	1	1	1	1	1	0	0	0	-19	-19
Bundled	0	0	0	0	0	0	0	0	0	0	-44	-100
Unbundled	2	1	1	1	1	1	1	0	0	0	-18	-19
Service Revenue	0	0	0	0	0	0	0	0	0	0	32	-20
Total Factory Revenue	5	2	2	2	1	2	1	1	1	1	-33	-11
Increase over Prior Year (%)	-62	-60	-17	15	-48	83	-29	-38	-17	-15		

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

Source: Dataquest (May 1993)

Table 35
CAD/CAM/CAE/GIS History and Forecast

Application: IC Layout
 Region: Europe
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	488	78	23	46	0	0	0	0	0	0	-83	-100
Unit Shipments or Seats	488	78	23	46	0	0	0	0	0	0	-83	-100
CPU Installed Base	1,322	1,349	1,215	975	606	290	110	40	10	0	-18	-100
Installed Seats	1,322	1,349	1,215	975	606	290	110	40	10	0	-18	-100
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	6.5	33.7	25.0	25.0	23.8	.0	.0	.0	.0	.0	38	-100
Hardware-Only ASP	4.6	3.7	3.2	2.2	.0	.0	.0	.0	.0	.0	-100	NA
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	0	0	0	0	0	0	0	0	0	-74	-100
CPU Revenue	2	0	0	0	0	0	0	0	0	0	-74	-100
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	0	0	0	0	0	0	0	0	0	NA	NA
Software Revenue	1	1	0	0	0	0	0	0	0	0	-35	-4
Bundled	0	0	NA	NA	0	0	0	0	0	0	-100	NA
Unbundled	1	1	0	0	0	0	0	0	0	0	-35	-4
Service Revenue	NA	0	0	0	0	0	0	0	0	0	NA	-100
Total Factory Revenue	3	2	0	0	0	0	0	0	0	0	-52	-7
Increase over Prior Year (%)	-37	-42	-88	27	-39	-18	0	-7	0	-8		

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

Source: Dataquest (May 1993)

**Table 36
CAD/CAM/CAE/GIS History and Forecast**

Application: IC Layout
 Region: Asia
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	414	132	65	87	101	90	80	60	40	10	-30	-37
Unit Shipments or Seats	414	132	65	87	101	90	80	60	40	10	-30	-37
CPU Installed Base	731	846	842	781	665	530	430	380	320	250	-2	-18
Installed Seats	731	846	842	781	665	530	430	380	320	250	-2	-18
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	12.1	20.1	27.2	27.0	30.1	26.9	24.3	22.8	21.6	20.7	26	-7
Hardware-Only ASP	5.1	4.4	NA	2.2	2.0	.0	.0	.0	.0	.0	-21	-100
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	2	2	2	2	2	1	1	1	0	-12	-37
CPU Revenue	3	2	2	2	2	1	1	1	0	0	-14	-37
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	4	-37
Software Revenue	2	0	0	0	1	1	1	0	0	0	-18	-38
Bundled	1	0	NA	NA	1	1	1	0	0	0	-0	-35
Unbundled	1	0	0	0	0	0	0	0	0	0	-37	-100
Service Revenue	0	0	0	0	0	0	0	0	0	0	6	-36
Total Factory Revenue	5	2	2	2	3	3	2	1	1	0	-13	-37
Increase over Prior Year (%)	-11	-53	-11	12	24	-9	-23	-29	-39	-67		

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

Source: Dataquest (May 1993)

Table 37
CAD/CAM/CAE/GIS History and Forecast

Application: IC Layout
Region: Rest of World
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	25	4	NA	NA	0	0	0	0	0	0	-100	NA
Unit Shipments or Seats	25	4	NA	NA	0	0	0	0	0	0	-100	NA
CPU Installed Base	80	82	72	54	32	10	0	0	0	0	-21	-100
Installed Seats	80	82	72	54	32	10	0	0	0	0	-21	-100
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	25.1	NA	NA	.0	.0	.0	.0	.0	.0	NA	NA
Hardware-Only ASP	6.0	5.5	NA	NA	.0	.0	.0	.0	.0	.0	-100	NA
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	0	0	NA	NA	0	0	0	0	0	0	-100	NA
CPU Revenue	0	0	NA	NA	0	0	0	0	0	0	-100	NA
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	0	NA	NA	0	0	0	0	0	0	NA	NA
Software Revenue	0	0	NA	NA	0	0	0	0	0	0	-100	NA
Bundled	NA	0	NA	NA	0	0	0	0	0	0	NA	NA
Unbundled	0	0	NA	NA	0	0	0	0	0	0	-100	NA
Service Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Total Factory Revenue	0	0	NA	NA	0	0	0	0	0	0	-100	NA
Increase over Prior Year (%)	-49	-44	-100	NA	NA	NA	NA	NA	NA	NA		

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

Source: Dataquest (May 1993)

Table 38
CAD/CAM/CAE/GIS History and Forecast

Application: PCB/Hybrid/MCM
Region: Worldwide
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	22,033	11,594	12,372	17,195	17,674	18,550	16,930	15,080	11,840	7,840	-5	-15
Unit Shipments or Seats	22,033	11,594	12,372	17,195	17,674	18,550	16,930	15,080	11,840	7,850	-5	-15
CPU Installed Base	48,545	57,399	63,429	69,762	73,001	75,820	77,560	77,480	73,020	63,680	11	-3
Installed Seats	48,545	57,399	63,429	69,762	73,001	75,820	77,560	77,480	73,020	63,680	11	-3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	10.7	12.3	16.1	11.2	10.3	9.1	8.1	7.5	7.0	6.6	-1	-9
Hardware-Only ASP	5.4	5.4	5.2	4.4	4.3	3.9	3.6	3.4	3.3	3.1	-6	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	117	75	78	88	89	85	72	60	44	27	-7	-21
CPU Revenue	107	71	69	75	76	73	62	52	39	24	-8	-20
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	11	4	8	13	13	12	10	8	5	3	5	-26
Software Revenue	63	47	49	49	53	57	58	54	48	33	-4	-9
Bundled	10	3	4	4	5	5	5	5	4	2	-16	-16
Unbundled	53	44	45	44	48	51	53	49	44	31	-2	-9
Service Revenue	9	8	8	11	12	12	11	10	8	6	6	-14
Total Factory Revenue	189	130	134	147	153	154	141	124	100	66	-5	-16
Increase over Prior Year (%)	16	-31	4	10	4	0	-8	-12	-19	-35		

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

Source: Dataquest (May 1993)

Table 39
CAD/CAM/CAE/GIS History and Forecast

Application: PCB/Hybrid/MCM
Region: North America
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	11,877	5,058	5,179	6,816	7,206	7,200	5,710	4,070	2,530	1,250	-12	-30
Unit Shipments or Seats	11,877	5,058	5,179	6,816	7,206	7,200	5,710	4,070	2,530	1,250	-12	-30
CPU Installed Base	24,325	27,985	30,037	31,546	31,757	31,460	30,280	27,950	23,930	18,570	7	-10
Installed Seats	24,325	27,985	30,037	31,546	31,757	31,460	30,280	27,950	23,930	18,570	7	-10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	320.0	12.9	17.1	13.6	13.6	12.2	11.0	10.4	9.8	9.4	-55	-7
Hardware-Only ASP	4.5	5.3	5.1	4.2	4.1	3.8	3.5	3.3	3.1	3.0	-2	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	56	27	27	29	30	28	20	14	8	4	-14	-33
CPU Revenue	55	26	26	27	28	26	19	12	7	4	-16	-34
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	1	2	3	2	2	1	1	0	84	-29
Software Revenue	29	20	17	18	19	19	20	18	16	8	-11	-15
Bundled	1	0	0	0	0	0	0	0	0	0	-32	-13
Unbundled	28	20	17	18	18	19	20	18	16	8	-10	-15
Service Revenue	4	2	2	3	4	4	4	3	2	1	-0	-22
Total Factory Revenue	89	49	47	50	53	51	44	35	27	13	-12	-24
Increase over Prior Year (%)	38	-45	-4	6	5	-2	-15	-21	-23	-51		

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

Source: Dataquest (May 1993)

Table 40
CAD/CAM/CAE/GIS History and Forecast

Application: PCB/Hybrid/MCM
 Region: Europe
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	6,425	4,176	4,806	6,735	6,974	7,320	7,000	6,760	5,650	3,910	2	-11
Unit Shipments or Seats	6,425	4,176	4,806	6,735	6,974	7,320	7,000	6,760	5,650	3,910	2	-11
CPU Installed Base	15,669	18,993	21,707	24,810	26,951	28,960	30,570	31,600	30,880	27,940	15	1
Installed Seats	15,669	18,993	21,707	24,810	26,951	28,960	30,570	31,600	30,880	27,940	15	1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	7.9	7.4	17.4	14.9	13.3	11.7	10.5	10.0	9.5	8.4	14	-9
Hardware-Only ASP	5.9	5.6	5.5	4.6	4.6	4.2	3.9	3.7	3.5	3.3	-6	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	38	24	31	36	37	35	30	26	20	13	-1	-19
CPU Revenue	37	22	26	29	29	28	25	23	18	12	-6	-17
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	1	5	7	7	7	5	4	2	1	68	-31
Software Revenue	21	19	21	18	21	22	22	21	18	13	0	-8
Bundled	2	1	1	1	1	1	1	0	0	0	-18	-58
Unbundled	19	18	20	17	20	21	21	20	17	13	1	-8
Service Revenue	4	3	2	4	4	4	4	4	3	2	2	-12
Total Factory Revenue	63	45	54	58	62	61	56	51	41	29	-0	-14
Increase over Prior Year (%)	-4	-28	19	8	6	-1	-8	-10	-19	-30		

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

Source: Dataquest (May 1993)

Table 41
CAD/CAM/CAE/GIS History and Forecast

Application: PCB/Hybrid/MCM
 Region: Asia
 Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	3,515	2,100	2,086	3,156	2,951	3,450	3,600	3,610	3,130	2,270	-4	-5
Unit Shipments or Seats	3,515	2,100	2,086	3,156	2,951	3,440	3,600	3,610	3,140	2,270	-4	-5
CPU Installed Base	7,851	9,511	10,581	11,985	12,556	13,350	14,340	15,310	15,540	14,620	12	3
Installed Seats	7,851	9,511	10,581	11,985	12,556	13,350	14,340	15,310	15,540	14,620	12	3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	12.0	15.2	15.5	9.9	9.3	8.3	7.5	7.1	6.7	6.5	-6	-7
Hardware-Only ASP	7.9	5.8	4.7	4.3	3.5	3.2	2.9	2.7	2.6	2.5	-18	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	22	23	18	20	19	20	19	17	14	9	-3	-14
CPU Revenue	13	21	16	17	16	17	16	15	12	8	6	-14
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	9	2	2	3	3	3	3	3	2	1	-25	-16
Software Revenue	12	8	10	12	13	13	13	12	10	8	1	-9
Bundled	7	2	3	4	4	4	4	4	3	2	-15	-13
Unbundled	5	6	6	8	9	9	9	9	7	6	17	-8
Service Revenue	1	3	3	4	3	4	4	3	3	2	31	-10
Total Factory Revenue	35	33	31	35	35	37	36	33	27	19	-0	-12
Increase over Prior Year (%)	16	-6	-8	15	1	4	-3	-7	-18	-31		

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

Source: Dataquest (May 1993)

Table 42
CAD/CAM/CAE/GIS History and Forecast

Application: PCB/Hybrid/MCM
Region: Rest of World
Platform: Personal Computer

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	CAGR (%) 1988-1992	CAGR (%) 1992-1997
HARDWARE SHIPMENT DATA												
CPU Shipments	217	259	301	488	542	590	620	650	520	420	26	-5
Unit Shipments or Seats	217	259	301	488	542	590	620	650	520	420	26	-5
CPU Installed Base	701	909	1,104	1,421	1,737	2,060	2,360	2,620	2,670	2,550	25	8
Installed Seats	701	909	1,104	1,421	1,737	2,060	2,360	2,620	2,670	2,550	25	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	14.6	19.8	18.0	10.9	10.4	9.4	8.4	7.9	7.5	7.2	-8	-7
Hardware-Only ASP	6.3	5.3	5.3	4.7	4.3	4.0	3.6	3.4	3.3	3.1	-9	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1	1	2	2	2	2	2	2	2	1	15	-11
CPU Revenue	1	1	2	2	2	2	2	2	2	1	13	-11
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	0	0	0	0	0	0	0	0	0	NA	-17
Software Revenue	1	0	1	1	1	2	2	3	4	4	12	23
Bundled	NA	0	0	0	0	0	0	0	0	0	NA	-20
Unbundled	1	0	1	1	1	2	2	3	4	4	11	24
Service Revenue	0	0	0	0	0	0	0	0	0	0	-11	10
Total Factory Revenue	2	2	3	4	4	4	5	6	6	5	13	6
Increase over Prior Year (%)	-3	-23	40	51	-1	16	11	15	-1	-8		

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

Source: Dataquest (May 1993)

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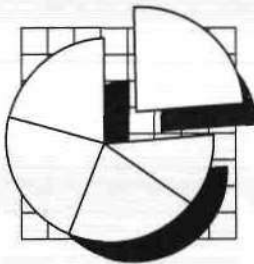
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Software

Personal CAD and Distribution Channels Worldwide Market Share



Market Statistics

1993

Program: Personal CAD and Distribution Channels Worldwide

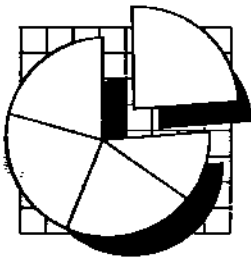
Product Code: CPER-WW-MS-9301

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Software

Personal CAD and Distribution Channels Worldwide Market Share



Market Statistics

1993

Program: Personal CAD and Distribution Channels Worldwide

Product Code: CPER-WW-MS-9301

Publication Date: March 15, 1993

Table of Contents

	Page
Introduction.....	1
Market Analysis.....	1
Dataquest Perspective	1
About This Document	3
Segmentation.....	4
Definitions	4
Market Share Methodology	6
The Audit Process.....	7
Publishing Schedule.....	8
Notes on Market Share.....	8

List of Figures

Figure	Page
1 CAD/CAM/CAE/GIS Market Database	2

List of Tables

Table		Page
1	CAD/CAM/CAE/GIS 1992 Market Summary.....	3
2	Companies Renamed	9
3	Companies (or CAD Portions Thereof) Sold/Merged	9
4	Companies—Added or Deleted.....	9
	Personal Computer	
	Worldwide	
5	All Applications	10
6	Mechanical	20
7	AEC	25
8	GIS/Mapping	30
9	Electronic Design Automation.....	34
10	Electronic CAE	39
11	IC Layout.....	43
12	PCB/Hybrid/MCM.....	44
	All Applications	
13	North America.....	47
14	Europe.....	54
15	Asia.....	62
16	Rest of World	67

Note: All tables show estimated data.

Personal CAD and Distribution Channels Worldwide Market Share

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.

Market Analysis

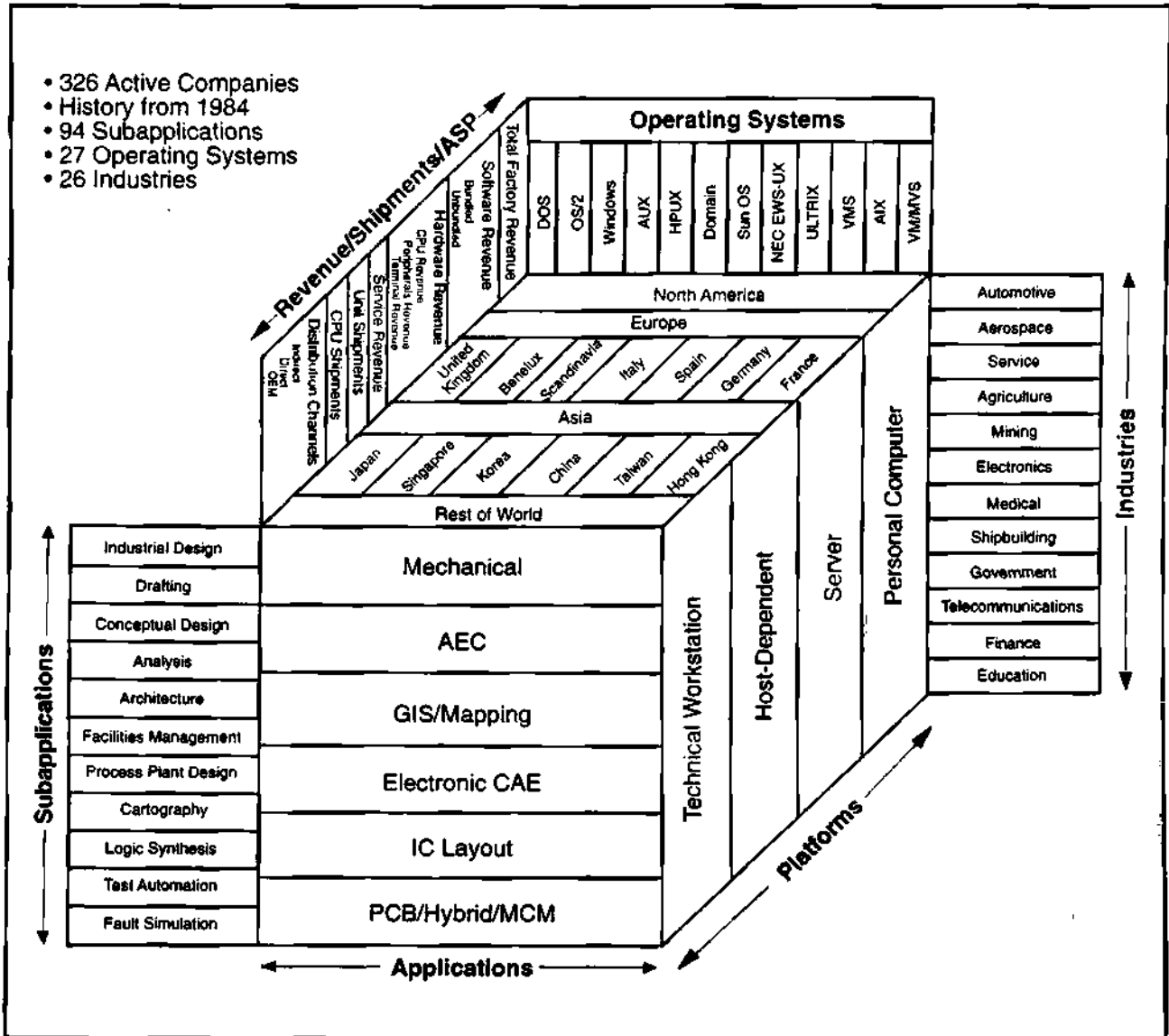
With potentially the lowest growth rates in the history of the industry, 1992 was a year of transition. Turmoil in world economic forces caused recessionary pressures in many of the oldest and strongest markets for CAD/CAM/CAE/GIS. At the same time, competitive pressures in the end-user environment forced a higher level of integration and system complexity with fewer people. Evolution in new hardware and software technologies further added to the transitional pressures. For many, 1992 was the first year to seriously discuss and solve some of the sticky problems of integrating technologies and people. The process is painful, but the result should fuel healthy CAD/CAM/CAE/GIS market growth for the next five years.

Based on our preliminary analysis, shown in Table 1, the year turned out somewhat better than expected, with a 4.2 percent growth rate in total revenue and 9.7 percent growth in software revenue. Regionally, European-based vendors enjoyed the strongest results, at 6.5 percent growth. Asian-based vendors grew 2.1 percent, with North American-based vendors in between the two, at 3.7 percent. In reality, the dollar was devalued against both the yen and the ECU, so the actual growth of both European- and Asian-based companies is lower than it appears.

Dataquest Perspective

The market dynamics in the total CAD/CAM/CAE/GIS market comprises many factors based on application-specific market needs, diverse geographical issues, and the amazing growth of computing and graphics resources. A more detailed analysis of each application area must be made to thoroughly understand the forces driving the entire market. Dataquest will discuss these forces and will provide an in-depth analysis of CAD/CAM/CAE/GIS regional issues, technology trends, and company analyses in future publications.

Figure 1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (March 1993)

G3000191

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

	Software Revenue 1991 (\$M)	Software Revenue 1992 (\$M)	Growth Rate (%)	Total Revenue 1991 (\$M)	Total Revenue 1992 (\$M)	Growth Rate (%)
Application						
Mechanical	2,033.0	2,235.3	10.0	7,229.2	7,655.3	5.9
AEC	666.1	746.1	12.0	2,345.3	2,420.0	3.2
GIS/Mapping	555.8	627.5	12.9	1,899.4	1,974.8	4.0
Electronic CAE	691.2	744.1	7.7	1,802.7	1,875.4	4.0
IC Layout	195.8	223.4	14.1	584.7	621.0	6.2
PCB/Hybrid/MCM	328.3	329.1	0.2	1,091.1	1,030.8	-5.5
Total	4,470.2	4,905.5	9.7	14,952.5	15,577.3	4.2
Region						
North America	1,516.0	1,693.7	11.7	5,069.2	5,258.8	3.7
Europe	1,623.9	1,775.8	9.4	5,531.0	5,887.7	6.5
Asia	1,249.0	1,339.8	7.3	4,050.4	4,135.6	2.1
Rest of World	81.2	96.2	18.5	302.0	295.1	-2.3
Total	4,470.2	4,905.5	9.7	14,952.5	15,577.3	4.2
Platform						
Technical Workstation	2,712.1	3,056.2	12.7	8,078.7	8,780.1	8.7
Host Dependent	584.1	530.6	-9.2	2,852.2	2,557.0	-10.3
Server	182.7	191.7	4.9	997.9	1,056.2	5.8
Personal Computer	991.3	1,127.0	13.7	3,023.7	3,183.9	5.3
Total	4,470.2	4,905.5	9.7	14,952.5	15,577.3	4.2

Source: Dataquest (March 1993)

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 information reported in the *Market Share* book for each segment:

- Source—All companies in database; overview of industry
- Mechanical Applications—All companies in database with mechanical revenue
- AEC Applications—All companies in database with AEC revenue
- GIS Applications—All companies in database with GIS revenue
- Electronic Design Automation Applications—All companies in database with EDA (electronic CAE, IC layout, PCB/hybrid/MCM) revenue

- Europe—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
- Personal CAD and Distribution Channels—All companies in database with personal computer revenue

More detailed data on these markets may be requested through our client inquiry service.

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.

Segmentation

Dataquest defines CAD/CAM/CAE/GIS as systems used in the mechanical; architecture, engineering, and construction (AEC); GIS/mapping; and electronic design automation (EDA) application areas. The CAD/CAM/CAE/GIS market is defined according to the following segmentation scheme:

- CAD/CAM/CAE/GIS
 - Mechanical
 - AEC (Architecture, Engineering, and Construction)
 - GIS/Mapping (Geographic Information Systems)
 - EDA (Electronic Design Automation)
 - Electronic CAE
 - IC Layout
 - PCB/Hybrid/MCM

In addition, more detailed information by subapplication, by operating systems, and by industry is available, much of it published in *Dataquest Perspectives*.

Definitions

This section lists the definitions that are specific to this document.

Application definitions are as follows:

- Mechanical—Mechanical CAD/CAM refers to computer-aided tools used to design, analyze, document, and manufacture discrete parts, components, and assemblies.
- Architecture, Engineering, and Construction (AEC)—This 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**—This 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)**—This segment covers computer-based tools that are used to automate the process of designing an electronic product including printed circuit boards, ICs, and systems. EDA includes Electronic CAE, IC Layout, and PCB/Hybrid/MCM, as follows:
 - **Electronic Computer-Aided Engineering (CAE)**—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 that is used to create and validate the physical implementation of an integrated circuit (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.
 - **Printed Circuit Board (PCB)/Hybrid/Multichip Module (MCM)**—This segment covers products that are 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.

Regional definitions are as follows:

- **North America**—Includes United States, Canada, and Mexico
- **Europe**—Includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe
- **Asia**—Includes 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

Platform definitions are as follows:

- **Technical Workstation**—This is a single-user computer that is 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, DOMAIN); the computer is designed by manufacturer to run high-performance graphics applications in a multiuser/multitasking environment.
- **Host-Dependent**—This 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, compute capability, and others. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE/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**—This is defined as a single-user computer that is 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.

Revenue/shipments/ASP definitions are as follows:

- **Total factory revenue** is defined as the amount of money received by a manufacturer for its goods 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).
- **Unit shipment** is defined as the number of products delivered (that is, seats).
- **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/GIS systems not including revenue from consulting. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year, we survey all major 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
- 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.

Notes on Market Share

CADAM has now been included in IBM's revenue for 1991 and 1992. In addition, based on our analysis of software revenue by operating system, we have changed the percent of Sun revenue allocated to CAD/CAM/CAE/GIS. The result is an increase in hardware revenue—\$144 million for Sun in 1991, primarily in the AEC and GIS markets, and an overall increase in market share.

Tables 2 through 4 show other changes made to the database since the last report.

Table 2
Companies Renamed

Old Name	New Name
ABB Trafonor	ABB Industria
Schlumberger	Applicon
Hahn & Kolb	ASCAD/ASCAM
Decad	EME
Robocom	RoboCAD Solutions
Vision 3D	Areon

Source: Dataquest (March 1993)

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

Companies	Sold to/Merged with
Geographic Systems (WPS)	GeoVision Systems
Kewill Systems	Han Dataport
ISYKON Software	Intergraph
Logic Automation	Logic Modeling Systems
Micro Engineering Solutions	Autodesk
Norsk	Technovision
Sumisho Electronic Systems	Sumisho Electronics
t2 Solutions	Alias
Technovision	Intergraph
Valid	Cadence
Vantage Analysis Systems	Viewlogic

Source: Dataquest (March 1993)

Table 4
Companies—Added or Deleted

New Companies	1992 Revenue
CAD Distribution	16.9
CAE-link	1.1
Exemplar Logic	0.3
Expertest	0.5
Minc Software	3.0
Neocad	3.0
Sunrise Test Systems	2.0
Quicklogic	1.0
Deleted Companies	1991 Revenue
Everex	19.4
Ferranti	10.0
Nestler	11.0
XAO Industrie	3.7

Source: Dataquest (March 1993)

Table 5
1992 CAD/CAM/CAE/GIS Market Share

Application: All Applications
 Platform: Personal Computer
 Region: Worldwide
 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
Compaq	416.3	416.3	.0	90,225	13.1%	22.3%	.0%	21.6%
Autodesk	318.8	.0	318.8	0	10.0%	.0%	28.3%	.0%
IBM	268.3	193.2	53.4	51,885	8.4%	10.3%	4.7%	12.4%
Apple Computer	243.2	214.0	.0	57,552	7.6%	11.5%	.0%	13.8%
Hewlett-Packard	135.7	108.5	.0	32,627	4.3%	5.8%	.0%	7.8%
NEC	112.9	94.8	9.0	16,805	3.5%	5.1%	.8%	4.0%
Fujitsu	88.4	56.6	23.0	2,627	2.8%	3.0%	2.0%	.6%
Intergraph	43.9	.0	41.3	0	1.4%	.0%	3.7%	.0%
Mutoh Industries—NO OEM	40.0	21.3	11.1	809	1.3%	1.1%	1.0%	.2%
Wacom	38.9	7.8	26.8	748	1.2%	.4%	2.4%	.2%
Hakuto	36.3	21.8	14.5	816	1.1%	1.2%	1.3%	.2%
Dell Computer	34.6	34.6	.0	9,012	1.1%	1.9%	.0%	2.2%
Hitachi	31.3	15.0	13.2	1,656	1.0%	.8%	1.2%	.4%
Nemetschek	31.3	11.6	17.5	400	1.0%	.6%	1.6%	.1%
Wiechers Datentechnik	30.3	8.0	14.0	638	1.0%	.4%	1.2%	.2%
Investronica SA	29.3	23.4	2.9	1,170	.9%	1.3%	.3%	.3%
Viewlogic Systems	28.3	.0	22.6	0	.9%	.0%	2.0%	.0%
Toshiba—NO OEM	27.1	13.5	10.8	2,165	.9%	.7%	1.0%	.5%
Computervision	27.0	.0	25.6	169	.8%	.0%	2.3%	.0%
CAD Distribution	16.9	8.4	6.7	261	.5%	.5%	.6%	.1%
Tebis	16.7	2.5	11.7	96	.5%	.1%	1.0%	.0%

(Continued)

Table 5 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

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

Company	Total			Market Share		
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
ESRI	16.2	.0	14.7	.0%	1.3%	.0%
Andor	15.7	3.9	11.1	.2%	1.0%	.0%
CADKEY	15.6	.0	15.6	.0%	1.4%	.0%
Research Machines	15.6	15.6	.0	.8%	.0%	.6%
Ziegler Informatics	14.4	.0	14.4	.0%	1.3%	.0%
LPKF	14.1	9.2	3.6	.5%	.3%	.2%
Soft-Tech Software Technologies	13.8	2.1	10.4	.1%	.9%	.2%
Altera	13.0	.0	11.1	.0%	1.0%	.0%
Design Automation	12.7	.6	12.0	.0%	1.1%	.0%
Racal-Redac	12.1	.0	8.8	.0%	.8%	.0%
Cimatron	12.0	5.4	5.4	.3%	.5%	.1%
Strategic Mapping	11.5	.0	10.4	.0%	.9%	.0%
ISICAD	11.3	.0	11.3	.0%	1.0%	.0%
Xilinx	11.2	.0	10.1	.0%	.9%	.0%
Orcad	10.9	.0	10.9	.0%	1.0%	.0%
CPU	10.5	.0	9.5	.0%	.8%	.0%
ACTEL	10.4	.0	9.4	.0%	.8%	.0%
Mitsubishi Electric	9.5	6.3	3.2	.3%	.3%	.2%
Point Control	9.2	.0	8.9	.0%	.8%	.0%
MapInfo	8.6	.0	6.9	.0%	.6%	.0%
Infocel	8.3	1.7	6.2	.1%	.6%	.0%

(Continued)

Table 5 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: All Applications
 Platform: Personal Computer
 Region: Worldwide
 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
PADS Software	8.3	.0	7.1	0	.3%	.0%	.6%	.0%
EEsof	8.1	.0	7.3	0	.3%	.0%	.6%	.0%
DAT Standard info systems	7.9	.0	7.5	0	.2%	.0%	.7%	.0%
Microsim	7.9	.0	7.4	0	.2%	.0%	.7%	.0%
ETAK	7.6	.4	7.3	18	.2%	.0%	.6%	.0%
Softdesk	7.6	.0	7.6	0	.2%	.0%	.7%	.0%
Ground Modelling Systems	7.3	4.0	3.0	60	.2%	.2%	.3%	.0%
Olivetti	7.3	6.2	.0	877	.2%	.3%	.0%	.2%
Data I/O	7.3	.0	7.3	0	.2%	.0%	.6%	.0%
Micrograft	7.3	.0	7.3	0	.2%	.0%	.6%	.0%
Aucotec	7.0	1.2	4.6	340	.2%	.1%	.4%	.1%
Serbi	7.0	.7	6.3	0	.2%	.0%	.6%	.0%
CNC Software	6.8	.0	6.8	0	.2%	.0%	.6%	.0%
Hochtief	6.8	1.0	4.8	84	.2%	.1%	.4%	.0%
ASG	6.5	.0	6.5	0	.2%	.0%	.6%	.0%
BATISOFT	6.3	.9	3.2	314	.2%	.1%	.3%	.1%
Moda CAD	6.3	1.5	4.4	52	.2%	.1%	.4%	.0%
RoboCAD Solutions	6.0	.0	4.5	0	.2%	.0%	.4%	.0%
Swanson Analysis	6.0	.0	6.0	0	.2%	.0%	.5%	.0%
RIB/RZB	6.0	.5	4.9	41	.2%	.0%	.4%	.0%
Graphisoft Software Dev	5.9	.0	5.9	0	.2%	.0%	.5%	.0%

(Continued)

Table 5 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: All Applications
 Platform: Personal Computer
 Region: Worldwide
 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
Aspen Technology	5.8	.0	5.2	0	.2%	.0%	.5%	.0%
American Small Business Comp.	5.3	.0	5.3	0	.2%	.0%	.5%	.0%
Seiko Instruments—NO OEM	5.3	3.8	3.8	136	.2%	.2%	.3%	.0%
mb Programme	5.1	2.5	1.8	122	.2%	.1%	.2%	.0%
GeoQuest	4.8	.0	4.8	0	.2%	.0%	.4%	.0%
BETRONEX	4.8	.5	4.3	89	.2%	.0%	.4%	.0%
Microway	4.7	2.9	1.4	60	.1%	.2%	.1%	.0%
Algor Interactive Systems	4.7	.0	4.2	0	.1%	.0%	.4%	.0%
International Software Systems	4.7	.0	4.7	0	.1%	.0%	.4%	.0%
ERDAS	4.6	1.2	3.0	500	.1%	.1%	.3%	.1%
Claris	4.6	.0	4.6	0	.1%	.0%	.4%	.0%
Kloeckner-Moeller	4.4	.2	3.1	46	.1%	.0%	.3%	.0%
ADRA Systems	4.3	.0	3.4	0	.1%	.0%	.3%	.0%
Teradyne	4.2	.0	3.2	0	.1%	.0%	.3%	.0%
Pathtrace	4.2	.9	2.7	62	.1%	.0%	.2%	.0%
Computer Services Consultants	4.2	.0	4.2	0	.1%	.0%	.4%	.0%
MCS	4.1	.0	3.6	0	.1%	.0%	.3%	.0%
Uchida Yoko	3.8	2.4	1.6	171	.1%	.1%	.1%	.0%
Innovative Data Design	3.7	.0	3.7	0	.1%	.0%	.3%	.0%
Mitsui Engineering	3.6	2.5	.7	60	.1%	.1%	.1%	.0%
Datagraphic	3.6	1.8	1.4	57	.1%	.1%	.1%	.0%

(Continued)

Table 5 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: All Applications
 Platform: Personal Computer
 Region: Worldwide
 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
GeoGraphix	3.4	.0	2.5	0	.1%	.0%	.2%	.0%
Engineering Mechanics	3.3	.2	2.8	407	.1%	.0%	.3%	.1%
PacSoft	3.2	.0	3.2	0	.1%	.0%	.3%	.0%
Vero International Software	3.1	.0	2.9	0	.1%	.0%	.3%	.0%
Sweet's Electronic Publishing	3.0	.0	2.4	0	.1%	.0%	.2%	.0%
Whessoe Computing Systems	3.0	.0	3.0	0	.1%	.0%	.3%	.0%
Accel Technologies	2.9	.0	2.6	0	.1%	.0%	.2%	.0%
Superdraft	2.8	1.3	1.4	160	.1%	.1%	.1%	.0%
Sigma Design	2.7	.0	2.5	0	.1%	.0%	.2%	.0%
Generation 5 Technology*	2.6	.0	2.6	0	.1%	.0%	.2%	.0%
ALDEC	2.6	.0	2.6	0	.1%	.0%	.2%	.0%
CADWorks	2.6	.0	2.3	0	.1%	.0%	.2%	.0%
Harris EDA	2.6	.2	2.0	10	.1%	.0%	.2%	.0%
Visionics	2.5	.0	1.9	10	.1%	.0%	.2%	.0%
Foresight Resources	2.5	.0	2.3	0	.1%	.0%	.2%	.0%
Facility Mapping Systems	2.4	.0	2.1	0	.1%	.0%	.2%	.0%
ALS Design	2.4	.1	2.1	20	.1%	.0%	.2%	.0%
Anilam Electronics	2.3	.6	1.5	18	.1%	.0%	.1%	.0%
Neocad	2.3	.0	2.3	0	.1%	.0%	.2%	.0%
Elstree Computing	2.2	1.0	1.2	62	.1%	.1%	.1%	.0%
Accugraph	2.2	.1	1.8	10	.1%	.0%	.2%	.0%

(Continued)

Table 5 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: All Applications
 Platform: Personal Computer
 Region: Worldwide
 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
CAD-UL	2.1	.0	2.1	0	.1%	.0%	.2%	.0%
Evolution Computing	2.1	.0	2.1	0	.1%	.0%	.2%	.0%
Integrated Computer Graphics	2.1	1.0	.8	119	.1%	.1%	.1%	.0%
Carrier Corporation	2.0	.0	2.0	0	.1%	.0%	.2%	.0%
CAD-Capture	2.0	.4	.6	10	.1%	.0%	.1%	.0%
Kork Systems	2.0	.2	1.4	20	.1%	.0%	.1%	.0%
PAFEC	1.9	.0	1.9	0	.1%	.0%	.2%	.0%
Terra Sciences	1.9	.0	1.9	0	.1%	.0%	.2%	.0%
Genasys II	1.9	.2	1.6	38	.1%	.0%	.1%	.0%
CAMTEK	1.9	.4	1.2	0	.1%	.0%	.1%	.0%
ISDATA	1.8	.0	1.6	0	.1%	.0%	.1%	.0%
Engineered Software	1.7	.0	1.7	0	.1%	.0%	.2%	.0%
Massteck	1.6	.0	1.6	0	.1%	.0%	.1%	.0%
Intera Tydac	1.6	.0	1.6	0	.0%	.0%	.1%	.0%
Radian Corporation	1.6	.0	.9	0	.0%	.0%	.1%	.0%
Research Engineers—Civilsoft	1.5	.0	1.5	0	.0%	.0%	.1%	.0%
LandCadd	1.5	.0	1.4	0	.0%	.0%	.1%	.0%
FEA	1.5	.4	.4	0	.0%	.0%	.0%	.0%
Minc Software	1.5	.0	1.5	0	.0%	.0%	.1%	.0%
EME	1.5	.4	.7	41	.0%	.0%	.1%	.0%
GRAPHSOFT	1.4	.0	1.4	0	.0%	.0%	.1%	.0%

(Continued)

Table 5 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: All Applications
 Platform: Personal Computer
 Region: Worldwide
 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
ARKTEC	1.4	.1	1.2	32	.0%	.0%	.1%	.0%
Lamp Software	1.4	.3	1.1	76	.0%	.0%	.1%	.0%
Aries Technology	1.3	.0	1.2	0	.0%	.0%	.1%	.0%
Cimlinc	1.3	.0	.9	0	.0%	.0%	.1%	.0%
Compact Software	1.3	.0	1.3	0	.0%	.0%	.1%	.0%
Applicon	1.3	.4	.5	40	.0%	.0%	.0%	.0%
Tanner Research	1.3	.0	1.1	0	.0%	.0%	.1%	.0%
Geometria GIS Systems House	1.3	.2	.4	15	.0%	.0%	.0%	.0%
Integer	1.2	.0	1.0	0	.0%	.0%	.1%	.0%
Aucos elektronische Gerate	1.2	.4	.9	121	.0%	.0%	.1%	.0%
Spectrum Software	1.1	.0	1.1	0	.0%	.0%	.1%	.0%
Mucke Software	1.1	.6	.4	27	.0%	.0%	.0%	.0%
Mega CADD	1.1	.0	1.1	0	.0%	.0%	.1%	.0%
CAE-link	1.1	.0	1.1	0	.0%	.0%	.1%	.0%
Cascade Graphics	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
Intrinsic	1.0	1.0	.0	10	.0%	.1%	.0%	.0%
Aura CAD/CAM Systems	1.0	.0	.9	0	.0%	.0%	.1%	.0%
Quicklogic	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
Omaton	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
Cadisys	.9	.0	.9	0	.0%	.0%	.1%	.0%
Maptech	.9	.0	.9	0	.0%	.0%	.1%	.0%

(Continued)

Table 5 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: All Applications
 Platform: Personal Computer
 Region: Worldwide
 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
Terr-Mar Resource Info Svs	.9	.2	.5	24	.0%	.0%	.0%	.0%
Areon	.9	.5	.2	6	.0%	.0%	.0%	.0%
Contract Data Research	.9	.0	.6	0	.0%	.0%	.1%	.0%
Rasna Corporation	.9	.0	.8	0	.0%	.0%	.1%	.0%
Number One Systems	.9	.2	.7	63	.0%	.0%	.1%	.0%
CADSI	.8	.1	.6	14	.0%	.0%	.1%	.0%
A.I. Systems	.8	.0	.8	0	.0%	.0%	.1%	.0%
Dynaware	.8	.0	.8	0	.0%	.0%	.1%	.0%
Douglas Electronics	.8	.0	.8	0	.0%	.0%	.1%	.0%
CAD Lab	.8	.0	.7	0	.0%	.0%	.1%	.0%
MacNeal-Schwendler	.8	.0	.7	0	.0%	.0%	.1%	.0%
Uniras	.7	.0	.7	0	.0%	.0%	.1%	.0%
Vamp	.7	.0	.7	0	.0%	.0%	.1%	.0%
Engineering Systems Corp.	.7	.0	.6	0	.0%	.0%	.0%	.0%
INS Engineering	.7	.4	.4	13	.0%	.0%	.0%	.0%
IGC Technology	.7	.0	.7	0	.0%	.0%	.1%	.0%
Mc2 Engineering Software	.7	.0	.7	0	.0%	.0%	.1%	.0%
debis Systemhaus	.7	.2	.4	13	.0%	.0%	.0%	.0%
ECOM Associates	.7	.0	.7	4	.0%	.0%	.1%	.0%
Digital	.7	.0	.5	0	.0%	.0%	.0%	.0%
CADMATIC	.7	.0	.4	4	.0%	.0%	.0%	.0%
Caroline Informatique	.7	.1	.3	10	.0%	.0%	.0%	.0%

(Continued)

Table 5 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: All Applications
 Platform: Personal Computer
 Region: Worldwide
 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
Infinite Graphics	.6	.0	.6	0	.0%	.0%	.1%	.0%
ESDU International	.6	.0	.6	0	.0%	.0%	.1%	.0%
ASCAD/ASCAM	.6	.4	.2	14	.0%	.0%	.0%	.0%
Machinery Sales	.6	.0	.6	0	.0%	.0%	.1%	.0%
Sharp System Products—NO OEM	.6	.3	.3	17	.0%	.0%	.0%	.0%
Integrated Silicon Systems	.6	.2	.4	8	.0%	.0%	.0%	.0%
Capilano Computing	.5	.0	.5	0	.0%	.0%	.0%	.0%
Ashlar	.5	.0	.5	0	.0%	.0%	.0%	.0%
Bechtel Software	.5	.0	.5	0	.0%	.0%	.0%	.0%
S.T.L.D. s.r.l.	.5	.0	.5	0	.0%	.0%	.0%	.0%
Inca	.5	.5	.0	2	.0%	.0%	.0%	.0%
Phase Three Logic	.4	.0	.4	0	.0%	.0%	.0%	.0%
Applications in CADD	.4	.1	.3	11	.0%	.0%	.0%	.0%
The CAD Group	.4	.0	.4	0	.0%	.0%	.0%	.0%
Ithaca Software	.4	.0	.4	0	.0%	.0%	.0%	.0%
Logic Modeling Systems	.4	.0	.3	0	.0%	.0%	.0%	.0%
BV Engineering	.4	.0	.4	0	.0%	.0%	.0%	.0%
Geosoft	.4	.0	.4	0	.0%	.0%	.0%	.0%
Geotrace Technologies	.3	.0	.3	0	.0%	.0%	.0%	.0%
GEOVISION Inc.	.3	.2	.1	38	.0%	.0%	.0%	.0%
Synthesis	.3	.0	.3	0	.0%	.0%	.0%	.0%
Meta-Software	.3	.0	.2	0	.0%	.0%	.0%	.0%

(Continued)

Table 5 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: All Applications
 Platform: Personal Computer
 Region: Worldwide
 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
SIMUCAD	.3	.0	.3	0	.0%	.0%	.0%	.0%
Masta Corporation	.3	.0	.2	0	.0%	.0%	.0%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.0%	.0%	.0%	.0%
Bobcat Systems	.2	.0	.2	0	.0%	.0%	.0%	.0%
Simulation Science	.2	.0	.2	0	.0%	.0%	.0%	.0%
Instrumatic Espanola	.2	.0	.2	0	.0%	.0%	.0%	.0%
Geomath	.2	.0	.2	0	.0%	.0%	.0%	.0%
Genrad	.2	.0	.2	9	.0%	.0%	.0%	.0%
Pacific Numerics	.2	.0	.2	0	.0%	.0%	.0%	.0%
Simutest	.2	.0	.2	0	.0%	.0%	.0%	.0%
Radan Computational	.2	.1	.1	6	.0%	.0%	.0%	.0%
TOOL Software	.1	.0	.1	3	.0%	.0%	.0%	.0%
National Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Other Companies	523.0	524.0	.0	138,026	16.4%	28.1%	.0%	33.0%
All Companies	3,183.9	1,867.9	1,127.0	418,247	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2,396.8	1,499.5	786.4	381,009	75.3%	80.3%	69.8%	91.1%
All Asian-Based Companies	437.2	251.0	151.0	27,111	13.7%	13.4%	13.4%	6.5%
All European-Based Companies	349.8	117.4	189.6	10,127	11.0%	6.3%	16.8%	2.4%
All Hardware Companies	1,613.8	1,544.0	.0	388,962	50.7%	82.7%	.0%	93.0%
All Turnkey & SW Companies	1,570.1	323.9	1,127.0	29,285	49.3%	17.3%	100.0%	7.0%

Source: Dataquest (March 1993)

Table 6
1992 CAD/CAM/CAE/GIS Market Share

Company	Application: Platform: Region: Units:	Mechanical Personal Computer Worldwide Millions of U.S. Dollars/Actual Units	Market Share										
			Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped			
Compaq			149.2	149.2	.0	32,333	11.6%	19.1%	.0%	19.3%			
Autodesk			121.2	.0	121.2	0	9.4%	.0%	28.9%	.0%			
IBM			115.6	67.6	37.1	18,160	9.0%	8.6%	8.9%	10.8%			
Apple Computer			99.7	87.7	.0	23,596	7.8%	11.2%	.0%	14.1%			
Hewlett-Packard			66.1	52.9	.0	15,585	5.1%	6.8%	.0%	9.3%			
NEC			53.1	44.6	4.3	7,902	4.1%	5.7%	1.0%	4.7%			
Hakuto			36.3	21.8	14.5	816	2.8%	2.8%	3.5%	.5%			
Fujitsu			36.2	23.2	9.4	1,077	2.8%	3.0%	2.2%	.6%			
Mutoh Industries—NO OEM			34.1	18.2	9.5	689	2.7%	2.3%	2.3%	.4%			
Wiechers Datentechnik			30.3	8.0	14.0	638	2.4%	1.0%	3.3%	.4%			
Investronica SA			29.3	23.4	2.9	1,170	2.3%	3.0%	.7%	.7%			
Computervision			25.3	.0	24.1	136	2.0%	.0%	5.7%	.1%			
Toshiba—NO OEM			24.5	12.3	9.8	1,961	1.9%	1.6%	2.3%	1.2%			
Hitachi			23.5	11.3	9.9	1,242	1.8%	1.4%	2.4%	.7%			
Tebis			16.7	2.5	11.7	96	1.3%	.3%	2.8%	.1%			
CADKEY			12.7	.0	12.7	0	1.0%	.0%	3.0%	.0%			
Dell Computer			12.5	12.5	.0	3,244	1.0%	1.6%	.0%	1.9%			
Cimatron			12.0	5.4	5.4	569	.9%	.7%	1.3%	.3%			
Andor			10.4	2.6	7.4	80	.8%	.3%	1.8%	.0%			
Design Automation			10.2	.5	9.6	54	.8%	.1%	2.3%	.0%			
CAD Distribution			10.1	5.1	4.1	157	.8%	.6%	1.0%	.1%			

(Continued)

Table 6 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: Platform: Region: Units:	Mechanical Personal Computer Worldwide Millions of U.S. Dollars/Actual Units	Total				Market Share			
		Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Point Control		9.2	.0	8.9	0	7%	.0%	2.1%	.0%
Wacom		7.7	1.5	5.3	147	.6%	.2%	1.3%	.1%
Research Machines		7.5	7.5	.0	1,208	.6%	1.0%	.0%	.7%
CNC Software		6.8	.0	6.8	0	.5%	.0%	1.6%	.0%
DAT Standard Info systems		6.7	.0	6.4	0	.5%	.0%	1.5%	.0%
Swanson Analysis		6.0	.0	6.0	0	.5%	.0%	1.4%	.0%
Ziegler Informatics		5.8	.0	5.8	0	.4%	.0%	1.4%	.0%
Serbi		4.8	.5	4.3	0	.4%	.1%	1.0%	.0%
Algor Interactive Systems		4.7	.0	4.2	0	.4%	.0%	1.0%	.0%
Moda CAD		4.4	1.1	3.1	36	.3%	.1%	.7%	.0%
ADRA Systems		4.3	.0	3.4	0	.3%	.0%	.8%	.0%
Pathtrace		4.2	.9	2.7	62	.3%	.1%	.6%	.0%
Mitsubishi Electric		4.1	2.7	1.4	387	.3%	.3%	.3%	.2%
MCS		4.1	.0	3.6	0	.3%	.0%	.9%	.0%
Olivetti		3.9	3.4	.0	475	.3%	.4%	.0%	.3%
Engineering Mechanics		3.3	.2	2.8	407	.3%	.0%	.7%	.2%
Micrografx		3.1	.0	3.1	0	.2%	.0%	.7%	.0%
American Small Business Comp.		3.1	.0	3.1	0	.2%	.0%	.7%	.0%
Vero International Software		3.1	.0	2.9	0	.2%	.0%	.7%	.0%
Whesoc Computing Systems		3.0	.0	3.0	0	.2%	.0%	.7%	.0%
Superdraft		2.8	1.3	1.4	160	.2%	.2%	.3%	.1%

(Continued)

Table 6 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: Mechanical
 Platform: Personal Computer
 Region: Worldwide
 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
RoboCAD Solutions	2.8	.0	2.1	0	.2%	.0%	.5%	.0%
Claris	2.7	.0	2.7	0	.2%	.0%	.6%	.0%
ISICAD	2.6	.0	2.6	0	.2%	.0%	.6%	.0%
Anilam Electronics	2.3	.6	1.5	18	.2%	.1%	.3%	.0%
Mitsui Engineering	2.0	1.4	.4	34	.2%	.2%	.1%	.0%
Intergraph	1.9	.0	1.8	0	.2%	.0%	.4%	.0%
PAFEC	1.9	.0	1.9	0	.1%	.0%	.5%	.0%
CAMTEK	1.9	.4	1.2	0	.1%	.1%	.3%	.0%
FEA	1.5	.4	.4	0	.1%	.0%	.1%	.0%
Aries Technology	1.3	.0	1.2	0	.1%	.0%	.3%	.0%
Appicon	1.3	.4	.5	40	.1%	.1%	.1%	.0%
Evolution Computing	1.2	.0	1.2	0	.1%	.0%	.3%	.0%
Cimlinc	1.2	.0	.8	0	.1%	.0%	.2%	.0%
Softdesk	1.1	.0	1.1	0	.1%	.0%	.3%	.0%
Foresight Resources	1.0	.0	.9	0	.1%	.0%	.2%	.0%
Areon	.9	.5	.2	6	.1%	.1%	.1%	.0%
Rasna Corporation	.9	.0	.8	0	.1%	.0%	.2%	.0%
CADSI	.8	.1	.6	14	.1%	.0%	.1%	.0%
Innovative Data Design	.8	.0	.8	0	.1%	.0%	.2%	.0%
CAD Lab	.8	.0	.7	0	.1%	.0%	.2%	.0%
MacNeal-Schwendler	.8	.0	.7	0	.1%	.0%	.2%	.0%

(Continued)

Table 6 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: Mechanical
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Aura CAD/CAM Systems	.7	.0	.6	0	.1%	.0%	.2%	.0%
A.I. Systems	.7	.0	.7	0	.1%	.0%	.2%	.0%
GRAPHISOFT	.7	.0	.7	0	.1%	.0%	.2%	.0%
Caroline Informatique	.7	.1	.3	10	.1%	.0%	.1%	.0%
CADWorks	.6	.0	.6	0	.0%	.0%	.1%	.0%
ESDU International	.6	.0	.6	0	.0%	.0%	.1%	.0%
Machinery Sales	.6	.0	.6	0	.0%	.0%	.1%	.0%
ASCAD/ASCAM	.6	.4	.2	14	.0%	.0%	.0%	.0%
Sharp System Products—NO OEM	.6	.3	.3	17	.0%	.0%	.1%	.0%
CAD-Capture	.6	.1	.2	3	.0%	.0%	.0%	.0%
S.T.L.D. s.r.l.	.5	.0	.5	0	.0%	.0%	.1%	.0%
Graphisoft Software Dev	.5	.0	.5	0	.0%	.0%	.1%	.0%
EME	.4	.1	.2	12	.0%	.0%	.0%	.0%
Uniras	.4	.0	.4	0	.0%	.0%	.1%	.0%
Cascade Graphics	.4	.0	.4	0	.0%	.0%	.1%	.0%
Ithaca Software	.4	.0	.4	0	.0%	.0%	.1%	.0%
Ashlar	.4	.0	.4	0	.0%	.0%	.1%	.0%
debis Systemhaus	.4	.1	.2	6	.0%	.0%	.1%	.0%
Mc2 Engineering Software	.3	.0	.3	0	.0%	.0%	.1%	.0%
Synthesis	.3	.0	.3	0	.0%	.0%	.1%	.0%
Engineering Systems Corp.	.3	.0	.2	0	.0%	.0%	.1%	.0%

(Continued)

Table 6 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: Mechanical
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mega CADD	.2	.0	.2	0	.0%	.0%	.1%	.0%
Uchida Yoko	.2	.1	.1	9	.0%	.0%	.0%	.0%
Radan Computational Engineered Software	.2	.0	.1	5	.0%	.0%	.0%	.0%
IGC Technology	.1	.0	.1	0	.0%	.0%	.0%	.0%
Accugraph	.1	.0	.1	0	.0%	.0%	.0%	.0%
Lamp Software	.1	.0	.1	4	.0%	.0%	.0%	.0%
Masta Corporation	.1	.0	.0	0	.0%	.0%	.0%	.0%
Number One Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	209.6	209.6	.0	55,210	16.3%	26.8%	.0%	32.9%
All Companies	1,284.2	782.1	419.1	167,792	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	884.9	581.2	262.2	148,762	68.9%	74.3%	62.6%	88.7%
All Asian-Based Companies	242.8	140.5	81.7	14,416	18.9%	18.0%	19.5%	8.6%
All European-Based Companies	156.5	60.5	75.1	4,614	12.2%	7.7%	17.9%	2.7%
All Hardware Companies	643.7	613.6	.0	154,491	50.1%	78.5%	.0%	92.1%
All Turnkey & SW Companies	640.5	168.5	419.1	13,300	49.9%	21.5%	100.0%	7.9%

Source: Dataquest (March 1993)

Table 7
1992 CAD/CAM/CAE/GIS Market Share

Application: AEC
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share									
	Total		Factory		Hardware		Total		Hardware	
	Revenue	Hardware Revenue	Revenue	Hardware Revenue	Revenue	Units Shipped	Revenue	Hardware Revenue	Revenue	Units Shipped
Autodesk	143.4	.0	143.4	.0	0	0	15.5%	.0%	43.7%	.0%
Apple Computer	97.3	85.6	.0	85.6	23,021	23,021	10.5%	15.3%	.0%	17.8%
Compaq	92.1	92.1	.0	92.1	19,960	19,960	10.0%	16.5%	.0%	15.4%
IBM	53.9	42.5	7.4	42.5	11,415	11,415	5.8%	7.6%	2.3%	8.8%
Nemetschek	31.3	11.6	17.5	11.6	400	400	3.4%	2.1%	5.3%	.3%
NEC	30.6	25.7	2.5	25.7	4,560	4,560	3.3%	4.6%	.7%	3.5%
Fujitsu	27.4	17.5	7.1	17.5	815	815	3.0%	3.1%	2.2%	.6%
Hewlett-Packard	17.8	14.3	.0	14.3	4,750	4,750	1.9%	2.6%	.0%	3.7%
Soft-Tech Software Technologies	13.8	2.1	10.4	2.1	932	932	1.5%	.4%	3.2%	.7%
Dell Computer	11.1	11.1	.0	11.1	2,884	2,884	1.2%	2.0%	.0%	2.2%
CPU	10.5	.0	9.5	.0	0	0	1.1%	.0%	2.9%	.0%
ISICAD	8.7	.0	8.7	.0	0	0	.9%	.0%	2.6%	.0%
Intergraph	8.0	.0	7.5	.0	0	0	.9%	.0%	2.3%	.0%
Hochtief	6.8	1.0	4.8	1.0	84	84	.7%	.2%	1.5%	.1%
ASG	6.5	.0	6.5	.0	0	0	.7%	.0%	2.0%	.0%
BATISOFT	6.3	.9	3.2	.9	314	314	.7%	.2%	1.0%	.2%
Aspen Technology	5.8	.0	5.2	.0	0	0	.6%	.0%	1.6%	.0%
Graphisoft Software Dev	5.4	.0	5.4	.0	0	0	.6%	.0%	1.6%	.0%
Seiko Instruments—NO OEM	5.3	3.8	3.8	3.8	136	136	.6%	.7%	1.1%	.1%
mb Programme	5.1	2.5	1.8	2.5	122	122	.5%	.5%	.5%	.1%
Softdesk	5.0	.0	5.0	.0	0	0	.5%	.0%	1.5%	.0%

(Continued)

Table 7 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: AEC
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
CAD Distribution	4.7	2.4	1.9	73	.5%	.4%	.6%	.1%
Microway	4.7	2.9	1.4	60	.5%	.5%	.4%	.0%
International Software Systems	4.7	.0	4.7	0	.5%	.0%	1.4%	.0%
RIB/RZB	4.6	.4	3.8	32	.5%	.1%	1.2%	.0%
Andor	4.2	1.1	3.0	32	.5%	.2%	.9%	.0%
Computer Services Consultants	4.2	.0	4.2	0	.4%	.0%	1.3%	.0%
Micrografx	4.2	.0	4.2	0	.4%	.0%	1.3%	.0%
Research Machines	4.1	4.1	.0	654	.4%	.7%	.0%	.5%
Mutoh Industries—NO OEM	3.9	2.1	1.1	79	.4%	.4%	.3%	.1%
Datagraphic	3.6	1.8	1.4	57	.4%	.3%	.4%	.0%
Hitachi	3.1	1.5	1.3	166	.3%	.3%	.4%	.1%
Sweet's Electronic Publishing	3.0	.0	2.4	0	.3%	.0%	.7%	.0%
CADKEY	2.9	.0	2.9	0	.3%	.0%	.9%	.0%
Ground Modelling Systems	2.8	1.5	1.1	23	.3%	.3%	.3%	.0%
RoboCAD Solutions	2.7	.0	2.0	0	.3%	.0%	.6%	.0%
Toshiba—NO OEM	2.6	1.3	1.0	204	.3%	.2%	.3%	.2%
Design Automation	2.5	.1	2.4	13	.3%	.0%	.7%	.0%
Sigma Design	2.5	.0	2.4	0	.3%	.0%	.7%	.0%
Innovative Data Design	2.5	.0	2.5	0	.3%	.0%	.8%	.0%
Olivetti	2.3	2.0	.0	281	.3%	.4%	.0%	.2%
Elstree Computing	2.2	1.0	1.2	62	.2%	.2%	.4%	.0%

(Continued)

Table 7 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: AEC
 Platform: Personal Computer
 Region: Worldwide
 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
Integrated Computer Graphics	2.1	1.0	.8	119	.2%	.2%	.3%	.1%
Ziegler Informatics	2.0	.0	2.0	0	.2%	.0%	.6%	.0%
Carrier Corporation	2.0	.0	2.0	0	.2%	.0%	.6%	.0%
Accugraph	2.0	.1	1.7	10	.2%	.0%	.5%	.0%
Claris	1.9	.0	1.9	0	.2%	.0%	.6%	.0%
CADWorks	1.9	.0	1.7	0	.2%	.0%	.5%	.0%
Moda CAD	1.9	.5	1.3	16	.2%	.1%	.4%	.0%
Computervision	1.7	.0	1.6	34	.2%	.0%	.5%	.0%
Engineered Software	1.6	.0	1.6	0	.2%	.0%	.5%	.0%
Research Engineers—Civilsoft	1.5	.0	1.5	0	.2%	.0%	.5%	.0%
American Small Business Comp.	1.4	.0	1.4	0	.2%	.0%	.4%	.0%
Mitsubishi Electric	1.4	.9	.5	135	.2%	.2%	.1%	.1%
ARKTEC	1.4	.1	1.2	32	.2%	.0%	.4%	.0%
Integer	1.2	.0	1.0	0	.1%	.0%	.3%	.0%
Lamp Software	1.2	.2	1.0	68	.1%	.0%	.3%	.1%
Mucke Software	1.1	.6	.4	27	.1%	.1%	.1%	.0%
Serbi	1.1	.1	1.0	0	.1%	.0%	.3%	.0%
CAE-link	1.1	.0	1.1	0	.1%	.0%	.3%	.0%
Foresight Resources	1.0	.0	.9	0	.1%	.0%	.3%	.0%
Evolution Computing	.9	.0	.9	0	.1%	.0%	.3%	.0%
Mega CADD	.8	.0	.8	0	.1%	.0%	.3%	.0%

(Continued)

Table 7 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: AEC
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Dynaware	.8	.0	.8	0	.1%	.0%	.2%	.0%
GRAPHSOFT	.8	.0	.8	0	.1%	.0%	.2%	.0%
CAD-Capture	.7	.2	.2	4	.1%	.0%	.1%	.0%
INS Engineering	.7	.4	.4	13	.1%	.1%	.1%	.0%
ECOM Associates	.7	.0	.7	4	.1%	.0%	.2%	.0%
CADMATIC	.7	.0	.4	4	.1%	.0%	.1%	.0%
IGC Technology	.6	.0	.6	0	.1%	.0%	.2%	.0%
Uchida Yoko	.5	.3	.2	24	.1%	.1%	.1%	.0%
Bechtel Software	.5	.0	.5	0	.1%	.0%	.2%	.0%
Cascade Graphics	.4	.0	.4	0	.0%	.0%	.1%	.0%
DAT Standard info ssystemes	.4	.0	.4	0	.0%	.0%	.1%	.0%
Mc2 Engineering Software	.4	.0	.4	0	.0%	.0%	.1%	.0%
Aura CAD/CAM Systems	.3	.0	.3	0	.0%	.0%	.1%	.0%
Simulation Science	.2	.0	.2	0	.0%	.0%	.1%	.0%
Engineering Systems Corp.	.2	.0	.2	0	.0%	.0%	.0%	.0%
Applications in CADD	.2	.0	.1	6	.0%	.0%	.0%	.0%
Ashlar	.2	.0	.2	0	.0%	.0%	.1%	.0%
Mitsui Engineering	.2	.1	.0	3	.0%	.0%	.0%	.0%
Uniras	.2	.0	.2	0	.0%	.0%	.0%	.0%
TOOL Software	.1	.0	.1	3	.0%	.0%	.0%	.0%
Masta Corporation	.1	.0	.1	0	.0%	.0%	.0%	.0%

(Continued)

Table 7 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: AEC
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
A.I. Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%
Radan Computational	.0	.0	.0	1	.0%	.0%	.0%	.0%
Other Companies	220.1	220.1	.0	57,970	23.8%	39.5%	.0%	44.7%
All Companies	924.6	557.4	327.9	129,598	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	716.5	467.2	227.3	120,182	77.5%	83.8%	69.3%	92.7%
All Asian-Based Companies	93.0	54.8	32.7	6,179	10.1%	9.8%	10.0%	4.8%
All European-Based Companies	115.1	35.4	68.0	3,238	12.5%	6.4%	20.7%	2.5%
All Hardware Companies	494.6	476.3	.0	121,870	53.5%	85.4%	.0%	94.0%
All Turnkey & SW Companies	430.0	81.1	327.9	7,728	46.5%	14.6%	100.0%	6.0%

Source: Dataquest (March 1993)

Table 8
1992 CAD/CAM/CAE/GIS Market Share

Company	Total		Hardware		Software		Hardware		Software		Hardware		Software		Hardware	
	Factory	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue
	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue
Compaq	60.0	60.0	.0	13,005	15.6%	28.5%	.0%	26.3%								
Intergraph	34.0	.0	31.9	0	8.8%	.0%	.0%	.0%								
IBM	32.9	30.9	.0	8,302	8.5%	14.7%	.0%	16.8%								
Autodesk	31.9	.0	31.9	0	8.3%	.0%	.0%	.0%								
Apple Computer	26.8	23.5	.0	6,331	6.9%	11.2%	.0%	12.8%								
ESRI	16.2	.0	14.7	0	4.2%	.0%	.0%	.0%								
Strategic Mapping	11.5	.0	10.4	0	3.0%	.0%	.0%	.0%								
Fujitsu	9.7	6.2	2.5	289	2.5%	3.0%	1.6%	.6%								
MapInfo	8.6	.0	6.9	0	2.2%	.0%	.0%	.0%								
Infocel	8.3	1.7	6.2	181	2.2%	.8%	4.0%	.4%								
ETAK	7.6	.4	7.3	18	2.0%	.2%	4.7%	.0%								
Hewlett-Packard	6.0	4.8	.0	1,748	1.6%	2.3%	.0%	3.5%								
Dell Computer	4.8	4.8	.0	1,262	1.3%	2.3%	.0%	2.5%								
GeoQuest	4.8	.0	4.8	0	1.2%	.0%	.0%	.0%								
ERDAS	4.6	1.2	3.0	500	1.2%	.6%	2.0%	1.0%								
Ground Modelling Systems	4.5	2.5	1.9	37	1.2%	1.2%	1.2%	.1%								
Mitsubishi Electric	4.0	2.6	1.4	378	1.0%	1.3%	.9%	.8%								
GeoGraphix	3.4	.0	2.5	0	.9%	.0%	1.6%	.0%								
PacSoft	3.2	.0	3.2	0	.8%	.0%	2.1%	.0%								
Hitachi	3.1	1.5	1.3	166	.8%	.7%	.9%	.3%								

(Continued)

Table 8 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: GIS/Mapping
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Generation 5 Technology	2.6	.0	2.6	0	.7%	.0%	1.7%	.0%
Facility Mapping Systems	2.4	.0	2.1	0	.6%	.0%	1.4%	.0%
Uchida Yoko	2.2	1.4	.9	99	.6%	.7%	.6%	.2%
Mutoh Industries—NO OEM	2.0	1.1	.6	41	.5%	.5%	.4%	.1%
Kork Systems	2.0	.2	1.4	20	.5%	.1%	.9%	.0%
Terra Sciences	1.9	.0	1.9	0	.5%	.0%	1.2%	.0%
Genasys II	1.9	.2	1.6	38	.5%	.1%	1.0%	.1%
Ziegler Informatics	1.7	.0	1.7	0	.4%	.0%	1.1%	.0%
Intera Tydac	1.6	.0	1.6	0	.4%	.0%	1.0%	.0%
Radian Corporation	1.6	.0	.9	0	.4%	.0%	.6%	.0%
LandCadd	1.5	.0	1.4	0	.4%	.0%	.9%	.0%
Softdesk	1.5	.0	1.5	0	.4%	.0%	1.0%	.0%
Mitsui Engineering	1.4	1.0	.3	23	.4%	.5%	.2%	.0%
RIB/RZB	1.3	.1	1.1	9	.3%	.1%	.7%	.0%
Geometria GIS Systems House	1.3	.2	.4	15	.3%	.1%	.3%	.0%
Research Machines	1.1	1.1	.0	176	.3%	.5%	.0%	.4%
Terr-Mar Resource Info Sys	.9	.2	.5	24	.2%	.1%	.3%	.0%
Maptech	.9	.0	.9	0	.2%	.0%	.6%	.0%
Contract Data Research	.9	.0	.6	0	.2%	.0%	.4%	.0%
Olivetti	.9	.7	.0	103	.2%	.3%	.0%	.2%

(Continued)

Table 8 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: GIS/Mapping
 Platform: Personal Computer
 Region: Worldwide
 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
CAD-Capture	.7	.2	.2	4	.2%	.1%	.1%	.0%
NEC	.7	.6	.1	104	.2%	.3%	.0%	.2%
Andor	.6	.2	.4	5	.2%	.1%	.3%	.0%
EME	.5	.1	.2	14	.1%	.1%	.2%	.0%
RoboCAD Solutions	.5	.0	.4	0	.1%	.0%	.2%	.0%
Geosoft	.4	.0	.4	0	.1%	.0%	.2%	.0%
Geotrace Technologies	.3	.0	.3	0	.1%	.0%	.2%	.0%
CAD Distribution	.3	.1	.1	5	.1%	.1%	.1%	.0%
GEOVISION Inc.	.3	.2	.1	38	.1%	.1%	.0%	.1%
Engineering Systems Corp.	.2	.0	.2	0	.1%	.0%	.1%	.0%
Applications in CADD	.2	.0	.1	6	.1%	.0%	.1%	.0%
Geomath	.2	.0	.2	0	.1%	.0%	.1%	.0%
American Small Business Comp.	.2	.0	.2	0	.0%	.0%	.1%	.0%
Uniras	.2	.0	.2	0	.0%	.0%	.1%	.0%
Sigma Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
Accugraph	.1	.0	.1	0	.0%	.0%	.0%	.0%
Foresight Resources	.1	.0	.1	0	.0%	.0%	.0%	.0%
Lamp Software	.1	.0	.1	4	.0%	.0%	.0%	.0%
A.I. Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%

(Continued)

Table 8 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: GIS/Mapping
 Platform: Personal Computer
 Region: Worldwide
 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
Other Companies	61.8	62.9	.0	16,563	16.0%	29.9%	.0%	33.5%
All Companies	385.0	210.6	154.7	49,508	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	347.3	191.0	140.4	48,030	90.2%	90.7%	90.8%	97.0%
All Asian-Based Companies	23.8	14.5	7.5	1,105	6.2%	6.9%	4.8%	2.2%
All European-Based Companies	14.0	5.1	6.8	373	3.6%	2.4%	4.4%	.8%
All Hardware Companies	195.3	188.8	.0	47,490	50.7%	89.6%	.0%	95.9%
All Turnkey & SW Companies	189.8	21.9	154.7	2,018	49.3%	10.4%	100.0%	4.1%

Source: Dataquest (March 1993)

Table 9
1992 CAD/CAM/CAE/GIS Market Share

Application: Electronic Design Automation
Platform: Personal Computer
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share				
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	115.0	115.0	.0	24,927	19.5%	36.2%	.0%	34.9%
IBM	65.9	52.2	8.9	14,009	11.2%	16.4%	3.9%	19.6%
Hewlett-Packard	45.8	36.6	.0	10,543	7.8%	11.5%	.0%	14.8%
Wacom	31.2	6.2	21.6	601	5.3%	2.0%	9.6%	.8%
NEC	28.5	23.9	2.3	4,239	4.8%	7.5%	1.0%	5.9%
Viewlogic Systems	28.3	.0	22.6	0	4.8%	.0%	10.0%	.0%
Autodesk	22.3	.0	22.3	0	3.8%	.0%	9.9%	.0%
Apple Computer	19.5	17.1	.0	4,604	3.3%	5.4%	.0%	6.5%
Fujitsu	15.0	9.6	3.9	447	2.5%	3.0%	1.7%	.6%
LPKF	14.1	9.2	3.6	676	2.4%	2.9%	1.6%	.9%
Altera	13.0	.0	11.1	0	2.2%	.0%	4.9%	.0%
Racal-Redac	12.1	.0	8.8	0	2.0%	.0%	3.9%	.0%
Xilinx	11.2	.0	10.1	0	1.9%	.0%	4.5%	.0%
Orcad	10.9	.0	10.9	0	1.8%	.0%	4.8%	.0%
ACTEL	10.4	.0	9.4	0	1.8%	.0%	4.2%	.0%
PADS Software	8.3	.0	7.1	0	1.4%	.0%	3.1%	.0%
EEsof	8.1	.0	7.3	0	1.4%	.0%	3.2%	.0%
Microsim	7.9	.0	7.4	0	1.3%	.0%	3.3%	.0%
Data I/O	7.3	.0	7.3	0	1.2%	.0%	3.2%	.0%
Aucotec	7.0	1.2	4.6	340	1.2%	.4%	2.0%	.5%

(Continued)

Table 9 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Company	Electronic Design Automation			Market Share				
	Personal Computer			Worldwide				
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Dell Computer	6.2	6.2	.0	1,622	1.1%	2.0%	.0%	2.3%
Ziegler Informatics	4.9	.0	4.9	0	.8%	.0%	2.2%	.0%
BETRONEX	4.8	.5	4.3	89	.8%	.1%	1.9%	.1%
Kloockner-Moeller	4.4	.2	3.1	46	.7%	.1%	1.4%	.1%
Teradyne	4.2	.0	3.2	0	.7%	.0%	1.4%	.0%
Research Machines	3.0	3.0	.0	478	.5%	.9%	.0%	.7%
Accel Technologies	2.9	.0	2.6	0	.5%	.0%	1.2%	.0%
ALDEC	2.6	.0	2.6	0	.4%	.0%	1.2%	.0%
Harris BDA	2.6	.2	2.0	10	.4%	.1%	.9%	.0%
Visionics	2.5	.0	1.9	10	.4%	.0%	.8%	.0%
ALS Design	2.4	.1	2.1	20	.4%	.0%	.9%	.0%
Neocad	2.3	.0	2.3	0	.4%	.0%	1.0%	.0%
CAD-UL	2.1	.0	2.1	0	.4%	.0%	.9%	.0%
ISDATA	1.8	.0	1.6	0	.3%	.0%	.7%	.0%
CAD Distribution	1.7	.8	.7	26	.3%	.3%	.3%	.0%
Massstek	1.6	.0	1.6	0	.3%	.0%	.7%	.0%
Hitachi	1.6	.8	.7	83	.3%	.2%	.3%	.1%
Minc Software	1.5	.0	1.5	0	.3%	.0%	.7%	.0%
Compact Software	1.3	.0	1.3	0	.2%	.0%	.6%	.0%
Tanner Research	1.3	.0	1.1	0	.2%	.0%	.5%	.0%

(Continued)

Table 9 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Worldwide
 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
Aucos elektronische Gerate	1.2	.4	.9	121	.2%	.1%	.4%	.2%
Spectrum Software	1.1	.0	1.1	0	.2%	.0%	.5%	.0%
Serbi	1.1	.1	1.0	0	.2%	.0%	.4%	.0%
Intrinsic	1.0	1.0	.0	10	.2%	.3%	.0%	.0%
Quicklogic	1.0	.0	1.0	0	.2%	.0%	.4%	.0%
Omaton	1.0	.0	1.0	0	.2%	.0%	.4%	.0%
Cadisys	.9	.0	.9	0	.2%	.0%	.4%	.0%
Uchida Yoko	.9	.6	.4	39	.1%	.2%	.2%	.1%
Number One Systems	.9	.2	.7	62	.1%	.0%	.3%	.1%
DAT Standard info ssystemes	.8	.0	.7	0	.1%	.0%	.3%	.0%
Douglas Electronics	.8	.0	.8	0	.1%	.0%	.3%	.0%
Vamp	.7	.0	.7	0	.1%	.0%	.3%	.0%
Digital	.7	.0	.5	0	.1%	.0%	.2%	.0%
Infinite Graphics	.6	.0	.6	0	.1%	.0%	.3%	.0%
Integrated Silicon Systems	.6	.2	.4	8	.1%	.1%	.2%	.0%
American Small Business Comp.	.6	.0	.6	0	.1%	.0%	.3%	.0%
Capilano Computing	.5	.0	.5	0	.1%	.0%	.2%	.0%
EME	.5	.1	.2	14	.1%	.0%	.1%	.0%
Inca	.5	.5	.0	2	.1%	.2%	.0%	.0%
Andor	.5	.1	.3	3	.1%	.0%	.1%	.0%

(Continued)

Table 9 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: Electronic Design Automation
Platform: Personal Computer
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Phase Three Logic	.4	.0	.4	0	.1%	.0%	.2%	.0%
The CAD Group	.4	.0	.4	0	.1%	.0%	.2%	.0%
Logic Modeling Systems	.4	.0	.3	0	.1%	.0%	.1%	.0%
Foresight Resources	.4	.0	.3	0	.1%	.0%	.2%	.0%
BV Engineering	.4	.0	.4	0	.1%	.0%	.2%	.0%
debis Systemhaus	.4	.1	.2	6	.1%	.0%	.1%	.0%
Meta-Software	.3	.0	.2	0	.0%	.0%	.1%	.0%
SIMUCAD	.3	.0	.3	0	.0%	.0%	.1%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.0%	.0%	.1%	.0%
Instrumatic Espanola	.2	.0	.2	0	.0%	.0%	.1%	.0%
Bobcat Systems	.2	.0	.2	0	.0%	.0%	.1%	.0%
Innovative Data Design	.2	.0	.2	0	.0%	.0%	.1%	.0%
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Genrad	.2	.0	.2	9	.0%	.0%	.1%	.0%
Pacific Numerics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Simutest	.2	.0	.2	0	.0%	.0%	.1%	.0%
Olivetti	.2	.1	.0	19	.0%	.0%	.0%	.0%
Cimlinc	.1	.0	.1	0	.0%	.0%	.0%	.0%
National Semiconductor	.1	.0	.1	0	.0%	.0%	.1%	.0%
Masta Corporation	.1	.0	.1	0	.0%	.0%	.0%	.0%

(Continued)

Table 9 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
RoboCAD Solutions	.1	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	31.6	31.5	.1	8,283	5.4%	9.9%	.1%	11.6%
All Companies	590.1	317.7	225.4	71,349	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	448.3	260.1	156.5	64,035	76.0%	81.9%	69.5%	89.7%
All Asian-Based Companies	77.6	41.2	29.1	5,412	13.2%	13.0%	12.9%	7.6%
All European-Based Companies	64.2	16.4	39.7	1,902	10.9%	5.2%	17.6%	2.7%
All Hardware Companies	280.2	265.3	.0	65,110	47.5%	83.5%	.0%	91.3%
All Turnkey & SW Companies	309.9	52.4	225.4	6,239	52.5%	16.5%	100.0%	8.7%

Source: Dataquest (March 1993)

Table 10
1992 CAD/CAM/CAE/GIS Market Share

Application: Electronic CAE
Platform: Personal Computer
Region: Worldwide
Units: Millions of U.S. Dollars / Actual Units

Company	Total				Market Share			
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	81.3	81.3	.0	17,612	18.9%	35.7%	.0%	33.2%
IBM	49.3	46.4	.0	12,452	11.5%	20.4%	.0%	23.5%
Wacom	31.2	6.2	21.6	601	7.2%	2.7%	12.6%	1.1%
Hewlett-Packard	30.7	24.6	.0	7,069	7.1%	10.8%	.0%	13.3%
Viewlogic Systems	28.3	.0	22.6	0	6.6%	.0%	13.3%	.0%
Autodesk	19.1	.0	19.1	0	4.4%	.0%	11.2%	.0%
NEC	16.3	13.7	1.3	2,425	3.8%	6.0%	.8%	4.6%
Altera	13.0	.0	11.1	0	3.0%	.0%	6.5%	.0%
Xilinx	11.2	.0	10.1	0	2.6%	.0%	5.9%	.0%
ACTEL	10.4	.0	9.4	0	2.4%	.0%	5.5%	.0%
Apple Computer	9.7	8.6	.0	2,302	2.3%	3.8%	.0%	4.3%
EEsof	8.1	.0	7.3	0	1.9%	.0%	4.3%	.0%
Microsim	7.9	.0	7.4	0	1.8%	.0%	4.3%	.0%
Orcad	7.7	.0	7.7	0	1.8%	.0%	4.5%	.0%
Data I/O	7.3	.0	7.3	0	1.7%	.0%	4.3%	.0%
Aucotec	7.0	1.2	4.6	340	1.6%	.5%	2.7%	.6%
Fujitsu	6.2	4.0	1.6	184	1.4%	1.7%	.9%	.3%
Dell Computer	4.9	4.9	.0	1,262	1.1%	2.1%	.0%	2.4%
Racal-Redac	4.5	.0	3.3	0	1.0%	.0%	1.9%	.0%
Kloekner-Moeller	4.4	.2	3.1	46	1.0%	.1%	1.8%	.1%
Teradyne	4.2	.0	3.2	0	1.0%	.0%	1.9%	.0%

(Continued)

Table 10 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: **Electronic CAE**
 Platform: **Personal Computer**
 Region: **Worldwide**
 Units: **Millions of U.S. Dollars/Actual Units**

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Ziegler Informatics	2.9	.0	2.9	0	.7%	.0%	1.7%	.0%
ALDEC	2.6	.0	2.6	0	.6%	.0%	1.5%	.0%
Harris EDA	2.6	.2	2.0	10	.6%	.1%	1.1%	.0%
Neocad	2.3	.0	2.3	0	.5%	.0%	1.3%	.0%
ISDATA	1.8	.0	1.6	0	.4%	.0%	.9%	.0%
ALS Design	1.8	.1	1.6	15	.4%	.0%	.9%	.0%
Research Machines	1.7	1.7	.0	277	.4%	.8%	.0%	.5%
CAD Distribution	1.7	.8	.7	26	.4%	.4%	.4%	.0%
Minc Software	1.5	.0	1.5	0	.3%	.0%	.9%	.0%
Aucos elektronische Geräte	1.2	.4	.9	121	.3%	.2%	.5%	.2%
Spectrum Software	1.1	.0	1.1	0	.3%	.0%	.7%	.0%
Serbi	1.1	.1	1.0	0	.3%	.0%	.6%	.0%
Compact Software	1.0	.0	1.0	0	.2%	.0%	.6%	.0%
Intrinsix	1.0	1.0	.0	10	.2%	.5%	.0%	.0%
Quicklogic	1.0	.0	1.0	0	.2%	.0%	.6%	.0%
PADS Software	.9	.0	.7	0	.2%	.0%	.4%	.0%
DAT Standard info ssystemes	.8	.0	.7	0	.2%	.0%	.4%	.0%
Douglas Electronics	.8	.0	.8	0	.2%	.0%	.5%	.0%
Visionics	.7	.0	.5	3	.2%	.0%	.3%	.0%
Omaton	.7	.0	.7	0	.2%	.0%	.4%	.0%
Capilano Computing	.5	.0	.5	0	.1%	.0%	.3%	.0%

(Continued)

Table 10 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Accel Technologies	.5	.0	.5	0	.1%	.0%	.3%	.0%
Inca	.5	.5	.0	2	.1%	.2%	.0%	.0%
Phase Three Logic	.4	.0	.4	0	.1%	.0%	.2%	.0%
The CAD Group	.4	.0	.4	0	.1%	.0%	.2%	.0%
Tanner Research	.4	.0	.3	0	.1%	.0%	.2%	.0%
American Small Business Comp.	.4	.0	.4	0	.1%	.0%	.2%	.0%
Number One Systems	.4	.1	.3	28	.1%	.0%	.2%	.1%
Logic Modeling Systems	.4	.0	.3	0	.1%	.0%	.2%	.0%
BV Engineering	.4	.0	.4	0	.1%	.0%	.2%	.0%
debis Systemhaus	.4	.1	.2	6	.1%	.0%	.1%	.0%
Digital	.3	.0	.3	0	.1%	.0%	.1%	.0%
Meta-Software	.3	.0	.2	0	.1%	.0%	.1%	.0%
SIMUCAD	.3	.0	.3	0	.1%	.0%	.2%	.0%
Foresight Resources	.3	.0	.3	0	.1%	.0%	.1%	.0%
Bobcat Systems	.2	.0	.2	0	.1%	.0%	.1%	.0%
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Infinite Graphics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Vamp	.2	.0	.2	0	.0%	.0%	.1%	.0%
Genrad	.2	.0	.2	9	.0%	.0%	.1%	.0%
Simutest	.2	.0	.2	0	.0%	.0%	.1%	.0%
Massteck	.2	.0	.2	0	.0%	.0%	.1%	.0%

(Continued)

Table 10 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
National Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Masta Corporation	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	31.6	31.5	.1	8,283	7.3%	13.8%	.1%	15.6%
All Companies	430.7	227.4	170.4	53,083	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	346.9	198.3	125.1	49,011	80.5%	87.2%	73.4%	92.3%
All Asian-Based Companies	53.7	23.9	24.5	3,210	12.5%	10.5%	14.4%	6.0%
All European-Based Companies	30.2	5.2	20.8	862	7.0%	2.3%	12.2%	1.6%
All Hardware Companies	209.5	199.3	.0	49,257	48.6%	87.6%	.0%	92.8%
All Turnkey & SW Companies	221.2	28.1	170.4	3,825	51.4%	12.4%	100.0%	7.2%

Source: Dataquest (March 1993)

Table 11
1992 CAD/CAM/CAE/GIS Market Share

Application: IC Layout
Platform: Personal Computer
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Fujitsu	2.7	1.7	.7	79	62.6%	87.6%	35.8%	69.3%
Tanner Research	.9	.0	.8	0	20.8%	.0%	41.5%	.0%
Integrated Silicon Systems	.6	.2	.4	8	14.2%	10.3%	20.7%	7.4%
Hewlett-Packard	.1	.0	.0	27	1.4%	2.1%	.0%	23.3%
National Semiconductor	.0	.0	.0	0	.9%	.0%	2.1%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	4.2	1.9	1.9	114	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1.6	.2	1.2	35	37.4%	12.4%	64.2%	30.7%
All Asian-Based Companies	2.7	1.7	.7	79	62.6%	87.6%	35.8%	69.3%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.1	.0	.0	27	1.4%	2.1%	.0%	23.3%
All Turnkey & SW Companies	4.2	1.9	1.9	87	98.6%	97.9%	100.0%	76.7%

Source: Dataquest (March 1993)

Table 12
1992 CAD/CAM/CAE/GIS Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share			Hardware Units Shipped	Total Factory Revenue	Software Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Hardware Revenue						
Compaq	33.8	33.8	.0	33.2%	.0%	38.2%	7,316	21.8%	.0	38.2%	.0%	40.3%
IBM	16.6	5.8	8.9	6.6%	16.7%	6.6%	1,557	10.7%	8.9	6.6%	16.7%	8.6%
Hewlett-Packard	15.1	12.1	.0	13.6%	.0%	13.6%	3,447	9.7%	.0	13.6%	.0%	19.0%
LPKF	14.1	9.2	3.6	10.4%	6.7%	10.4%	676	9.1%	3.6	10.4%	6.7%	3.7%
NEC	12.2	10.2	1.0	11.6%	1.8%	11.6%	1,814	7.9%	1.0	11.6%	1.8%	10.0%
Apple Computer	9.7	8.6	.0	9.7%	.0%	9.7%	2,302	6.3%	.0	9.7%	.0%	12.7%
Racal-Redac	7.6	.0	5.5	.0%	10.3%	.0%	0	4.9%	5.5	.0%	10.3%	.0%
PADS Software	7.5	.0	6.3	.0%	11.9%	.0%	0	4.8%	6.3	.0%	11.9%	.0%
Fujitsu	6.2	4.0	1.6	4.5%	3.0%	4.5%	184	4.0%	1.6	4.5%	3.0%	1.0%
BETRONEX	4.8	.5	4.3	.5%	8.1%	.5%	89	3.1%	4.3	.5%	8.1%	.5%
Orcad	3.2	.0	3.2	.0%	6.0%	.0%	0	2.1%	3.2	.0%	6.0%	.0%
Autodesk	3.2	.0	3.2	.0%	6.0%	.0%	0	2.1%	3.2	.0%	6.0%	.0%
Accel Technologies	2.4	.0	2.2	.0%	4.1%	.0%	0	1.5%	2.2	.0%	4.1%	.0%
CAD-UL	2.1	.0	2.1	.0%	4.0%	.0%	0	1.4%	2.1	.0%	4.0%	.0%
Ziegler Informatics	2.0	.0	2.0	.0%	3.8%	.0%	0	1.3%	2.0	.0%	3.8%	.0%
Visionics	1.9	.0	1.4	.0%	2.6%	.0%	8	1.2%	1.4	.0%	2.6%	.0%
Hitachi	1.6	.8	.7	.9%	1.2%	.9%	83	1.0%	.7	.9%	1.2%	.5%
Massteck	1.5	.0	1.5	.0%	2.8%	.0%	0	1.0%	1.5	.0%	2.8%	.0%
Dell Computer	1.4	1.4	.0	1.6%	.0%	1.6%	360	.9%	.0	1.6%	.0%	2.0%
Research Machines	1.2	1.2	.0	1.4%	.0%	1.4%	201	.8%	.0	1.4%	.0%	1.1%
Cadisy	.9	.0	.9	.0%	1.8%	.0%	0	.6%	.9	.0%	1.8%	.0%

(Continued)

Table 12 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Uchida Yoko	.9	.6	.4	39	.6%	.6%	.7%	.2%
ALS Design	.6	.0	.5	5	.4%	.0%	1.0%	.0%
Vamp	.5	.0	.5	0	.3%	.0%	1.0%	.0%
EME	.5	.1	.2	14	.3%	.1%	.5%	.1%
Number One Systems	.5	.1	.4	35	.3%	.1%	.7%	.2%
Andor	.5	.1	.3	3	.3%	.1%	.6%	.0%
Infinite Graphics	.4	.0	.4	0	.3%	.0%	.8%	.0%
Digital	.3	.0	.3	0	.2%	.0%	.5%	.0%
Omaton	.3	.0	.3	0	.2%	.0%	.5%	.0%
Compact Software	.3	.0	.3	0	.2%	.0%	.5%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.2%	.0%	.5%	.0%
Instrumatic Espanola	.2	.0	.2	0	.1%	.0%	.4%	.0%
American Small Business Comp.	.2	.0	.2	0	.1%	.0%	.4%	.0%
Pacific Numerics	.2	.0	.2	0	.1%	.0%	.4%	.0%
Olivetti	.2	.1	.0	19	.1%	.1%	.0%	.1%
Cimlinc	.1	.0	.1	0	.1%	.0%	.2%	.0%
Innovative Data Design	.1	.0	.1	0	.1%	.0%	.2%	.0%
Foresight Resources	.1	.0	.1	0	.1%	.0%	.2%	.0%
RoboCAD Solutions	.1	.0	.0	0	.0%	.0%	.1%	.0%
Masta Corporation	.1	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

Table 12 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Worldwide
 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
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	155.2	88.4	53.1	18,153	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	99.8	61.6	30.2	14,990	64.3%	69.6%	57.0%	82.6%
All Asian-Based Companies	21.3	15.6	3.9	2,123	13.7%	17.7%	7.4%	11.7%
All European-Based Companies	34.0	11.2	18.9	1,040	21.9%	12.7%	35.6%	5.7%
All Hardware Companies	70.6	66.0	.0	15,826	45.5%	74.7%	.0%	87.2%
All Turnkey & SW Companies	84.5	22.4	53.1	2,327	54.5%	25.3%	100.0%	12.8%

Source: Dataquest (March 1993)

Table 13
1992 CAD/CAM/CAE/GIS Market Share

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

Company	Total			Market Share			Hardware		
	Factory Revenue	Hardware Revenue	Software Revenue	Factory Revenue	Hardware Revenue	Software Revenue	Units Shipped	Revenue	Units Shipped
Compaq	197.5	197.5	.0	15.7%	26.6%	.0%	42,808	.0%	22.5%
Autodesk	159.8	.0	159.8	12.7%	.0%	34.9%	0	34.9%	.0%
Apple Computer	150.7	132.6	.0	12.0%	17.9%	.0%	35,682	.0%	18.7%
IBM	71.4	50.0	15.5	5.7%	6.7%	3.4%	13,725	.0%	7.2%
Hewlett-Packard	66.7	53.4	.0	5.3%	7.2%	.0%	18,793	.0%	9.9%
Intergraph	27.2	.0	25.5	2.2%	.0%	5.6%	0	5.6%	.0%
Dell Computer	25.3	25.3	.0	2.0%	3.4%	.0%	6,597	.0%	3.5%
Viewlogic Systems	18.7	.0	14.9	1.5%	.0%	3.3%	0	3.3%	.0%
Computervision	14.9	.0	14.1	1.2%	.0%	3.1%	90	3.1%	.0%
CADKEY	11.7	.0	11.7	.9%	.0%	2.6%	0	2.6%	.0%
ESRI	11.6	.0	10.6	.9%	.0%	2.3%	0	2.3%	.0%
Strategic Mapping	8.2	.0	7.4	.6%	.0%	1.6%	0	1.6%	.0%
Altera	7.5	.0	6.4	.6%	.0%	1.4%	0	1.4%	.0%
Infocel	7.5	1.5	5.6	.6%	.2%	1.2%	163	1.2%	.1%
Xilinx	7.3	.0	6.6	.6%	.0%	1.4%	0	1.4%	.0%
MapInfo	7.1	.0	5.7	.6%	.0%	1.2%	0	1.2%	.0%
Softdesk	6.5	.0	6.5	.5%	.0%	1.4%	0	1.4%	.0%
ACTEL	6.5	.0	5.8	.5%	.0%	1.3%	0	1.3%	.0%
Point Control	6.3	.0	6.1	.5%	.0%	1.3%	0	1.3%	.0%
ASG	6.1	.0	6.1	.5%	.0%	1.3%	0	1.3%	.0%
ETAK	5.7	.3	5.5	.5%	.0%	1.2%	14	1.2%	.0%

(Continued)

Table 13 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

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

Company	Total			Market Share			
	Factory Revenue	Hardware Revenue	Software Revenue	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Microsim	5.4	.0	5.0	.4%	.0%	1.1%	.0%
American Small Business Comp.	4.7	.0	4.7	.4%	.0%	1.0%	.0%
ISICAD	4.7	.0	4.7	.4%	.0%	1.0%	.0%
Aspen Technology	4.6	.0	4.2	.4%	.0%	.9%	.0%
PADS Software	4.2	.0	3.5	.3%	.0%	.8%	.0%
CNC Software	4.1	.0	4.1	.3%	.0%	.9%	.0%
Micrografx	4.0	.0	4.0	.3%	.0%	.9%	.0%
Moda CAD	4.0	1.0	2.8	.3%	.1%	.6%	.0%
Algor Interactive Systems	4.0	.0	3.5	.3%	.0%	.8%	.0%
Orcad	3.8	.0	3.8	.3%	.0%	.8%	.0%
GeoQuest	3.6	.0	3.6	.3%	.0%	.8%	.0%
Innovative Data Design	3.5	.0	3.5	.3%	.0%	.8%	.0%
EESof	3.3	.0	3.0	.3%	.0%	.7%	.0%
PacSoft	3.2	.0	3.2	.3%	.0%	.7%	.0%
Racal-Redac	3.2	.0	2.7	.3%	.0%	.6%	.0%
GeoGraphix	3.2	.0	2.4	.3%	.0%	.5%	.0%
Data I/O	3.1	.0	3.1	.2%	.0%	.7%	.0%
MCS	3.1	.0	2.8	.2%	.0%	.6%	.0%
Swanson Analysis	2.9	.0	2.9	.2%	.0%	.6%	.0%
ERDAS	2.8	.8	1.9	.2%	.1%	.4%	.2%
Sweet's Electronic Publishing	2.7	.0	2.2	.2%	.0%	.5%	.0%

(Continued)

Table 13 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: All Applications
 Platform: Personal Computer
 Region: North America
 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
Teradyne	2.7	.0	2.1	0	.2%	.0%	.5%	.0%
Visionics	2.5	.0	1.9	10	.2%	.0%	.4%	.0%
International Software Systems	2.4	.0	2.4	0	.2%	.0%	.5%	.0%
Claris	2.3	.0	2.3	0	.2%	.0%	.5%	.0%
Neocad	2.3	.0	2.3	0	.2%	.0%	.5%	.0%
Accel Technologies	2.2	.0	2.0	0	.2%	.0%	.4%	.0%
Generation 5 Technology	2.2	.0	2.2	0	.2%	.0%	.5%	.0%
Integrated Computer Graphics	2.1	1.0	.8	119	.2%	.1%	.2%	.1%
Facility Mapping Systems	2.1	.0	1.8	0	.2%	.0%	.4%	.0%
Foresight Resources	2.1	.0	1.9	0	.2%	.0%	.4%	.0%
ADRA Systems	2.0	.0	1.6	0	.2%	.0%	.4%	.0%
Accugraph	2.0	.1	1.7	10	.2%	.0%	.4%	.0%
ALDEC	2.0	.0	2.0	0	.2%	.0%	.4%	.0%
Cimatron	1.6	.7	.7	84	.1%	.1%	.2%	.0%
Intera Tydac	1.6	.0	1.6	0	.1%	.0%	.3%	.0%
Evolution Computing	1.6	.0	1.6	0	.1%	.0%	.3%	.0%
LPKF	1.6	1.0	.4	68	.1%	.1%	.1%	.0%
Sigma Design	1.5	.0	1.4	0	.1%	.0%	.3%	.0%
Research Engineers—Civisoft	1.5	.0	1.5	0	.1%	.0%	.3%	.0%
Terra Sciences	1.5	.0	1.5	0	.1%	.0%	.3%	.0%
GRAPHSOFT	1.4	.0	1.4	0	.1%	.0%	.3%	.0%

(Continued)

Table 13 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: All Applications
 Platform: Personal Computer
 Region: North America
 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
Harris EDA	1.4	.1	1.1	5	.1%	.0%	.2%	.0%
Investronica SA	1.2	1.0	.1	48	.1%	.1%	.0%	.0%
BETRONEX	1.2	.1	1.1	22	.1%	.0%	.2%	.0%
Engineering Mechanics	1.2	.1	1.0	143	.1%	.0%	.2%	.1%
Massteck	1.1	.0	1.1	0	.1%	.0%	.2%	.0%
Minc Software	1.1	.0	1.1	0	.1%	.0%	.2%	.0%
Spectrum Software	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Intrinsix	1.0	1.0	.0	10	.1%	.1%	.0%	.0%
Engineered Software	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Carrier Corporation	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Tanner Research	1.0	.0	.9	0	.1%	.0%	.2%	.0%
LandCadd	1.0	.0	.9	0	.1%	.0%	.2%	.0%
Pathtrace	1.0	.2	.6	14	.1%	.0%	.1%	.0%
Graphisoft Software Dev	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
CAE-link	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Aries Technology	.9	.0	.9	0	.1%	.0%	.2%	.0%
Cadisys	.9	.0	.9	0	.1%	.0%	.2%	.0%
Maptech	.9	.0	.9	0	.1%	.0%	.2%	.0%
Quicklogic	.9	.0	.9	0	.1%	.0%	.2%	.0%
Aura CAD/CAM Systems	.9	.0	.8	0	.1%	.0%	.2%	.0%
Cascade Graphics	.8	.0	.8	0	.1%	.0%	.2%	.0%

(Continued)

Table 13 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

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

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cimlinc	.8	.0	.6	0	.1%	.0%	.1%	.0%
Dynaware	.8	.0	.8	0	.1%	.0%	.2%	.0%
Radian Corporation	.8	.0	.5	0	.1%	.0%	.1%	.0%
Kork Systems	.8	.1	.6	15	.1%	.0%	.1%	.0%
Genasys II	.8	.1	.7	16	.1%	.0%	.1%	.0%
Douglas Electronics	.8	.0	.8	0	.1%	.0%	.2%	.0%
Mega CADD	.8	.0	.8	0	.1%	.0%	.2%	.0%
Uniras	.7	.0	.7	0	.1%	.0%	.2%	.0%
CADWorks	.7	.0	.6	0	.1%	.0%	.1%	.0%
IGC Technology	.7	.0	.7	0	.1%	.0%	.2%	.0%
A.I. Systems	.7	.0	.7	0	.1%	.0%	.2%	.0%
ECOM Associates	.7	.0	.7	4	.1%	.0%	.1%	.0%
Ground Modelling Systems	.7	.5	.3	4	.1%	.1%	.1%	.0%
Machinery Sales	.6	.0	.6	0	.0%	.0%	.1%	.0%
Engineering Systems Corp.	.6	.0	.5	0	.0%	.0%	.1%	.0%
Omaton	.6	.0	.6	0	.0%	.0%	.1%	.0%
Rasna Corporation	.6	.0	.5	0	.0%	.0%	.1%	.0%
Vamp	.6	.0	.6	0	.0%	.0%	.1%	.0%
Mc2 Engineering Software	.6	.0	.6	0	.0%	.0%	.1%	.0%
Infinite Graphics	.6	.0	.6	0	.0%	.0%	.1%	.0%
Digital	.5	.0	.4	0	.0%	.0%	.1%	.0%

(Continued)

Table 13 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: All Applications
 Platform: Personal Computer
 Region: North America
 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
Terr-Mar Resource Info Svs	.5	.1	.3	14	.0%	.0%	.1%	.0%
Ashlar	.5	.0	.5	0	.0%	.0%	.1%	.0%
CADSI	.5	.1	.4	9	.0%	.0%	.1%	.0%
Compact Software	.5	.0	.5	0	.0%	.0%	.1%	.0%
Applicon	.5	.2	.2	16	.0%	.0%	.0%	.0%
MacNeal-Schwendler	.5	.0	.5	0	.0%	.0%	.1%	.0%
Capilano Computing	.5	.0	.5	0	.0%	.0%	.1%	.0%
Bechtel Software	.5	.0	.5	0	.0%	.0%	.1%	.0%
Phase Three Logic	.4	.0	.4	0	.0%	.0%	.1%	.0%
The CAD Group	.4	.0	.4	0	.0%	.0%	.1%	.0%
Geosoft	.4	.0	.4	0	.0%	.0%	.1%	.0%
Integrated Silicon Systems	.4	.1	.2	5	.0%	.0%	.1%	.0%
BV Engineering	.4	.0	.4	0	.0%	.0%	.1%	.0%
GEOVISION Inc.	.3	.2	.1	36	.0%	.0%	.0%	.0%
Geotrace Technologies	.3	.0	.3	0	.0%	.0%	.1%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.0%	.0%	.1%	.0%
SIMUCAD	.2	.0	.2	0	.0%	.0%	.0%	.0%
Bobcat Systems	.2	.0	.2	0	.0%	.0%	.1%	.0%
Logic Modeling Systems	.2	.0	.2	0	.0%	.0%	.0%	.0%
Geomath	.2	.0	.2	0	.0%	.0%	.0%	.0%
Meta-Software	.2	.0	.2	0	.0%	.0%	.0%	.0%

(Continued)

Table 13 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

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

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Simutest	.2	.0	.2	0	.0%	.0%	.0%	.0%
Pacific Numerics	.2	.0	.2	0	.0%	.0%	.0%	.0%
Ithaca Software	.2	.0	.2	0	.0%	.0%	.0%	.0%
BATISOFT	.2	.0	.1	7	.0%	.0%	.0%	.0%
Synthesis	.1	.0	.1	0	.0%	.0%	.0%	.0%
Areon	.1	.0	.0	0	.0%	.0%	.0%	.0%
Genrad	.1	.0	.1	4	.0%	.0%	.0%	.0%
Simulation Science	.1	.0	.1	0	.0%	.0%	.0%	.0%
National Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Number One Systems	.0	.0	.0	3	.0%	.0%	.0%	.0%
CADMATIC	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	271.6	272.5	.0	71,773	21.6%	36.7%	.0%	37.6%
All Companies	1,260.0	741.6	458.2	190,648	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1,248.3	738.1	451.1	190,397	99.1%	99.5%	98.5%	99.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	11.8	3.6	7.1	251	.9%	.5%	1.5%	.1%
All Hardware Companies	775.3	740.7	.0	191,249	61.5%	99.9%	.0%	100.3%
All Turnkey & SW Companies	484.8	1.0	458.2	(601)	38.5%	.1%	100.0%	-.3%

Source: Dataquest (March 1993)

Table 14
1992 CAD/CAM/CAE/GIS Market Share

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

Company	Total		Hardware		Software		Hardware		Software		Market Share	
	Factory Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Shipped
Compaq	197.3	197.3	197.3	42,765	.0	17.5%	28.8%	.0%	28.5%			
IBM	106.0	88.5	10.1	23,521	10.1	9.4%	12.9%	2.7%	15.7%			
Autodesk	103.6	.0	103.6	0	103.6	9.2%	.0%	27.9%	.0%			
Apple Computer	63.2	55.6	.0	14,964	.0	5.6%	8.1%	.0%	10.0%			
Hewlett-Packard	61.0	48.8	.0	10,777	.0	5.4%	7.1%	.0%	7.2%			
Nemetschek	31.3	11.6	17.5	400	17.5	2.8%	1.7%	4.7%	.3%			
Wiechers Datentechnik	30.0	7.9	13.9	632	13.9	2.7%	1.2%	3.7%	.4%			
Investronica SA	27.6	22.1	2.8	1,102	2.8	2.4%	3.2%	.7%	.7%			
CAD Distribution	16.9	8.4	6.7	261	6.7	1.5%	1.2%	1.8%	.2%			
Tebis	16.7	2.5	11.7	96	11.7	1.5%	.4%	3.1%	.1%			
Research Machines	15.6	15.6	.0	2,517	.0	1.4%	2.3%	.0%	1.7%			
Ziegler Informatics	14.3	.0	14.3	0	14.3	1.3%	.0%	3.9%	.0%			
Soft-Tech Software Technologies	13.8	2.1	10.4	932	10.4	1.2%	.3%	2.8%	.6%			
Intergraph	11.4	.0	10.7	0	10.7	1.0%	.0%	2.9%	.0%			
LPKF	11.0	7.2	2.8	541	2.8	1.0%	1.0%	.7%	.4%			
Computervision	10.8	.0	10.2	80	10.2	1.0%	.0%	2.7%	.1%			
Dell Computer	9.3	9.3	.0	2,415	.0	.8%	1.4%	.0%	1.6%			
Cimatron	8.3	3.8	3.7	381	3.7	.7%	.5%	1.0%	.3%			
DAT Standard Information Systems	7.9	.0	7.5	0	7.5	.7%	.0%	2.0%	.0%			
Olivetti	7.3	6.2	.0	877	.0	.6%	.9%	.0%	.6%			
Serbi	7.0	.7	6.3	0	6.3	.6%	.1%	1.7%	.0%			

(Continued)

Table 14 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

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

Company	Total			Market Share			
	Factory Revenue	Hardware Revenue	Software Revenue	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Aucotec	7.0	1.2	4.6	.6%	.2%	1.2%	.2%
Ground Modelling Systems	6.6	3.6	2.7	.6%	.5%	.7%	.0%
Hochtiel	6.5	1.0	4.6	.6%	.1%	1.2%	.1%
Racal-Redac	6.4	.0	5.3	.6%	.0%	1.4%	.0%
ISICAD	6.2	.0	6.2	.6%	.0%	1.7%	.0%
BATISOFT	6.0	.9	3.0	.5%	.1%	.8%	.2%
RoboCAD Solutions	6.0	.0	4.5	.5%	.0%	1.2%	.0%
RIB/RZB	6.0	.5	4.9	.5%	.1%	1.3%	.0%
Orcad	5.1	.0	5.1	.5%	.0%	1.4%	.0%
mb Programme	5.1	2.5	1.8	.4%	.4%	.5%	.1%
Microway	4.7	2.9	1.4	.4%	.4%	.4%	.0%
Graphisoft Software Dev	4.5	.0	4.5	.4%	.0%	1.2%	.0%
Kloeckner-Moeller	4.4	.2	3.1	.4%	.0%	.8%	.0%
Computer Services Consultants	4.2	.0	4.2	.4%	.0%	1.1%	.0%
Viewlogic Systems	4.0	.0	3.2	.4%	.0%	.9%	.0%
Datagraphic	3.6	1.8	1.4	.3%	.3%	.4%	.0%
Altera	3.5	.0	3.0	.3%	.0%	.8%	.0%
Micrografix	3.3	.0	3.3	.3%	.0%	.9%	.0%
HEsof	2.8	.0	2.6	.3%	.0%	.7%	.0%
ESRI	2.7	.0	2.5	.2%	.0%	.7%	.0%
CADKEY	2.7	.0	2.7	.2%	.0%	.7%	.0%

(Continued)

Table 14 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

Application: Platform: Region: Units:	All Applications Personal Computer Europe		Millions of U.S. Dollars/Actual Units					Market Share				
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped				
Company												
Xilinx	2.6	.0	2.3	0	.2%	.0%	.6%	.0%				
Pathtrace	2.5	.5	1.6	37	.2%	.1%	.4%	.0%				
ALS Design	2.4	.1	2.1	20	.2%	.0%	.6%	.0%				
Superdraft	2.3	1.1	1.1	132	.2%	.2%	.3%	.1%				
Whessee Computing Systems	2.2	.0	2.2	0	.2%	.0%	.6%	.0%				
Elstree Computing	2.2	1.0	1.2	62	.2%	.1%	.3%	.0%				
BETRONEX	2.2	.2	1.9	40	.2%	.0%	.5%	.0%				
Vero International Software	2.2	.0	2.0	0	.2%	.0%	.5%	.0%				
CAD-UL	2.1	.0	2.1	0	.2%	.0%	.6%	.0%				
ACTEL	2.1	.0	1.9	0	.2%	.0%	.5%	.0%				
CAD-Capture	2.0	.4	.6	10	.2%	.1%	.2%	.0%				
Swanson Analysis	1.9	.0	1.9	0	.2%	.0%	.5%	.0%				
PAFBC	1.9	.0	1.9	0	.2%	.0%	.5%	.0%				
CAMTEK	1.9	.4	1.2	0	.2%	.1%	.3%	.0%				
ISDATA	1.8	.0	1.6	0	.2%	.0%	.4%	.0%				
Data I/O	1.7	.0	1.7	0	.1%	.0%	.5%	.0%				
PADS Software	1.6	.0	1.4	0	.1%	.0%	.4%	.0%				
Microsim	1.6	.0	1.5	0	.1%	.0%	.4%	.0%				
Moda CAD	1.6	.4	1.1	13	.1%	.1%	.3%	.0%				
Point Control	1.6	.0	1.5	0	.1%	.0%	.4%	.0%				
FEA	1.5	.4	.4	0	.1%	.1%	.1%	.0%				

(Continued)

Table 14 (Continued)
1992 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	Hardware Revenue	Software Revenue	Hardware Units Shipped
Strategic Mapping	1.5	.0	1.4	0	.1%	.0%	.4%	.0%
EME	1.5	.4	.7	41	.1%	.1%	.2%	.0%
ARKTEC	1.4	.1	1.2	32	.1%	.0%	.3%	.0%
Lamp Software	1.4	.3	1.1	76	.1%	.0%	.3%	.1%
Geometria GIS Systems House	1.3	.2	.4	15	.1%	.0%	.1%	.0%
Aucos elektronische Gerate	1.2	.4	.9	121	.1%	.1%	.2%	.1%
ETAK	1.1	.1	1.1	3	.1%	.0%	.3%	.0%
Mucke Software	1.1	.6	.4	27	.1%	.1%	.1%	.0%
Teradyne	1.1	.0	.9	0	.1%	.0%	.2%	.0%
Integer	1.1	.0	.9	0	.1%	.0%	.2%	.0%
ADRA Systems	1.0	.0	.8	0	.1%	.0%	.2%	.0%
ERDAS	1.0	.3	.7	110	.1%	.0%	.2%	.1%
CADWorks	1.0	.0	.9	0	.1%	.0%	.2%	.0%
Genasys II	.9	.1	.8	19	.1%	.0%	.2%	.0%
CNC Software	.9	.0	.9	0	.1%	.0%	.2%	.0%
Contract Data Research	.9	.0	.6	0	.1%	.0%	.2%	.0%
Aspen Technology	.9	.0	.8	0	.1%	.0%	.2%	.0%
Anilam Electronics	.8	.1	.6	0	.1%	.0%	.2%	.0%
Areon	.8	.4	.2	6	.1%	.1%	.0%	.0%
Applicon	.8	.2	.3	24	.1%	.0%	.1%	.0%
Number One Systems	.8	.1	.6	55	.1%	.0%	.2%	.0%

(Continued)

Table 14 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
CAD Lab	.8	.0	.7	0	.1%	.0%	.2%	.0%
GeoQuest	.7	.0	.7	0	.1%	.0%	.2%	.0%
debis Systemhaus	.7	.2	.4	13	.1%	.0%	.1%	.0%
Algor Interactive Systems	.7	.0	.6	0	.1%	.0%	.2%	.0%
Caroline Informatique	.7	.1	.3	10	.1%	.0%	.1%	.0%
MCS	.7	.0	.6	0	.1%	.0%	.2%	.0%
Engineered Software	.6	.0	.6	0	.1%	.0%	.2%	.0%
Sigma Design	.6	.0	.6	0	.1%	.0%	.2%	.0%
ESDU International	.6	.0	.6	0	.1%	.0%	.2%	.0%
ASCAD/ASCAM	.6	.4	.2	14	.1%	.1%	.0%	.0%
Carrier Corporation	.6	.0	.6	0	.1%	.0%	.2%	.0%
CADMATIC	.6	.0	.4	4	.1%	.0%	.1%	.0%
Harris EDA	.6	.0	.4	2	.0%	.0%	.1%	.0%
Evolution Computing	.5	.0	.5	0	.0%	.0%	.1%	.0%
ALDEC	.5	.0	.5	0	.0%	.0%	.1%	.0%
Inca	.5	.5	.0	2	.0%	.1%	.0%	.0%
S.T.L.D. s.r.l.	.5	.0	.5	0	.0%	.0%	.1%	.0%
Applications in CADD	.4	.1	.3	11	.0%	.0%	.1%	.0%
Terra Sciences	.4	.0	.4	0	.0%	.0%	.1%	.0%
Massteck	.4	.0	.4	0	.0%	.0%	.1%	.0%
Cimlinc	.4	.0	.3	0	.0%	.0%	.1%	.0%

(Continued)

Table 14 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

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

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Accel Technologies	.4	.0	.4	0	.0%	.0%	.1%	.0%
Kork Systems	.4	.0	.3	4	.0%	.0%	.1%	.0%
LandCadd	.4	.0	.4	0	.0%	.0%	.1%	.0%
Foresight Resources	.4	.0	.3	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.4	.0	.4	0	.0%	.0%	.1%	.0%
Omaton	.3	.0	.3	0	.0%	.0%	.1%	.0%
Compact Software	.3	.0	.3	0	.0%	.0%	.1%	.0%
Minc Software	.3	.0	.3	0	.0%	.0%	.1%	.0%
Softdesk	.3	.0	.3	0	.0%	.0%	.1%	.0%
Sweet's Electronic Publishing	.3	.0	.2	0	.0%	.0%	.1%	.0%
Generation 5 Technology	.3	.0	.3	0	.0%	.0%	.1%	.0%
Masta Corporation	.3	.0	.2	0	.0%	.0%	.0%	.0%
Instrumatic Espanola	.2	.0	.2	0	.0%	.0%	.1%	.0%
Mega CADD	.2	.0	.2	0	.0%	.0%	.1%	.0%
Facility Mapping Systems	.2	.0	.2	0	.0%	.0%	.1%	.0%
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Tanner Research	.2	.0	.2	0	.0%	.0%	.0%	.0%
CADSI	.2	.0	.1	3	.0%	.0%	.0%	.0%
Radan Computational	.2	.1	.1	6	.0%	.0%	.0%	.0%
Synthesis	.2	.0	.2	0	.0%	.0%	.0%	.0%
Aries Technology	.2	.0	.2	0	.0%	.0%	.0%	.0%

(Continued)

Table 14 (Continued)
1992 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	Hardware Revenue	Software Revenue	Hardware Units Shipped
TOOL Software	.1	.0	.1	3	.0%	.0%	.0%	.0%
ASG	.1	.0	.1	0	.0%	.0%	.0%	.0%
Rasna Corporation	.1	.0	.1	0	.0%	.0%	.0%	.0%
A.I. Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%
Terr-Mar Resource Info Svcs	.1	.0	.1	3	.0%	.0%	.0%	.0%
Vamp	.1	.0	.1	0	.0%	.0%	.0%	.0%
Logic Modeling Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%
Genrad	.1	.0	.1	4	.0%	.0%	.0%	.0%
Accugraph	.1	.0	.1	0	.0%	.0%	.0%	.0%
Simulation Science	.1	.0	.1	0	.0%	.0%	.0%	.0%
GeoGraphix	.1	.0	.1	0	.0%	.0%	.0%	.0%
Ithaca Software	.1	.0	.1	0	.0%	.0%	.0%	.0%
National Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Quicklogic	.1	.0	.1	0	.0%	.0%	.0%	.0%
Geotrace Technologies	.1	.0	.1	0	.0%	.0%	.0%	.0%
CAE-link	.1	.0	.1	0	.0%	.0%	.0%	.0%
Bechtel Software	.0	.0	.0	0	.0%	.0%	.0%	.0%
Infinite Graphics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Integrated Silicon Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
GEOVISION Inc.	.0	.0	.0	2	.0%	.0%	.0%	.0%
Phase Three Logic	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 14 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

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

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Pacific Numerics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Meta-Software	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	174.0	174.0	.0	45,825	15.4%	25.4%	.0%	30.5%
All Companies	1,129.1	685.1	372.0	150,114	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	804.9	574.7	197.1	140,533	71.3%	83.9%	53.0%	93.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	324.2	110.5	174.9	9,581	28.7%	16.1%	47.0%	6.4%
All Hardware Companies	628.5	601.9	.0	144,909	55.7%	87.9%	.0%	96.5%
All Turnkey & SW Companies	500.6	83.2	372.0	5,204	44.3%	12.1%	100.0%	3.5%

Source: Dataquest (March 1993)

Table 15
1992 CAD/CAM/CAE/GIS Market Share

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

Company	Total		Hardware		Software		Hardware		Total		Market Share		Hardware		
	Factory Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Factory Revenue	Revenue	Revenue	Revenue	Revenue	Units Shipped	Units Shipped
NEC	112.9	94.8	9.0	16,805	15.9%	24.4%	3.4%	26.1%							
Fujitsu	88.4	56.6	23.0	2,627	12.5%	14.6%	8.6%	4.1%							
IBM	80.7	45.1	27.8	12,000	11.4%	11.6%	10.4%	18.6%							
Autodesk	51.5	.0	51.5	0	7.3%	.0%	19.3%	.0%							
Mutoh Industries—NO OEM	40.0	21.3	11.1	809	5.6%	5.5%	4.2%	1.3%							
Wacom	38.9	7.8	26.8	748	5.5%	2.0%	10.1%	1.2%							
Hakuto	36.3	21.8	14.5	816	5.1%	5.6%	5.4%	1.3%							
Hitachi	31.3	15.0	13.2	1,656	4.4%	3.9%	4.9%	2.6%							
Toshiba—NO OEM	27.1	13.5	10.8	2,165	3.8%	3.5%	4.1%	3.4%							
Apple Computer	26.7	23.5	.0	6,331	3.8%	6.1%	.0%	9.8%							
Andor	15.7	3.9	11.1	121	2.2%	1.0%	4.2%	.2%							
Design Automation	12.7	.6	12.0	67	1.8%	.2%	4.5%	.1%							
CPU	10.5	.0	9.5	0	1.5%	.0%	3.5%	.0%							
Mitsubishi Electric	9.5	6.3	3.2	900	1.3%	1.6%	1.2%	1.4%							
Hewlett-Packard	6.1	4.9	.0	2,532	.9%	1.3%	.0%	3.9%							
Viewlogic Systems	5.7	.0	4.5	0	.8%	.0%	1.7%	.0%							
Seiko Instruments—NO OEM	5.3	3.8	3.8	136	.7%	1.0%	1.4%	.2%							
Uchida Yoko	3.8	2.4	1.6	171	.5%	.6%	.6%	.3%							
Mitsui Engineering	3.6	2.5	.7	60	.5%	.6%	.3%	.1%							
Intergraph	3.0	.0	2.8	0	.4%	.0%	1.1%	.0%							
PADS Software	2.5	.0	2.1	0	.3%	.0%	.8%	.0%							

(Continued)

Table 15 (Continued)
1992 CAD/CAM/CAE/CIS Market Share

Company	Total			Market Share		
	Factory Revenue	Hardware Revenue	Software Revenue	Total Factory Revenue	Hardware Revenue	Software Revenue
Racal-Redac	2.5	.0	.7	.3%	.0%	.3%
Data I/O	2.2	.0	2.2	.3%	.0%	.8%
EBsol	1.8	.0	1.6	.3%	.0%	.6%
ACTEL	1.6	.0	1.5	.2%	.0%	.5%
Anilam Electronics	1.5	.5	.9	.2%	.1%	.3%
LPKF	1.4	.9	.4	.2%	.2%	.1%
Altera	1.3	.0	1.1	.2%	.0%	.4%
CADKEY	1.3	.0	1.3	.2%	.0%	.5%
Xilinx	1.1	.0	1.0	.2%	.0%	.4%
Cimatron	1.1	.5	.5	.2%	.1%	.2%
Point Control	1.1	.0	1.0	.1%	.0%	.4%
ADRA Systems	1.0	.0	.8	.1%	.0%	.3%
Swanson Analysis	1.0	.0	1.0	.1%	.0%	.4%
BETRONEX	1.0	1	.9	.1%	.0%	.3%
Microsim	1.0	.0	.9	.1%	.0%	.3%
ESRI	.8	.0	.7	.1%	.0%	.3%
CADWorks	.8	.0	.7	.1%	.0%	.3%
INS Engineering	.7	.4	.4	.1%	.1%	.1%
CNC Software	.7	.0	.7	.1%	.0%	.3%
Moda CAD	.6	.2	.4	.1%	.0%	.2%
Harris EDA	.6	.1	.5	.1%	.0%	.2%

(Continued)

Table 15 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sharp System Products—NO OEM	.6	.3	.3	17	.1%	.1%	.1%	.0%
Computervision	.5	.0	.5	0	.1%	.0%	.2%	.0%
Whesoe Computing Systems	.5	.0	.5	0	.1%	.0%	.2%	.0%
GeoQuest	.5	.0	.5	0	.1%	.0%	.2%	.0%
Softdesk	.5	.0	.5	0	.1%	.0%	.2%	.0%
ERDAS	.5	.1	.3	50	.1%	.0%	.1%	.1%
Sigma Design	.4	.0	.4	0	.1%	.0%	.1%	.0%
Carrier Corporation	.4	.0	.4	0	.1%	.0%	.1%	.0%
ETAK	.4	.0	.4	1	.1%	.0%	.1%	.0%
Teradyne	.3	.0	.3	0	.0%	.0%	.1%	.0%
Compact Software	.3	.0	.3	0	.0%	.0%	.1%	.0%
Investronica SA	.3	.2	.0	12	.0%	.1%	.0%	.0%
Wiechers Datentechnik	.3	.1	.1	6	.0%	.0%	.1%	.0%
ISICAD	.3	.0	.3	0	.0%	.0%	.1%	.0%
Aspen Technology	.3	.0	.3	0	.0%	.0%	.1%	.0%
MCS	.3	.0	.3	0	.0%	.0%	.1%	.0%
Accel Technologies	.3	.0	.2	0	.0%	.0%	.1%	.0%
Superdraft	.3	.1	.1	14	.0%	.0%	.0%	.0%
MacNeal-Schwendler	.2	.0	.2	0	.0%	.0%	.1%	.0%
Graphisoft Software Dev	.2	.0	.2	0	.0%	.0%	.1%	.0%
Terr-Mar Resource Info Svcs	.2	.1	.1	6	.0%	.0%	.0%	.0%

(Continued)

Table 15 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Integrated Silicon Systems	.2	.1	.1	3	.0%	.0%	.1%	.0%
Aries Technology	.2	.0	.2	0	.0%	.0%	.1%	.0%
BATISOFT	.2	.0	.1	7	.0%	.0%	.0%	.0%
GeoGraphix	.2	.0	.1	0	.0%	.0%	.0%	.0%
Minc Software	.2	.0	.2	0	.0%	.0%	.1%	.0%
ALDEC	.1	.0	.1	0	.0%	.0%	.1%	.0%
Digital	.1	.0	.1	0	.0%	.0%	.0%	.0%
ASG	.1	.0	.1	0	.0%	.0%	.0%	.0%
CADSI	.1	.0	.1	2	.0%	.0%	.0%	.0%
Cimlinc	.1	.0	.1	0	.0%	.0%	.0%	.0%
Pathtrace	.1	.0	.1	2	.0%	.0%	.0%	.0%
Integer	.1	.0	.1	0	.0%	.0%	.0%	.0%
Rasna Corporation	.1	.0	.1	0	.0%	.0%	.0%	.0%
Mega CADD	.1	.0	.1	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.1	.0	.1	0	.0%	.0%	.0%	.0%
Algor Interactive Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%
Meta-Software	.1	.0	.1	0	.0%	.0%	.0%	.0%
Tanner Research	.1	.0	.1	0	.0%	.0%	.0%	.0%
Simulation Science	.1	.0	.1	0	.0%	.0%	.0%	.0%
Infinite Graphics	.1	.0	.1	0	.0%	.0%	.0%	.0%
Ithaca Software	.1	.0	.1	0	.0%	.0%	.0%	.0%
Genasys II	.1	.0	.1	1	.0%	.0%	.0%	.0%

(Continued)

Table 15 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

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

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Logic Modeling Systems	.1	.0	.0	0	.0%	.0%	.0%	.0%
Quicklogic	.1	.0	.1	0	.0%	.0%	.0%	.0%
Accugraph	.0	.0	.0	0	.0%	.0%	.0%	.0%
SIMUCAD	.0	.0	.0	0	.0%	.0%	.0%	.0%
Massteck	.0	.0	.0	0	.0%	.0%	.0%	.0%
The CAD Group	.0	.0	.0	0	.0%	.0%	.0%	.0%
Vamp	.0	.0	.0	0	.0%	.0%	.0%	.0%
Facility Mapping Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
Omaton	.0	.0	.0	0	.0%	.0%	.0%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.0%	.0%
PAFEC	.0	.0	.0	0	.0%	.0%	.0%	.0%
Geotrace Technologies	.0	.0	.0	0	.0%	.0%	.0%	.0%
Kork Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
Bechtel Software	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	61.3	61.3	.1	16,149	8.7%	15.8%	.0%	25.1%
All Companies	708.9	388.7	266.9	64,388	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	262.3	135.3	111.3	37,083	37.0%	34.8%	41.7%	57.6%
All Asian-Based Companies	437.2	251.0	151.0	27,111	61.7%	64.6%	56.6%	42.1%
All European-Based Companies	9.4	2.4	4.6	195	1.3%	.6%	1.7%	.3%
All Hardware Companies	157.8	150.4	.0	40,132	22.3%	38.7%	.0%	62.3%
All Turnkey & SW Companies	551.1	238.3	266.9	24,256	77.7%	61.3%	100.0%	37.7%

Source: Dataquest (March 1993)

Table 16
1992 CAD/CAM/CAE/GIS Market Share

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

Company	Total		Hardware		Software		Hardware		Total		Market Share		Hardware Units Shipped
	Factory Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Factory Revenue	Revenue	Hardware Revenue	Software Revenue	
Compaq	21.5	21.5	21.5	.0	4,653	25.0%	40.9%	.0%	35.5%				
IBM	10.2	9.6	.0	3.9	2,639	11.9%	18.3%	.0%	20.2%				
Autodesk	3.9	.0	2.2	.0	576	4.5%	.0%	13.0%	.0%				
Apple Computer	2.4	.0	.0	2.4	0	2.8%	4.1%	.0%	4.4%				
International Software Systems	2.4	.0	.0	2.4	0	2.7%	.0%	7.8%	.0%				
Clarix	2.3	.0	.0	2.3	0	2.7%	.0%	7.7%	.0%				
Intergraph	2.3	.0	.0	2.2	0	2.7%	.0%	7.2%	.0%				
Engineering Mechanics	2.2	.1	1.8	.0	265	2.5%	.2%	6.1%	2.0%				
Orcad	1.9	.0	1.9	.0	0	2.2%	.0%	6.4%	.0%				
Hewlett-Packard	1.9	1.5	.0	1.9	525	2.2%	2.8%	.0%	4.0%				
Strategic Mapping	1.8	.0	1.7	.0	0	2.1%	.0%	5.5%	.0%				
MapInfo	1.5	.0	1.2	.0	0	1.7%	.0%	3.9%	.0%				
CNC Software	1.2	.0	1.2	.0	0	1.3%	.0%	3.8%	.0%				
Vero International Software	1.0	.0	.9	.0	0	1.1%	.0%	2.9%	.0%				
ESRI	1.0	.0	.9	.0	0	1.1%	.0%	3.0%	.0%				
Cimatron	.9	.4	.6	.4	47	1.1%	.8%	1.4%	.4%				
Infocel	.8	.2	.8	.6	18	1.0%	.3%	2.1%	.1%				
Computervision	.8	.0	.8	.8	0	1.0%	.0%	2.6%	.0%				
Radian Corporation	.8	.0	.5	.5	0	.9%	.0%	1.6%	.0%				
Kork Systems	.8	.1	.6	.6	1	.9%	.1%	1.9%	.0%				
Altera	.7	.0	.6	.6	0	.8%	.0%	1.8%	.0%				

(Continued)

Table 16 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Pathtrace	.6	.1	.4	9	.7%	.2%	1.3%	.1%
BETRONEX	.5	.1	.4	9	.6%	.1%	1.4%	.1%
ETAK	.4	.0	.4	1	.4%	.0%	1.2%	.0%
Softdesk	.4	.0	.4	0	.4%	.0%	1.2%	.0%
Point Control	.3	.0	.3	0	.4%	.0%	1.1%	.0%
ERDAS	.3	.1	.2	35	.4%	.2%	.7%	.3%
Data I/O	.3	.0	.3	0	.3%	.0%	1.0%	.0%
Hochtief	.3	.0	.2	2	.3%	.1%	.7%	.0%
ACTEL	.3	.0	.2	0	.3%	.0%	.8%	.0%
Superdraft	.3	.1	.1	14	.3%	.2%	.4%	.1%
Whessoe Computing Systems	.3	.0	.3	0	.3%	.0%	.8%	.0%
Xilinx	.2	.0	.2	0	.3%	.0%	.7%	.0%
Investronica SA	.2	.2	.0	8	.2%	.3%	.1%	.1%
ADRA Systems	.2	.0	.2	0	.2%	.0%	.5%	.0%
Generation 5 Technology	.2	.0	.2	0	.2%	.0%	.6%	.0%
EEsof	.2	.0	.2	0	.2%	.0%	.5%	.0%
Graphisoft Software Dev	.2	.0	.2	0	.2%	.0%	.5%	.0%
LPKF	.2	.1	.0	7	.2%	.2%	.1%	.1%
Aura CAD/CAM Systems	.2	.0	.1	0	.2%	.0%	.4%	.0%
LandCadd	.2	.0	.1	0	.2%	.0%	.5%	.0%
Mc2 Engineering Software	.1	.0	.1	0	.2%	.0%	.5%	.0%

(Continued)

Table 16 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
American Small Business Comp.	.1	.0	.1	0	.2%	.0%	.5%	.0%
Compact Software	.1	.0	.1	0	.2%	.0%	.4%	.0%
Innovative Data Design	.1	.0	.1	0	.2%	.0%	.4%	.0%
Swanson Analysis	.1	.0	.1	0	.1%	.0%	.4%	.0%
Engineering Systems Corp.	.1	.0	.1	0	.1%	.0%	.3%	.0%
CADWorks	.1	.0	.1	0	.1%	.0%	.3%	.0%
Spectrum Software	.1	.0	.1	0	.1%	.0%	.3%	.0%
Sigma Design	.1	.0	.1	0	.1%	.0%	.3%	.0%
Genasys II	.1	.0	.1	2	.1%	.0%	.3%	.0%
Ziegler Informatics	.1	.0	.1	0	.1%	.0%	.3%	.0%
ISICAD	.1	.0	.1	0	.1%	.0%	.3%	.0%
Ithaca Software	.1	.0	.1	0	.1%	.0%	.3%	.0%
CADMATIC	.1	.0	.0	1	.1%	.0%	.1%	.0%
PADS Software	.1	.0	.1	0	.1%	.0%	.2%	.0%
Number One Systems	.1	.0	.1	4	.1%	.0%	.2%	.0%
Moda CAD	.1	.0	.0	1	.1%	.0%	.1%	.0%
Facility Mapping Systems	.1	.0	.1	0	.1%	.0%	.2%	.0%
Accel Technologies	.1	.0	.1	0	.1%	.0%	.2%	.0%
ASG	.1	.0	.1	0	.1%	.0%	.2%	.0%
CAE-link	.1	.0	.1	0	.1%	.0%	.2%	.0%
Terr-Mar Resource Info Svs	.1	.0	.0	1	.1%	.0%	.1%	.0%
Capilano Computing	.1	.0	.1	0	.1%	.0%	.2%	.0%

(Continued)

Table 16 (Continued)
1992 CAD/CAM/CAE/GIS Market Share

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

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Algor Interactive Systems	.0	.0	.0	0	.0%	.0%	.1%	.0%
Teradyne	.0	.0	.0	0	.0%	.0%	.1%	.0%
Aries Technology	.0	.0	.0	0	.0%	.0%	.1%	.0%
Accugraph	.0	.0	.0	0	.0%	.0%	.1%	.0%
Massteck	.0	.0	.0	0	.0%	.0%	.1%	.0%
Engineered Software	.0	.0	.0	0	.0%	.0%	.1%	.0%
Areon	.0	.0	.0	0	.0%	.0%	.0%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.1%	.0%
Simulation Science	.0	.0	.0	0	.0%	.0%	.1%	.0%
MacNeal-Schwendler	.0	.0	.0	0	.0%	.0%	.1%	.0%
Genrad	.0	.0	.0	1	.0%	.0%	.1%	.0%
FEA	.0	.0	.0	0	.0%	.0%	.0%	.0%
Rasna Corporation	.0	.0	.0	0	.0%	.0%	.0%	.0%
ESDU International	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	16.1	16.2	.0	4,279	18.7%	31.0%	.0%	32.7%
All Companies	85.9	52.4	30.0	13,097	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	81.4	51.4	26.9	12,996	94.7%	98.1%	89.7%	99.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	4.5	1.0	3.1	101	5.3%	1.9%	10.3%	.8%
All Hardware Companies	52.2	51.0	.0	12,671	60.8%	97.2%	.0%	96.8%
All Turnkey & SW Companies	33.7	1.5	30.0	426	39.2%	2.8%	100.0%	3.2%

Source: Dataquest (March 1993)

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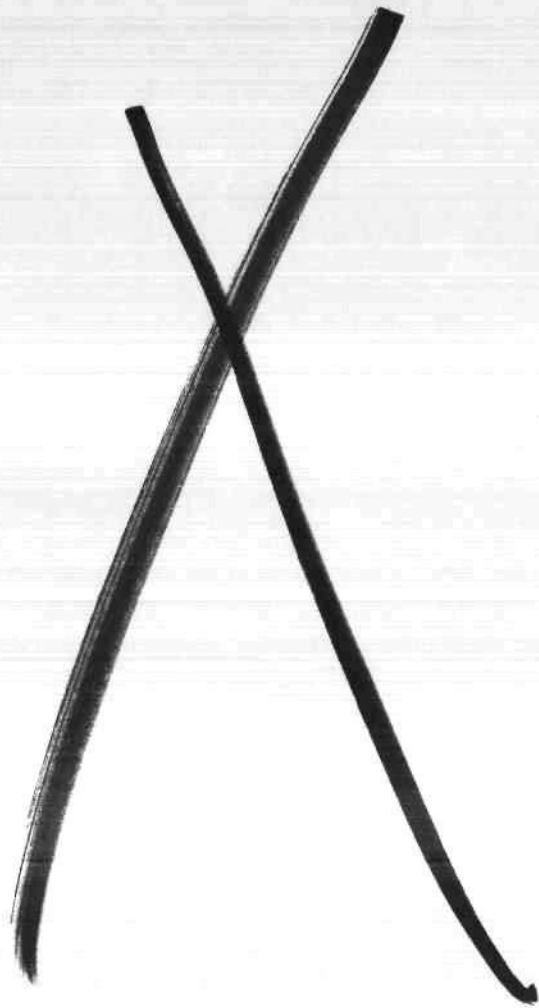
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270-1256

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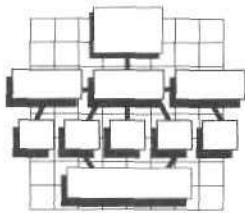
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Internal Distribution



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X



Dataquest Vendor Profile

Software

Personal CAD and Distribution Channels Worldwide

Intergraph Corporation

Corporate Statistics

Location	Huntsville, Alabama
Chairman and CEO	James W. Meadlock
Number of Employees	10,300 (1992) (7,400 United States, 2,900 international)
1992 Corporate Revenue	\$1.116 billion
1992 Software Revenue	\$323.0 million
1992 PC-Based Software Revenue	\$47.4 million
Founded	1969
1992 CAD/CAM/CAE Software Market Share	6.5 percent
1992 PC CAD Software Market Share	16.0 percent

Intergraph Corporation develops, manufactures, markets, and supports interactive computer graphics systems for the CAD/CAM/CAE/GIS markets. The company offers a complete line of computer systems, including workstations, servers, applications software, peripheral devices, and services. It is currently one of the leaders in the CAD/CAM/CAE/GIS market because of its diverse and comprehensive product line.

Corporate Overview and Market Position

Founded in 1969 as a consulting firm developing missile guidance software for the U.S. Army, the company changed its name to Intergraph Corporation (INTERactive GRAPHics) in 1980. Today the company ranks among the key players in the CAD/CAM/CAE/GIS market, with revenue increasing from \$800 million in 1988 to \$1.116 billion in 1992. Net income per share, however, has dropped substantially in recent years, from \$1.47 in 1991 to \$0.18 in 1992.

Recently released operating results for Intergraph's third quarter ending September 30 indicate quarterly revenue of \$250.6 million as shown in Figure 1. This represents a decline of \$52.0 million from the same period last fiscal year, with a loss of \$19.9 million for this quarter. The company incurred \$9.5 million in restructuring charges relating to the closing of manufacturing facilities, asset write-offs, and severance payments. This

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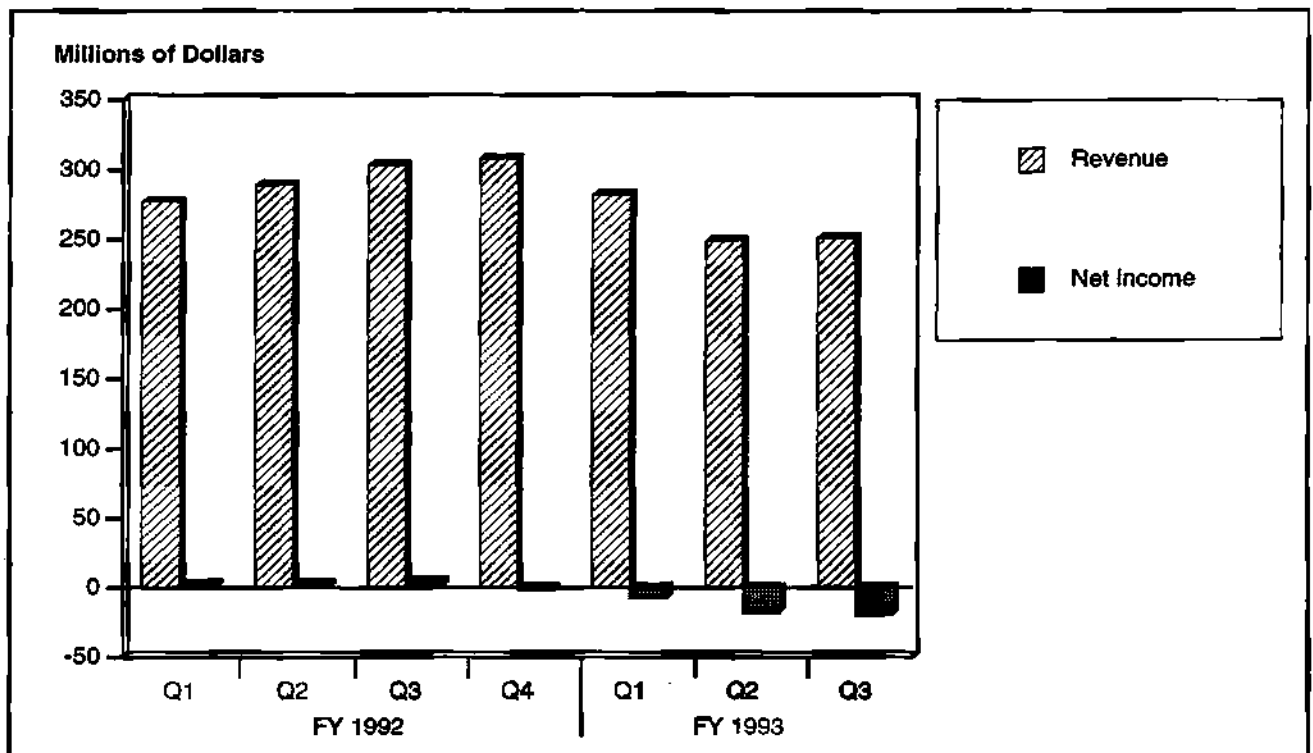
Product Code: CPER-WW-VP-9301

Publication Date: December 6, 1993

quarter's reduction of 94 manufacturing positions was the culmination of a year-long evaluation of cost-cutting measures. In a move that represented the first layoff in the company's history, Intergraph let 100 employees go in 1992 from Dazix, an Intergraph subsidiary.

Growth rates and market share of Intergraph's application areas have varied considerably as seen in Table 1. The company derived nearly 80 percent of its 1992 software revenue from workstation applications and less than 15 percent from PC applications. More than half of its 1992 revenue came from sales outside of the United States. Revenue contributions for 1992 from the company's various divisions is shown in Figure 2.

Figure 1
Intergraph Quarterly Revenue and Net Income



Source: Intergraph

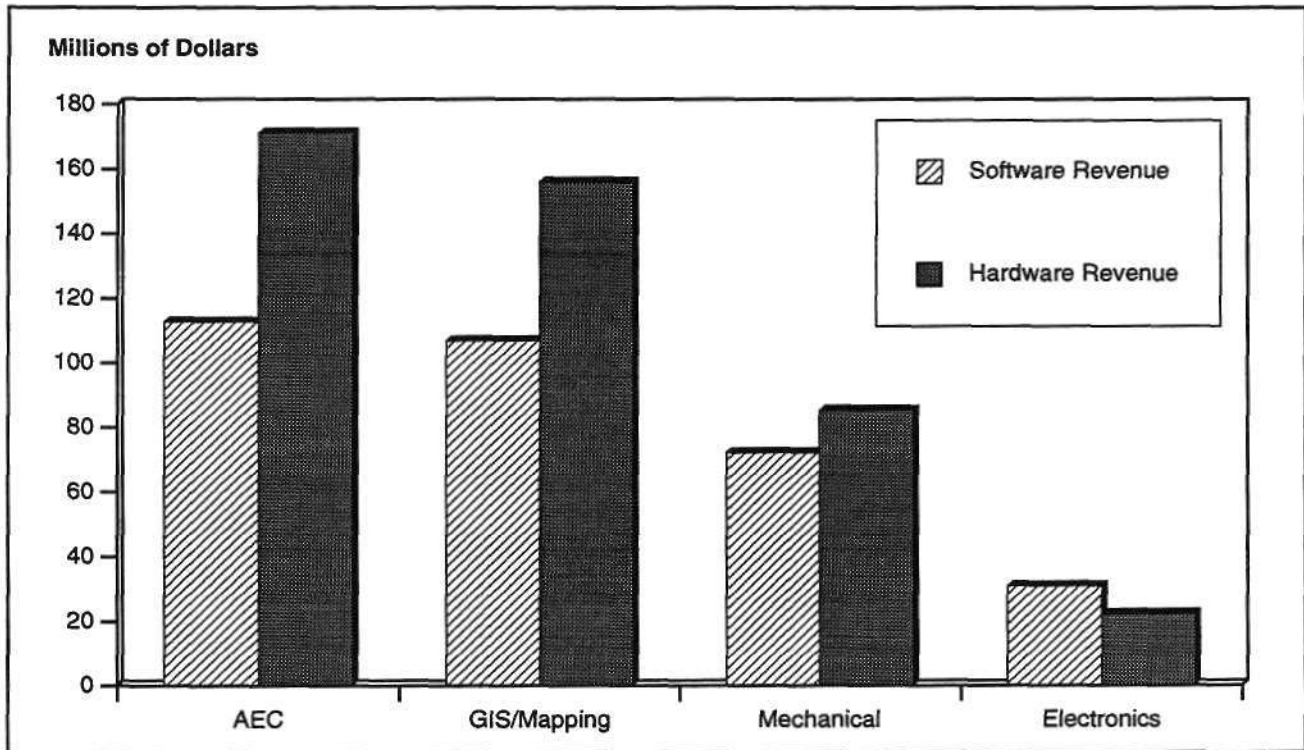
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Table 1
Intergraph Revenue Overview

Application	1991 Software Revenue (\$M)	1992 Software Revenue (\$M)	1991-1992 Revenue Growth (%)	1992 Market Share (%)	1992 Ranking
AEC	105.2	112.8	7.2	15.1	2
GIS/Mapping	94.1	107.0	13.7	17.7	1
Mechanical	50.1	72.3	44.3	3.1	7
EDA	30.8	30.9	0.1	2.4	7
All Applications	280.2	323.0	15.3	6.5	4

Source: Dataquest (November 1993)

Figure 2
Intergraph Revenue by Application



Source: Dataquest (November 1993)

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One of Intergraph's greatest strengths revolves around the detailed attention it gives to its customers. The company has traditionally gone to great lengths to ensure customer satisfaction with Intergraph's products and will invest the necessary resources to develop a particular application to suit a customer's needs. As a result of this strategy, however, Intergraph finds itself supporting a multitude of software products.

Corporate Mission and the Move to Windows NT

Historically, Intergraph has focused its resources on proprietary systems technology. This label has stuck, despite Intergraph's movement away from the VAX-based proprietary software offered in the company's early days. In an attempt to definitively shed this proprietary image, Intergraph has embarked on a new marketing strategy. In June 1993, the company announced plans to deliver and support products on the Windows NT operating system. Product deliveries will begin with a Windows NT version of MicroStation, its low-end CAD/CAM product, scheduled for release on November 30, 1993.

While the company remains unequivocally committed to supporting products for the UNIX operating system for Sun and Intergraph workstations, going forward, all of its workstations will allow the user to choose between UNIX and Windows NT. Depending on the application, Intergraph will supply applications on Intel-based workstations, DEC Alpha Windows NT systems, and Intergraph RISC-based

Windows NT workstations. Intergraph will also support Silicon Graphics' RISC-based workstations, which run SGI's UNIX variant, IRIX. For the same tools running on different platforms and operating systems, there will be no price difference between applications for the two operating systems. Intergraph is currently the largest independent development site for applications running under the Windows NT operating system.

While the lack of standardization in the UNIX environment has rendered the support of multiple hardware architectures expensive, the availability of Windows NT on multiple architectures enables hardware platform consistency, and as Intergraph Electronics Division Vice President of Sales and Marketing Jeff Edson believes, this will lower hardware prices: "Initially, the most compelling reason for users to look at Windows NT applications will be the price of hardware. For the first time, a workstation on every engineer's desk will be feasible." Portability among architectures is evolving as a key component of Intergraph's market strategy.

Finally, the addition of the Windows NT technology is the impetus behind the company's higher profile at trade shows and press tours, promotional vehicles infrequently exploited by Intergraph's founder and Chairman, James W. Meadlock, who now grants more interviews to the trade press. Also, because the company is actively seeking to shed its image as a proprietary solutions provider, it behooves Intergraph to promulgate its adoption of the Windows NT operating system as frequently as it can.

Sales Channels Organization

The company's headquarters are located in Huntsville, Alabama, with regional sales and support offices in 49 other countries, and a Federal Systems Division that sells to government agencies around the world. The regional offices are grouped into four territories, each with its own headquarters. Additionally, Intergraph Electronics Division has its own sales channel.

With the decision to create Windows NT product offerings, the company has galvanized to expand its direct and indirect channels. Intergraph's direct U.S. sales force has been reorganized along industry lines (such as government, utilities, transportation, electronics, and manufacturing), emulating its European channels model that has been in operation for three years. This "industry solutions" approach to distribution reinforces Intergraph's time-tested approach of providing a comprehensive CAD/CAM/CAE/GIS solution, including hardware, software, service, and support.

In addition to a direct sales force, Intergraph has been opening its doors to the outside world by expanding its value-added reseller (VAR) network. VARs have traditionally only sold MicroStation, its low-end solution, but will now be selling some of Intergraph's core high-end products and applications. In 1992, VARs contributed less than 5 percent to the company's sales; the goal is to expand this contribution to about 25 percent by 1995. In conjunction with the expanded VAR network, Intergraph has been

creating partnerships with distributors that in turn, distribute the products to qualified resellers.

Recent Alliances—A Move Toward Open Systems

In an attempt to shed some of its proprietary image, Intergraph has forged several relationships with highly visible partners—among them Microsoft and Sun Microsystems. In July 1993, Intergraph announced an alliance with Sun to develop the next generation of SPARC processors and to help port the Windows NT operating system to the Sun SPARC hardware platform. Under this agreement, both companies will have the right to use the 64-bit processor in system-level products. As much as the company asserts that there will be at least two more releases of the Clipper hardware architecture, the SPARC development effort clearly implies a smooth migration of resources away from Clipper.

Also, last year the company released Technical Desktop 1 (TD•1), a workstation based on Intel Corporation's 486 microprocessor running DOS instead of Intergraph's proprietary Clipper microprocessor operating its own special version of UNIX, known as CLIX UNIX.

Intergraph's MicroStation

MicroStation and related products, listed in Table 2, are sold through Intergraph's Basic Application Group, which is part of Intergraph Sales. MicroStation has typically been sold either through dealers or as the core graphics software in a direct turnkey sale. MicroStation provides the underlying software for all Intergraph AEC and GIS application software. Anticipated release dates for Version 5.0 range from November 30, 1993, for the Windows and Windows NT versions through second quarter 1994 for various workstation versions.

MicroStation was first written by Bentley Systems, in Exton, Pennsylvania, as a PC-based "clone" of Intergraph software. In January 1987, Intergraph bought a 50 percent interest in Bentley Systems, acquiring exclusive worldwide marketing and distribution rights to the MicroStation software, making Bentley Systems an affiliate of Intergraph. Today, Bentley Systems is the development organization for MicroStation.

MicroStation's 1992 revenue of \$79 million is one-fourth the size of the \$316 million earned in 1992 by the AutoCAD product. Because Dataquest does not measure revenue by product line, the best means of comparison between the two companies is on revenue on the PC platform and on unit shipments (see Table 3). Worldwide, Intergraph holds the No. 3 spot in revenue. The company's position is somewhat improved in North America, where it trails Altium only slightly. It is in the AEC market that Intergraph's strength becomes clear: Even in the PC-based market dominated by Autodesk, Intergraph achieved a strong second position. Growth appears to be continuing: In 1993, overall MicroStation sales are expected to increase 18 percent, whereas PC-based MicroStation sales are expected to increase 35 percent.

Table 2
Intergraph Basic Application Group Products

MicroStation 5.0	2-D and 3-D design and drafting software providing associative dimensioning, NURBS surfacing, rendering, reference files, database support, and direct import/export of AutoCAD.dwg files. User interface editor includes shells targeted to various ability levels and professions. Runs on DOS/Windows, Windows NT, Macintosh, and UNIX.
ModelView	Rendering and animation software based on models created in MicroStation or AutoCAD.
I/RAS	Raster/vector editing software. The I/RAS C version displays continuous tone and color raster data. The I/RAS Engineer version provides enhanced vector conversion for engineering drawings.
MicroStation Review	Redlining and review software that provides access across a network to MicroStation files and associated reference files. Version 5.0, scheduled to ship second quarter 1994, will operate with pen computers.

Source: Dataquest (November 1993)

Table 3
1992 PC CAD Software Revenue (Millions of Dollars)

	Worldwide	North America	North America AEC
Autodesk	345.7	158.3	68.1
IBM (Altium)	106.9	39.5	4.0
Intergraph	47.4	37.6	24.1
Other Companies	683.0	239.0	50.0
Total	1,183.0	474.4	146.2

Source: Dataquest (November 1993)

MicroStation unit shipments have grown about 38 percent per year for the last 2 years (see Table 4), with about 68 percent of units typically selling on the PC platform, compared to Autodesk's 94 percent of sales on PCs. While MicroStation's installed base of 152,000 is far smaller than AutoCAD's 900,000-plus base, MicroStation's shipment growth rate of 38 percent is actually higher than AutoCAD's. Dataquest anticipates that in 1993, AutoCAD will ship 204,000 units, whereas MicroStation will ship 42,000 units.

The Reseller Channel

MicroStation, which represents approximately 65 percent of Intergraph's indirect channel sales, must provide the leading thrust in the company's drive to earn 25 percent of sales through indirect channels by 1995. Progress is being made toward this goal: Intergraph indirect sales in the United States were only 5.8 percent of total U.S. sales in 1992, but have grown to 13.0 percent in 1993. For MicroStation alone, 46 percent of U.S. sales are through resellers. This figure is in the same range as Autodesk's

Table 4
MicroStation Installed Base

	1991	1992	1993
PC	53,000	74,000	103,500
Workstation	27,000	36,000	48,500
Total	80,000	110,000	152,000

Source: Dataquest (November 1993)

59 percent of U.S. sales through resellers, if one takes into account the fact that the Autodesk indirect sales include low-end products such as Generic CADD and AutoSketch.

CEO James Meadlock once said, "Trying to sell direct is a disease we have," illustrating Intergraph's history of being extremely cautious toward resellers. Whereas the full range of AutoCAD add-on software has always been available to dealers, in the past, Intergraph resellers have had to settle with the much smaller collection of MicroStation third-party software. Today, the company states that its Business Partners can be authorized to sell any Intergraph product based on their qualifications.

Business Partners is the umbrella term the company uses for dealers, value-added resellers, sales agents, sales representatives, and distributors. Intergraph has 900 Business Partners, 180 of which are U.S.-based MicroStation dealers.

Dataquest Perspective

MicroStation is responsible for one-fourth of Intergraph software sales and is the basis for most of the company's application software. Although the product might be said to have arrived through the back door, it provides the foundation for much of Intergraph's future. The Bentley brothers continue to write superior software, and the relationship between the two companies is probably adequate for support of future collaboration. MicroStation is capable enough to challenge AutoCAD's dominance if Intergraph can overcome the hurdles it has created for itself in the reseller channel.

During the past year, Intergraph has managed to mute the detractors that continuously assaulted the company as a proponent of proprietary products. In fact, Intergraph's championship of the Windows NT operating system has contributed to the growing awareness of the lack of interoperability among the many flavors of UNIX, effectively turning the public relations tables on workstation vendors. Windows NT is in many ways not a radical choice for Intergraph; it will eventually be a very reasonable migration path for many AEC and GIS users, who represent the company's core constituency.

Shedding the proprietary image was an important step toward building an indirect sales channel. The next step, allowing more products to be sold by resellers, will more significantly test Intergraph's ability to change. We

suspect that there is a connection between the company's high customer satisfaction and the unwillingness to share revenue with resellers. One of Intergraph's core strengths is its strong "bedside manner," a willingness to stay until the customer is satisfied. This strength has clearly been blindsided by competitive requirements to build market share through indirect channels, selling to unknown customers. Thus, in a strong direct sales culture, the 1995 goal of 25 percent of sales through resellers will require rigorous measurement of progress toward that goal. However, it is fair to say that, after years of intransigence, Intergraph is finally organized around building software market share.

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