Worlwide CAD/CAM Market Shares for 1988
In Millions of Dollars

Copyright Dataquest
June 1989

	1987	1988	% Chg.	SOM
A.I. Systems	1.0	1.2	23.5%	.0%
Accel Technologies	1.6	2.0	25.0%	.0%
Accugraph	10.4	14.0	34.3%	.1%
ACDS	4.9	6.0	22.4%	.1%
Albert Nestler	4.1	5.4	31.5%	.1%
Algor Interactive Systems	1.2	1.9	58.3%	.0%
Altera	5.7	6.0	5.3%	.1%
American Small Business Comp.	4.2	3.3	-22.0%	.0%
Andor	14.0	8.4	-40.3%	.1%
Apollo	155.0	196.0	26.4%	1.9%
Apple Computer	88.0	150.0	70.5%	1.5%
Aptos	2.5	3.1	23.5%	.0%
Aries Technology	5.2	5.2	.0%	.1%
Asahi Optical	20.0	15.4	-23.0%	.1%
Ashton-Tate	1.3	1.5	17.2%	.0%
Assigraph	7.4	6.5	-12.1%	.1%
Aucotec	4.6	6.0	31.7%	.1%
Auto-Trol	76.7	74.3	-3.2%	.7%
Autodesk	77.1	117.3	52.1%	1.1%
Autokon CIM Systems	2.5	3.4	37.2%	.0%
Automated Images	1.9	2.5	31.6%	.0%
Automated Systems	2.0	1.5	-25.0%	.0%
Automated Technology Products	8.5	8.4	-1.2%	.1%
Automatix	.0	.0	NA	.0%
Automatric	.9	1.0	17.6%	.0%
Bechtel Software	1.6	2.0	27.4%	.0%
Bentley	1.5	1.6	8.7%	.0%
Bishop Graphics CAD Systems	1.2	1.2	3.4%	.0%
BV Engineering	.4	.4	.0%	.0%
BYG	1.5	1.7	14.7%	.0%
C. Itoh Techno-Science	43.0	54.1	27.0%	.6%
C.H. Guernsey	.9	1.0	17.6%	.0%
CAD Centre	8.5	10.9	28.0%	.1%
CAD Lab	6.5	10.0	53.8%	.1%
CAD Software	2.5	3.3	30.4%	.0%
CAD-UL	.7	1.0	38.4%	.0%
CADAM	33.1	34.3	3.8%	.3%
Cade	6.9	8.0	15.4%	.1%
Cadence	37.9	61.7	62.9%	.6%
Cadisys	.7	1.0	38.9%	.0%
CADKEY	6.8	10.3	51.8%	.1%
Cadtronic	2.6	2.8	8.8%	.0%
Calay	27.2	21.0	-22.9%	.2%
Calma	125.0	87.0	-30.4%	.8%
Cascade Graphics	2.0	2.3	13.9%	.0%
Catalpa	.6	1.1	89.7%	.0%
Century Research Center	10.0	10.0	.0%	.1%

Worlwide CAD/CAM Market Shares for 1988
In Millions of Dollars

Copyright Dataquest
June 1989

	1987	1988	% Chg.	SOM
Challenger Software	1.8	1.0	-42.9%	.0%
Cimatron	10.7	13.3	24.5%	.1%
Cimlinc	35.2	35.2	.1%	.3%
Cisigraph	24.0	20.8	-13.2%	.2%
CIVILSOFT	.9	1.2	27.7%	.0%
CLM/Systems	2.4	3.0	27.1%	.0%
Cognition	3.0	2.2	-26.7%	.0%
Compaq	136.0	250.0	83.8%	2.4%
Computer Aided Planning	3.2	4.0	27.0%	.0%
Computer-Aided Design Group	.0	2.0	NA	.0%
Comshoppe	.6	.8	27.0%	.0%
Control Data	189.0	170.0	-10.1%	1.6%
CPU	2.0	5.4	170.0%	.1%
CRTC	.4	.5	28.2%	.0%
D.C.A. Engineering	2.4	3.0	25.5%	.0%
Daisy Systems	152.6	204.6	34.1%	2.0%
Daniel Geophysical	.9	1.0	17.6%	.0%
Dassault	33.0	28.0	-15.2%	.3%
Datagraph	4.5	.0	NA	.0%
DECAD	.9	1.2	39.5%	.0%
Dennis Klein & Associates	.4	.9	117.5%	.0%
Design Automation	4.0	5.4	35.0%	.1%
DFI	1.9	2.3	19.9%	.0%
Digital	949.7	780.0	-17.9%	7.5%
Douglas Electronics	.5	.7	37.3%	.0%
Dynamic Graphics	3.4	4.0	16.6%	.0%
Dynaware	.3	.4	27.3%	.0%
EDA Systems	.0	3.2	NA	.0%
EDSA Micro	.2	.2	26.7%	.0%
EESOF	8.5	9.5	11.6%	.1%
EIE	10.5	.0	NA	.0%
Electrical Eng. Software	.7	1.2	84.8%	.0%
Elite Software Development	.5	.8	53.8%	.0%
Emerald Design Systems	.8	1.0	28.2%	.0%
Endeco Systems	1.6	2.0	27.4%	.0%
Engineering Computer Services	8.9	10.5	18.0%	.1%
Engineering Software	.8	1.0	25.0%	.0%
EPIC Design Technology	.2	.4	66.7%	.0%
ERDAS	2.0	1.5	-24.0%	.0%
ESRI	22.1	32.4	46.7%	.3%
ETAK	7.7	9.0	16.7%	.1%
European Silicon Structures	7.0	4.5	-35.2%	.0%
Everex	2.5	13.5	440.4%	.1%
Evolution Computing	1.2	1.8	50.4%	.0%
Exapt	11.4	12.1	6.3%	.1%
Ferranti	32.3	31.1	-3.7%	.3%
Foresight Resources	2.2	3.1	40.5%	.0%

Worlwide CAD/CAM Market Shares for 1988
In Millions of Dollars

Copyright Dataquest
June 1989

	1987	1988	% Chg.	SOM
Fujitsu	158.0	269.0	70.2%	2.6%
Futurenet	17.9	15.0	-16.1%	.1%
Gateway Design Automation	6.0	9.0	49.5%	.1%
Generic Software	6.3	7.1	12.9%	.1%
Genrad	7.2	10.0	40.3%	.1%
Geobased Systems	1.0	5.0	400.0%	.0%
Geographic Data Technologies	2.8	1.9	-31.8%	.0%
Geomath	.3	.6	132.0%	.0%
Geospectra	.2	.3	19.0%	.0%
GeoVision Corp.	10.6	13.4	25.8%	.1%
GEOVISION Inc.	1.0	1.2	16.5%	.0%
Gerber Systems	21.0	26.8	27.5%	.3%
GRAPHSOFT	.7	.8	23.5%	.0%
Graphtec Engineering	6.0	10.1	68.3%	.1%
Hakuto	14.0	27.0	92.9%	.3%
Harris Computer	7.0	7.8	11.3%	.1%
Hewlett-Packard	158.1	276.9	75.2%	2.7%
Hitachi	124.0	154.0	24.2%	1.5%
Hitachi Seiko	10.0	10.5	4.9%	.1%
Hitachi Zosen	63.0	77.0	22.2%	.7%
IBM	1,384.9	1,510.0	9.0%	14.6%
ICAD	4.1	5.0	22.2%	.0%
ICL	17.5	22.2	26.8%	.2%
IGC Technology	.4	.5	25.0%	.0%
Ikos Systems	1.5	5.2	244.4%	.1%
Infinite Graphics	.0	.0	NA	.0%
Info. Services Int'l. Dentsu	15.0	20.0	33.3%	.2%
Innotech	.0	19.2	NA	.2%
Innovative Data Design	2.5	2.5	-.4%	.0%
Integrated Information Systems	2.0	5.0	150.0%	.0%
Integrated Silicon Systems	.8	1.0	29.5%	.0%
Intercad	2.3	6.5	185.8%	.1%
Intergraph	639.6	801.6	25.3%	7.7%
International Microelectronic	1.0	1.3	32.3%	.0%
ISICAD	34.0	42.0	23.5%	.4%
ISYKON Software	5.8	7.5	29.8%	.1%
ItalCad	18.0	13.0	-28.1%	.1%
Ithaca Software	.8	.5	-32.9%	.0%
Kanematsu Semiconductor	7.0	8.5	21.6%	.1%
Kork Systems	.9	1.0	17.6%	.0%
Kubota Computer	1.2	1.5	22.8%	.0%
Kyocera	2.9	3.8	30.6%	.0%
LandCadd	1.2	1.4	16.7%	.0%
Landmark Graphics	25.6	30.0	17.0%	.3%
Logic Automation	1.2	5.0	312.5%	.0%
Logotec	6.8	8.5	24.4%	.1%
LSI Logic	10.0	22.0	120.0%	.2%

Worlwide CAD/CAM Market Shares for 1988
In Millions of Dollars

Copyright Dataquest
June 1989

	1987	1988	% Chg.	SOM
MacNeal-Schwendler	34.1	39.9	17.0%	.4%
Manufacturing Consultants	11.0	16.6	51.0%	.2%
Mapinfo	1.0	2.3	130.0%	.0%
MARC	5.0	8.1	62.4%	.1%
Marubeni Hytech	13.0	29.2	124.4%	.3%
MATC CAD	.4	.7	66.7%	.0%
Matra Datavision	55.0	67.0	21.8%	.6%
McDonnell Douglas	191.3	231.0	20.8%	2.2%
Mechanical Dynamics	3.0	4.4	47.2%	.0%
Mega CADD	1.5	2.1	40.7%	.0%
Mentor Graphics	218.2	300.8	37.8%	2.9%
Meta-Software	2.9	4.3	46.9%	.0%
Micro CAD/CAM Systems	2.0	1.8	-12.0%	.0%
Micro Engineering Solutions	1.6	2.0	25.3%	.0%
Micrografx	2.4	3.0	25.0%	.0%
Microsim	2.0	3.3	65.0%	.0%
Mitsubishi Electric	70.0	77.0	10.0%	.7%
Mitsui Engineering	14.0	17.0	21.4%	.2%
MPSI Systems	.4	.6	40.0%	.0%
Mutoh Industries	59.4	97.4	64.0%	.9%
NCR Microelectronics	.6	.8	32.8%	.0%
NEC	169.5	226.4	33.6%	2.2%
Nippon Kokan	2.9	3.5	22.4%	.0%
Nihon Unisys	93.0	138.5	48.9%	1.3%
Norsk Data	30.0	43.5	44.8%	.4%
Olivetti	13.7	17.9	30.7%	.2%
Omation	.8	3.5	338.7%	.0%
Orcad	2.9	5.0	75.4%	.0%
PAFEC	20.0	31.4	57.2%	.3%
PDA Engineering	15.2	22.9	50.5%	.2%
Phase Three Logic	.5	1.0	88.2%	.0%
Philips International	2.1	2.5	22.0%	.0%
Plessey Semiconductors	.6	.8	35.1%	.0%
Prime Computer	753.6	874.0	16.0%	8.4%
Quadtree	.8	.5	-33.3%	.0%
Quantic Laboratories	.9	.8	-5.9%	.0%
Quwat (Shukosha)	.0	.0	NA	.0%
Racal-Redac	67.7	77.0	13.8%	.7%
Radan Computational	4.2	5.1	22.8%	.0%
RHV Software Systems	4.4	5.5	23.7%	.1%
Rikei	4.0	3.2	-20.0%	.0%
Robocom	3.5	4.1	17.8%	.0%
Rotring euroCAD	12.7	16.0	25.8%	.2%
Royal Digital Scepter	2.0	3.2	54.9%	.0%
Schlumberger (Applicon)	135.0	140.0	3.7%	1.4%
Scientific Calc.	64.3	29.0	-54.8%	.3%
SDA (Acquired by ECAD)	16.5	.0	NA	.0%

Worlwide CAD/CAM Market Shares for 1988
In Millions of Dollars

Copyright Dataquest
June 1989

	1987	1988	% Chg.	SOM
SDRC	24.5	42.0	71.7%	.4%
Seattle Silicon	5.1	5.5	8.0%	.1%
Secagraphics	1.7	2.7	55.0%	.0%
Secmai	12.0	11.6	-2.9%	.1%
Seiko Instruments	89.5	113.9	27.3%	1.1%
Shared Resources	1.8	2.5	38.9%	.0%
Sharp System Products	25.0	36.2	44.8%	.3%
Siemens	100.0	105.6	5.6%	1.0%
Sigma Design	10.0	9.5	-4.9%	.1%
Silc Technologies	.0	1.0	NA	.0%
Silicon Compiler Systems	27.7	30.4	9.9%	.3%
Silicon Graphics	35.0	55.6	59.0%	.5%
Silvar-Lisco	25.3	18.9	-25.5%	.2%
Sony	6.0	6.8	13.2%	.1%
Spectrum Software	1.2	1.5	30.2%	.0%
STI-Strassle	14.2	17.1	20.6%	.2%
Strategic Locations Planning	.5	2.3	350.0%	.0%
Sukosha	.0	.0	NA	.0%
Sumisho Electronics	9.0	20.0	122.0%	.2%
Sumitomo Electric Industries	.0	.0	NA	.0%
Sun	110.0	215.3	95.8%	2.1%
Superdraft	2.2	2.9	28.8%	.0%
Swanson Analysis	15.5	17.8	15.0%	.2%
Sycotronic AG	1.1	1.4	29.0%	.0%
Synercom	10.3	15.3	49.3%	.1%
Synopysis	.0	.8	NA	.0%
Sysscan	18.0	17.9	-.5%	.2%
T2 Solutions	6.0	8.1	34.3%	.1%
Tangent Systems	5.0	7.4	48.2%	.1%
Technische Computer Systeme	3.3	4.3	31.8%	.0%
Technovision	2.6	3.2	22.1%	.0%
Teradyne	10.8	22.3	107.1%	.2%
Terr-Mar	2.0	1.7	-17.0%	.0%
Test Systems Strategies	2.2	4.8	118.2%	.0%
The CAD Group	1.6	2.0	27.4%	.0%
The Great Softwestern Co.	1.0	1.3	30.0%	.0%
Thom 6	3.0	2.6	-15.0%	.0%
Tokyo Electron	19.0	32.2	69.4%	.3%
Tokyo Keiki	3.9	5.4	38.8%	.1%
Toshiba	71.0	69.8	-1.7%	.7%
Toyo Information Systems	6.0	16.5	174.1%	.2%
Toyoelectric Manufacturing	.0	.0	NA	.0%
Trimeter	.0	1.1	NA	.0%
Uchida Yoko	10.0	13.0	30.0%	.1%
Ultimap	.9	1.0	17.6%	.0%
Unisys	33.3	38.6	15.9%	.4%
Ustation	9.0	4.6	-48.9%	.0%

Worlwide CAD/CAM Market Shares for 1988
In Millions of Dollars

Copyright Dataquest
June 1989

	1987	1988	% Chg.	SOM
Valid	67.3	141.0	109.6%	1.4%
Vamp	.6	.7	20.0%	.0%
Versacad	7.6	8.0	5.0%	.1%
View Logic	8.0	10.3	28.1%	.1%
Vision 3D	1.0	1.2	23.7%	.0%
Visionics	2.0	2.8	40.0%	.0%
VLSI Technology	12.2	20.1	64.5%	.2%
Wacom	9.0	11.6	28.4%	.1%
Westward	9.5	11.6	22.6%	.1%
Wild Heerbrugg	1.0	1.3	30.0%	.0%
WPS Development	2.0	2.7	33.0%	.0%
XAO Industrie	1.1	1.5	31.9%	.0%
Xerox	3.0	.0	NA	.0%
Xilinx	8.2	10.8	31.7%	.1%
Yamashita Electronic	4.0	4.6	16.0%	.0%
Yokogawa Electric	8.0	6.5	-18.8%	.1%
Zenith	33.0	23.6	-28.5%	.2%
Ziegler Instruments GmbH	8.5	14.1	65.5%	.1%
Zuken	43.0	58.5	36.1%	.6%
Zycad	28.9	35.4	22.3%	.3%
Zycor	2.0	4.1	103.5%	.0%
Other Computer	562.4	601.8	7.0%	5.8%
Other Companies	1,149.9	1,346.0	17.1%	13.0%
All Companies	8,748.5	10,346.6	18.3%	100.0%
All U.S.-Based Companies	6,973.3	8,179.2	17.3%	79.1%
All Asian-Based Companies	1,119.2	1,441.3	28.8%	13.9%
All European-Based Companies	656.1	726.1	10.7%	7.0%
All Hardware Companies	2,472.2	2,630.2	6.4%	25.4%
All Turnkey & SW Companies	6,276.4	7,716.4	22.9%	74.6%

TABLE NUMBER: 32
TITLE: 1987 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	218.2	103.4	83.0	5,031	11.0%	10.1%	11.7%	9.6%
Digital	173.7	149.5	.0	779	8.8%	14.6%	.0%	1.5%
Daisy Systems	152.6	37.7	89.3	1,356	7.7%	3.7%	12.6%	2.6%
Apollo	82.6	74.0	.0	3,115	4.2%	7.2%	.0%	5.9%
IBM	80.1	68.4	5.2	9,799	4.1%	6.7%	.7%	18.7%
Sun	68.5	60.5	.0	2,886	3.5%	5.9%	.0%	5.5%
Racal-Redac	67.7	7.0	50.6	199	3.4%	.7%	7.1%	.4%
Valid	67.3	19.3	33.6	688	3.4%	1.9%	4.7%	1.3%
Scientific Calc.	64.3	23.4	16.9	154	3.3%	2.3%	2.4%	.3%
Hewlett-Packard	58.7	34.7	18.9	2,466	3.0%	3.4%	2.7%	4.7%
Prime Computer	49.0	17.0	18.8	424	2.5%	1.7%	2.6%	.8%
NEC	45.4	29.3	13.0	1,842	2.3%	2.9%	1.8%	3.5%
Intergraph	45.4	27.5	9.6	378	2.3%	2.7%	1.4%	.7%
Zuken	4[illegible]7	21.9	14.4	346	2.1%	2.1%	2.0%	.7%
Fujitsu	3[illegible]9	26.1	8.1	508	1.9%	2.5%	1.1%	1.0%
Cadence	3[illegible]9	.4	36.7	10	1.9%	.0%	5.2%	.0%
Seiko - No OEM	35.0	18.1	13.4	200	1.8%	1.8%	1.9%	.4%
Zycad	28.9	25.5	.0	53	1.5%	2.5%	.0%	.1%
Silicon Compiler Systems	27.7	.0	25.2	0	1.4%	.0%	3.6%	.0%
Calay	27.2	17.1	8.1	230	1.4%	1.7%	1.1%	.4%
Compaq	27.2	27.2	.0	7,640	1.4%	2.7%	.0%	14.5%
Silvar-Lisco	25.3	.0	23.0	0	1.3%	.0%	3.2%	.0%
Control Data	21.8	14.2	2.6	374	1.1%	1.4%	.4%	.7%
CADAM	20.1	(.2)	18.1	0	1.0%	-.0%	2.5%	.0%
Futurenet	17.9	.0	15.7	0	.9%	.0%	2.2%	.0%
Sharp System Products	16.3	6.8	7.9	85	.8%	.7%	1.1%	.2%
Autodesk	14.1	.0	14.1	0	.7%	.0%	2.0%	.0%
Hitachi	13.7	9.3	3.3	245	.7%	.9%	.5%	.5%
VLSI Technology	12.2	1.5	8.9	50	.6%	.2%	1.2%	.1%
Teradyne	10.8	.0	8.6	0	.5%	.0%	1.2%	.0%
Asahi Optical - No OEM	10.0	7.4	1.6	55	.5%	.7%	.2%	.1%
LSI Logic	10.0	.0	10.0	0	.5%	.0%	1.4%	.0%

(Continued)

TABLE NUMBER: 32 (Continued)
TITLE: 1987 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					---------- Market Share ----------			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Schlumberger (Applicon)	9.5	3.9	2.7	200	.5%	.4%	.4%	.4%
Toshiba - No OEM	8.7	7.8	.0	0	.4%	.8%	.0%	.0%
Apple Computer	7.0	7.1	.0	2,527	.4%	.7%	.0%	4.8%
Rotring euroCAD	5.1	2.2	2.3	0	.3%	.2%	.3%	.0%
Hitachi Zosen	4.4	1.6	2.4	29	.2%	.2%	.3%	.1%
Mitsubishi Electric	3.5	2.2	1.0	43	.2%	.2%	.1%	.1%
Toyko Electron - No OEM	.8	.0	.7	0	.0%	.0%	.1%	.0%
ICL	.8	.6	.2	19	.0%	.1%	.0%	.0%
Olivetti	.5	.3	.2	108	.0%	.0%	.0%	.2%
Sumisho Electronics	.4	.2	.1	16	.0%	.0%	.0%	.0%
Other Companies	318.0	166.2	139.7	10,353	16.1%	16.2%	19.7%	19.7%
All Companies	1,975.6	1,023.1	710.5	52,510	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1,533.8	810.3	529.5	45,432	77.6%	79.2%	74.5%	86.5%
All Asian-Based Companies	271.6	159.7	85.2	4,766	13.7%	15.6%	12.0%	9.1%
All European-Based Companies	170.3	53.2	95.9	2,313	8.6%	5.2%	13.5%	4.4%
All Hardware Companies	539.4	503.1	.6	35,009	27.3%	49.2%	.1%	66.7%
All Turnkey & SW Companies	1,436.2	520.1	709.9	17,501	72.7%	50.8%	99.9%	33.3%

Source: Dataquest
April 1989

TABLE NUMBER: 42
TITLE: 1986 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					---------- Market Share ----------			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	213.3	192.8	.0	708	12.1%	17.9%	.0%	1.5%
Mentor Graphics	189.5	99.5	69.7	2,110	10.8%	9.2%	13.0%	4.5%
Daisy Systems	124.5	44.0	68.7	1,624	7.1%	4.1%	12.8%	3.5%
IBM	76.9	65.9	5.2	8,417	4.4%	6.1%	1.0%	18.1%
Apollo	73.8	65.0	.0	3,000	4.2%	6.0%	.0%	6.5%
Racal-Redac	62.1	24.2	36.0	469	3.5%	2.2%	6.7%	1.0%
Valid	60.9	32.2	24.8	1,260	3.5%	3.0%	4.6%	2.7%
Seiko - No OEM	56.6	39.3	13.9	371	3.2%	3.6%	2.6%	.8%
Scientific Calc.	50.0	14.0	11.2	154	2.8%	1.3%	2.1%	.3%
Prime Computer	49.5	30.8	14.3	497	2.8%	2.9%	2.7%	1.1%
Hewlett-Packard	42.5	34.1	8.6	950	2.4%	3.2%	1.6%	2.0%
Zuken	31.6	16.3	13.1	319	1.8%	1.5%	2.4%	.7%
Calay	30.0	18.5	7.8	240	1.7%	1.7%	1.5%	.5%
Control Data	26.3	17.1	2.2	159	1.5%	1.6%	.4%	.3%
Silvar-Lisco	25.2	.0	22.9	0	1.4%	.0%	4.3%	.0%
NEC	25.0	16.0	6.9	461	1.4%	1.5%	1.3%	1.0%
Futurenet	23.7	.9	17.6	400	1.3%	.1%	3.3%	.9%
Sun	21.7	19.0	.0	1,003	1.2%	1.8%	.0%	2.2%
Silicon Compiler Systems	21.1	5.5	14.1	203	1.2%	.5%	2.6%	.4%
Asahi Optical - No OEM	21.0	11.5	7.6	140	1.2%	1.1%	1.4%	.3%
Fujitsu	19.8	12.9	5.5	138	1.1%	1.2%	1.0%	.3%
Zycad	19.2	17.3	.0	0	1.1%	1.6%	.0%	.0%
Intergraph	17.7	9.8	4.6	177	1.0%	.9%	.9%	.4%
CADAM	17.0	.4	15.1	23	1.0%	.0%	2.8%	.0%
Sharp System Products	16.8	10.7	4.9	95	1.0%	1.0%	.9%	.2%
Schlumberger (Applicon)	16.5	11.3	2.5	218	.9%	1.0%	.5%	.5%
Cadence	14.7	.3	13.8	18	.8%	.0%	2.6%	.0%
Hitachi	13.5	7.5	5.0	57	.8%	.7%	.9%	.1%
Teradyne	9.8	.0	7.8	0	.6%	.0%	1.5%	.0%
Apple Computer	8.8	8.8	.0	3,159	.5%	.8%	.0%	6.8%
VLSI Technology	8.5	1.7	5.5	30	.5%	.2%	1.0%	.1%
LSI Logic	8.0	1.5	6.5	34	.5%	.1%	1.2%	.1%

(Continued)

TABLE NUMBER: 42 (Continued)
TITLE: 1986 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compaq	6.6	6.6	.0	2,000	.4%	.6%	.0%	4.3%
Toshiba - No OEM	5.1	4.2	.5	36	.3%	.4%	.1%	.1%
Rotring euroCAD	4.0	1.8	1.8	0	.2%	.2%	.3%	.0%
Autodesk	1.8	.0	1.8	0	.1%	.0%	.3%	.0%
Hitachi Zosen	1.3	.7	.5	16	.1%	.1%	.1%	.0%
Mitsubishi Electric	1.3	1.0	.2	6	.1%	.1%	.0%	.0%
ICL	.4	.3	.1	10	.0%	.0%	.0%	.0%
Other Companies	342.8	233.3	113.5	17,597	19.5%	21.6%	21.2%	37.9%
All Companies	1,762.5	1,078.7	535.4	46,401	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1,379.9	876.2	393.6	42,022	78.3%	81.2%	73.5%	90.6%
All Asian-Based Companies	231.2	139.1	76.0	2,772	13.1%	12.9%	14.2%	6.0%
All European-Based Companies	151.4	63.4	65.8	1,607	8.6%	5.9%	12.3%	3.5%
All Hardware Companies	509.1	506.5	.6	33,086	28.9%	46.9%	.1%	71.3%
All Turnkey & SW Companies	1,253.4	572.3	534.8	13,315	71.1%	53.1%	99.9%	28.7%

Source: Dataquest
April 1989

TABLE NUMBER: 42
TITLE: 1985 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

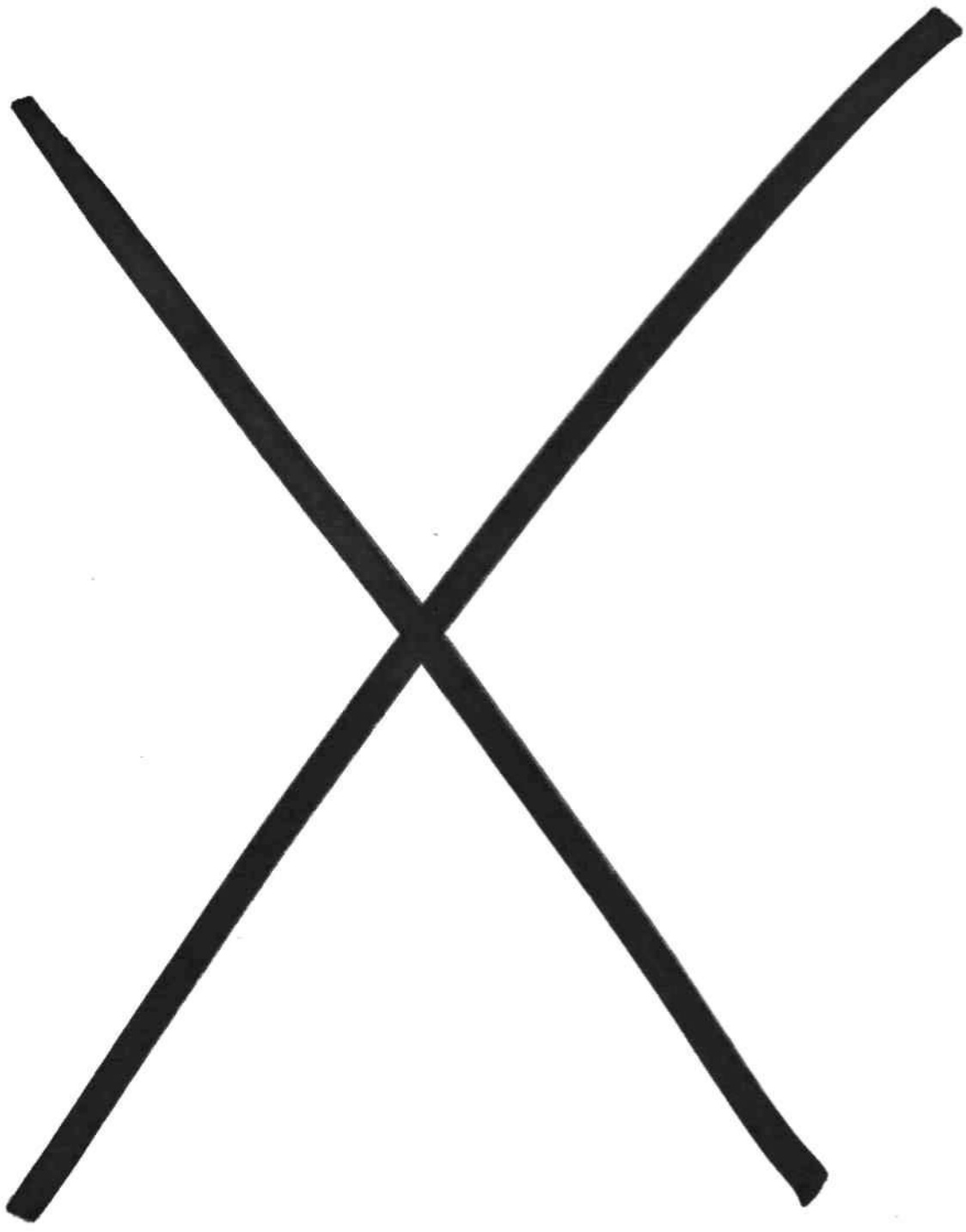
					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	189.8	174.2	.0	174	13.4%	19.7%	.0%	.8%
Mentor Graphics	156.4	71.0	55.5	1,665	11.0%	8.0%	14.2%	7.2%
Daisy Systems	154.7	52.5	88.0	2,104	10.9%	5.9%	22.5%	9.2%
IBM	85.7	77.9	3.5	6,916	6.0%	8.8%	.9%	30.1%
Prime Computer	72.3	32.0	10.3	759	5.1%	3.6%	2.6%	3.3%
Valid	61.9	36.2	20.9	990	4.4%	4.1%	5.3%	4.3%
Racal-Redac	50.5	25.5	19.2	218	3.6%	2.9%	4.9%	.9%
Scientific Calc.	48.2	23.5	10.2	436	3.4%	2.7%	2.6%	1.9%
Seiko I&E - Turnkey	44.1	32.0	12.1	369	3.1%	3.6%	3.1%	1.6%
Apollo	37.2	32.7	.0	1,202	2.6%	3.7%	.0%	5.2%
Hewlett-Packard	30.4	12.9	10.6	504	2.1%	1.5%	2.7%	2.2%
Calay	26.6	17.6	7.0	196	1.9%	2.0%	1.8%	.9%
Zycad	24.4	21.9	.7	0	1.7%	2.5%	.2%	.0%
Intergraph	22.6	15.2	3.4	211	1.6%	1.7%	.9%	.9%
Zuken	22.3	17.5	4.8	180	1.6%	2.0%	1.2%	8%
Futurenet	19.7	.0	17.4	33	1.4%	.0%	4.4%	.1%
Asahi Optical - No OEM	18.9	11.6	7.3	120	1.3%	1.3%	1.9%	.5%
Schlumberger (Applicon)	18.7	12.0	4.8	241	1.3%	1.4%	1.2%	1.0%
Control Data	18.6	10.3	5.5	160	1.3%	1.2%	1.4%	.7%
Silvar-Lisco	17.7	.0	15.4	0	1.2%	.0%	3.9%	.0%
Fujitsu	17.2	14.6	2.6	118	1.2%	1.7%	.7%	.5%
Sharp System Products	12.8	8.7	4.1	80	.9%	1.0%	1.0%	.3%
Cadence	11.8	.6	10.2	30	.8%	.1%	2.6%	.1%
NEC	11.4	8.8	2.6	230	.8%	1.0%	.7%	1.0%
CADAM	11.3	.0	11.1	0	.8%	.0%	2.8%	.0%
Silicon Compiler Systems	9.4	3.7	4.9	35	.7%	.4%	1.3%	.2%
Teradyne	7.8	.0	6.2	0	.5%	.0%	1.6%	.0%
Hitachi	7.6	6.1	1.5	46	.5%	.7%	.4%	.2%
Sun	4.0	3.6	.0	156	.3%	.4%	.0%	.7%
Mitsubishi Electric	1.7	1.5	.2	12	.1%	.2%	.1%	.1%
Autodesk	1.0	.0	1.0	0	.1%	.0%	.3%	.0%
Mutoh Industries - No OEM	.8	.4	.4	294	.1%	.0%	.1%	1.3%

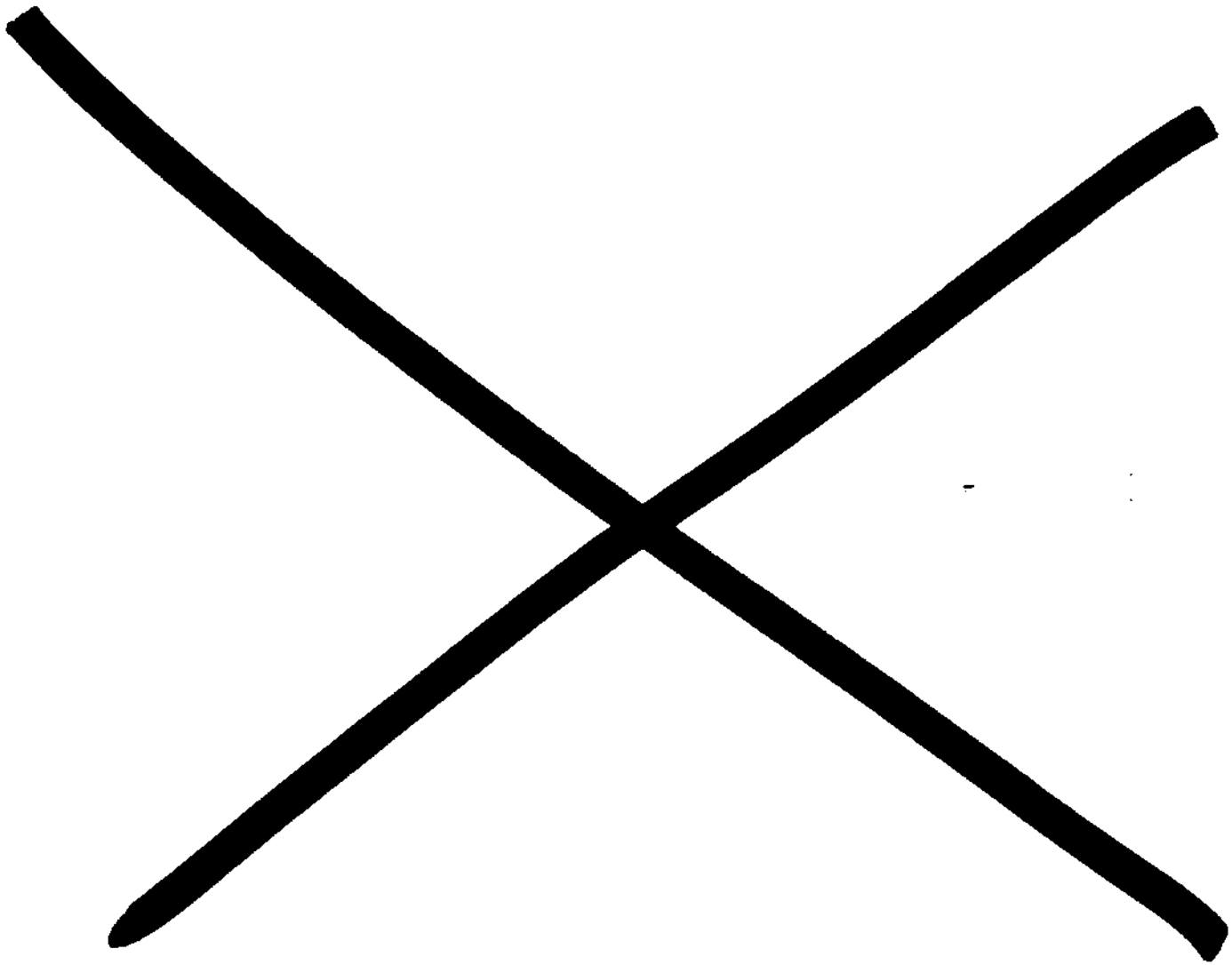
(Continued)

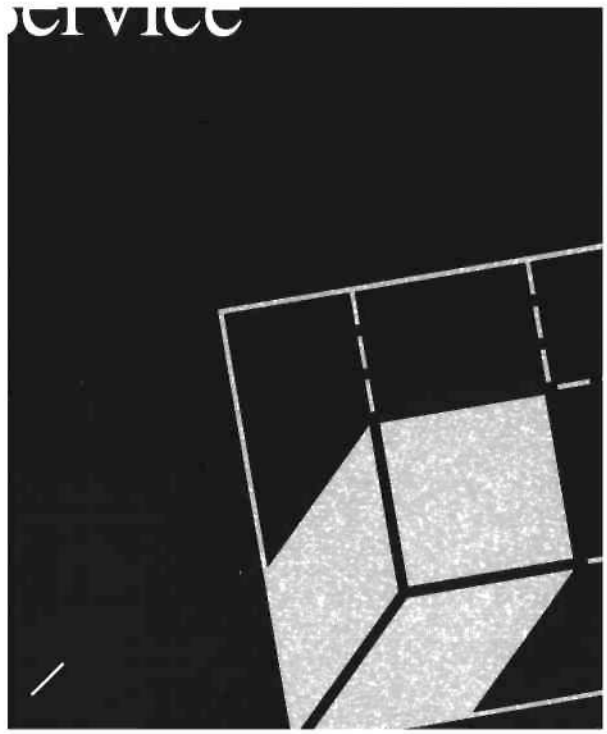
TABLE NUMBER: 42 (Continued)
TITLE: 1985 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Swanson Analysis	.5	.0	.5	0	.0%	.0%	.1%	.0%
Hitachi Zosen	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	201.3	158.0	50.1	5,432	14.2%	17.9%	12.8%	23.6%
All Companies	1,419.0	883.0	391.0	22,972	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1,179.4	716.9	319.1	20,870	83.1%	81.2%	81.6%	90.8%
All Asian-Based Companies	162.6	123.0	45.8	1,688	11.5%	13.9%	11.7%	7.3%
All European-Based Companies	77.1	43.0	26.2	414	5.4%	4.9%	6.7%	1.8%
All Hardware Companies	383.6	368.7	.0	12,841	27.0%	41.8%	.0%	55.9%
All Turnkey & SW Companies	1,035.4	514.3	391.0	10,131	73.0%	58.2%	100.0%	44.1%

Source: Dataquest
April 1989







CAD/CAM Industry Service

Introduction to the Service

Dataquest

a company of
The Dun & Bradstreet Corporation

Published by Dataquest Incorporated

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients.

Printed in the United States of America. All rights reserved. No part of this publication may be reproduced, stored in retrieval systems, or transmitted, in any form or by any means—mechanical, electronic, photocopying, duplicating, microfilming, videotape, or otherwise—without the prior written permission of the publisher.

© 1988 Dataquest Incorporated
December 1988

Introduction to the CAD/CAM Industry Service

Welcome to the CAD/CAM Industry Service

As the CAD/CAM industry matures, with the compound annual growth rate (CAGR) slowing to the 8 percent range as we enter the nineties, the decision-making process is becoming increasingly more complex for CAD/CAM professionals.

Significant mergers and acquisitions and general market attrition have dramatically changed the competitive nature of the CAD/CAM industry over the past two years. Now more than ever a need persists for information on a global scale. A resource that can offer comprehensive worldwide research and analysis of the markets, products, trends, technologies, and participants in the CAD/CAM industry is an essential ingredient to the development of sound product and marketing strategies in the wake of this industry shakeout.

Dataquest's CAD/CAM Industry Service (CCIS) is that resource.

CCIS provides clients with qualitative insight into integral issues and trends that develop in the CAD/CAM industry. Qualitative analysis is supported by extensive quantitative data on shipments, installed base, forecasts, history, market shares, market segmentation, and company performance. Exhaustive research provides all levels of personnel at our client companies with the information and analysis they require to make informed, timely business decisions.

For example, CCIS provides tools to help you do the following:

- Identify effectively the most appropriate target markets
- Gain a realistic understanding of end-user requirements
- Analyze the effect of contributing technology trends on your future product plans
- Evaluate competitors' marketing strategies and product offerings
- Position your products properly in relation to your competitors

CCIS has a highly professional research staff with an in-depth background in the CAD/CAM industry and research techniques. Augmenting the skills of the CCIS staff are the resources of other Dataquest syndicated services. Worldwide dedicated research in more than 25 technology areas enables Dataquest to provide an unparalleled picture of the total electronics industry. In addition, Dataquest brings to bear the vast resources of its parent company, information industry giant Dun & Bradstreet. Through its

relationship with D&B, Dataquest is uniquely positioned to assess the impact of external influences such as economic, political, and monetary trends that may effect the electronics industry.

Service Structure

Dataquest's CAD/CAM Industry Service has two major components: the core (or general) service and the application-specific segments. The service has been structured in this manner to provide clients with both a comprehensive overview of the CAD/CAM industry and an in-depth vertically focused view of the primary application markets.

Core Service

The core service represents a macro view of the entire CAD/CAM market, with information and analyses relevant to all CAD/CAM industry participants. Core service is rendered by a staff of industry and research experts. The core service is provided to all CCIS clients. It consists of the following elements:

- **Industry overview data base notebook.** This notebook contains analyses of the macro industry parameters, including summaries of the major CAD/CAM market segments. (Forecast data bases are also available to clients in electronic format upon request.)
- **Research Studies.** Research studies are event-driven publications that provide a continual flow of timely information and analyses on major industry events and issues.
- **Inquiry privilege.** This feature is designed to meet the unique information needs of each client, enabling the client to communicate directly with the CCIS research staff. Through this vehicle, questions concerning information in the data base notebooks, the impact of new product announcements, technical trends, and issues that will affect the general business environment, are addressed on a timely basis. Inquiries can be made in person or via telephone, fax, or telex.
- **Industry conference.** An annual conference brings together industry decision makers to review the state of the CAD/CAM industry and to discuss major issues in an open forum. Clients are entitled to one free conference seat, and seats must be reserved in advance.
- **Research libraries.** Clients have access to Dataquest's extensive libraries offering a broad range of reference materials in our San Jose, Boston, London, Paris, Munich, and Tokyo offices.
- **CAD/CAM industry directory.** Clients receive one free copy of the annually updated directory containing pertinent information on more than 600 CAD/CAM suppliers and their products.
- **Demographics and economic reports.** These reports present in-depth analyses of external influences on the electronics industry.

- **International support.** International support is provided through access to the Dataquest research staffs in our London, Paris, Munich, and Tokyo offices.

Application-Specific Segments

The application-specific segments are available to CCIS clients who need detailed information on a specific CAD/CAM application market. The following application segments are available:

- Mechanical CAD/CAM (MCAD)
- Electronics Design Automation (EDA)
- Facilities Design and Mapping (FD&M)

Each segment contains information and analyses particular to the specific application, including research studies and other event-driven publications, market overview, detailed market segmentation, forecasts, market shares, both vendor and end-user surveys, and specialized research reports. Each application segment is supported by a staff of CCIS analysts with experience in the specific application.

Detailed analyses and data are provided down to the design phase within each application specific segment. The following design phases are covered within the respective segments:

- **Mechanical CAD/CAM (MCAD)**
  - MCAE
  - Drafting
  - Design
  - FEM/FEA
  - Numerical control
  - Solid modeling
  - Process simulation
- **Electronic Design Automation (EDA)**
  - ECAE
  - IC
  - PCB
  - Compilation
  - Test
  - Logic design automation
  - Simulation

- **Facilities Design and Mapping (FD&M)**
  - Architectural
  - Facilities management
  - Process design
  - Mapping
  - Geographic information systems
  - Structural
  - HVAC and piping

CCIS also provides three additional information segments:

- **European Markets.** The European Markets segment provides the country-by-country data and analyses required to effectively penetrate the markets of Europe. European Markets offers insight into the market-specific parameters, coupled with an in-depth review of the government, trade, and economic forces that shape the European marketplace. Detailed information and analyses are available for the following regions:
  - United Kingdom
  - France
  - Italy
  - German region
  - Scandinavia
  - Benelux
  - Rest of Europe
  - Total Europe
- **Asian Markets.** The Asian Markets segment offers comprehensive coverage of the fastest-growing, yet most complicated, marketplace in the world. Similar to the European Market segment (and its coverage of the markets of Europe), the Asian Markets segment provides in-depth coverage of the dynamics of the individual markets that make up Asia. Detailed information and analyses are available of the following regions:
  - Japan
  - Taiwan
  - Korea
  - Singapore

- — Hong Kong
- — China
- — Rest of Asia
- — Total Asia

- **Personal CAD: Markets at the Low End.** With the dramatic decline in CAD/CAM workstation selling prices, the continued blurring of the distinction between a personal computer and a technical workstation, and the realization by traditional turnkey vendors of the necessity of offering a scalable solution, the market for low-end CAD/CAM solutions (under $15,000) has experienced explosive growth.

  As the price of low-end turnkey systems drops below the $15,000 mark, it will become increasingly difficult to profitably sell low-end solutions utilizing traditional sales channels. This is a challenge that all turnkey vendors currently are, or soon will be, facing. It is imperative that all vendors understand the complexities and competitive nature of the new low-end markets and delivery mechanisms. The Personal CAD segment will help you to confront the distribution challenges of the low end and to understand thoroughly the competitive pressures being exerted by PC-based solutions that offer competitive performance capabilities.

Figure 1 shows the total CAD/CAM Industry Service segmentation.

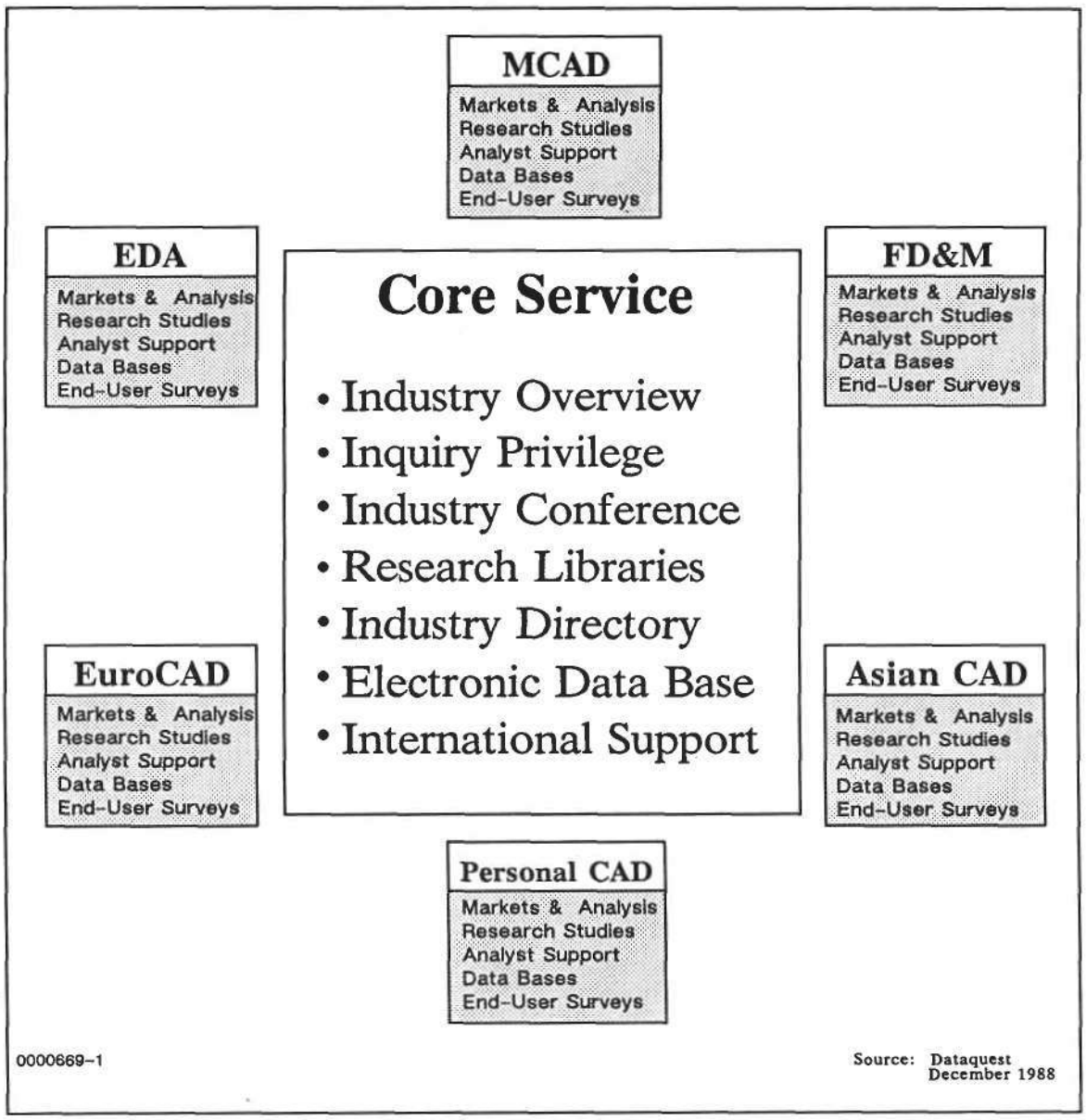


Figure 1. Total CAD/CAM Industry Service segmentation

Information Structure

The information available to CAD/CAM Industry Service clients is structured to provide data and analyses that are easily accessible and clearly defined. Figure 2 illustrates the CCIS information model. The components of the information model are defined on a macro level in the Industry Overview Data Base Binder and on an application-specific basis in each of the respective application segments.

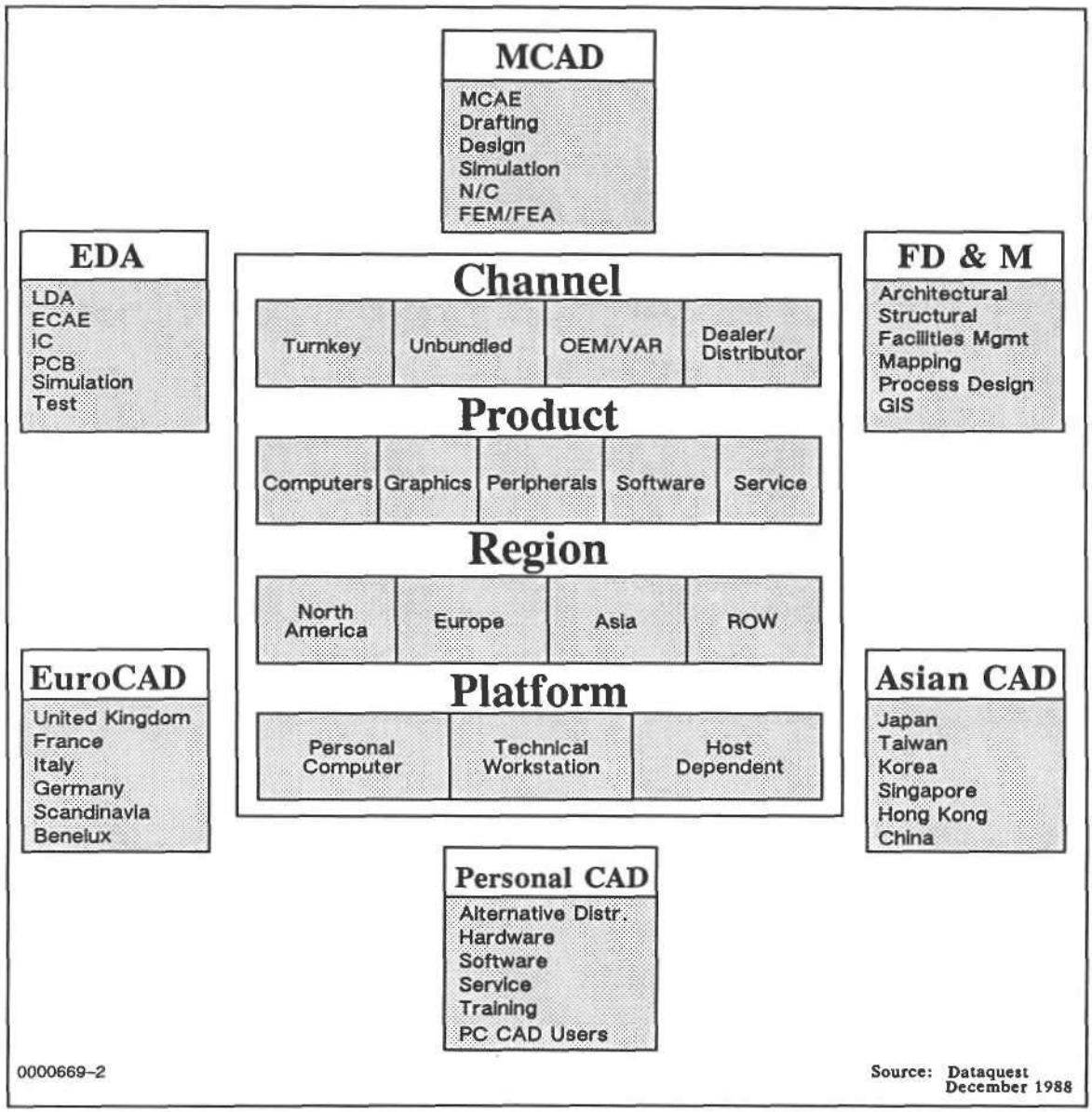


Figure 2. CCIS information model

Channel

Channel, the first of the data base models, identifies how CAD/CAM systems ultimately reach the end user. This tier will help you distinguish the various distribution channels and marketing arrangements used to bring products to market. These include the following:

- **Turnkey.** The turnkey channel encompasses the sale of complete CAD/CAM systems. A complete system is defined as CPU, graphics device, operating system, application software, and basic peripherals.

Turnkey vendors also typically offer complete service, training, and maintenance programs for the systems they sell.

- **Unbundled.** The unbundled channel comprises the sale of CAD/CAM system components, such as application software or hardware, sold independently of one another. Unbundled components may be sold by either a company that specializes in that particular component, such as a software-only company or a computer manufacturer, or by a turnkey vendor selling its software independent of the system.
- **OEM/VAR.** The original equipment manufacturer (OEM) and the value-added reseller (VAR) channel consist of companies that sell their products to other companies for resale. Resale may be to another tier in the distribution channel or to the ultimate end user. An example of companies in this tier are the computer manufacturers that sell their systems to turnkey vendors, who then bundle the hardware with applications software and resell the computers to end users.
- **Dealer/Distributor.** This growing channel is made up of a group of companies that resell products developed by other companies. Although not limited to personal computers, the majority of CAD/CAM products moving through this channel reside on this platform.

Product

The product tier tracks the dollar volume of sales from major subsystems of a turnkey CAD/CAM system. Subsystems covered include the following:

- Computers
- Graphics terminals
- Peripherals (such as plotters and printers used in CAD/CAM applications)
- Application software
- Service

In addition to dollar volume, unit volume is also identified for the computer and graphics terminal segments.

Region

The regional segment of the CAD/CAM Industry Service data base defines four regions into which CAD/CAM systems are sold. This segmentation will aid in your understanding of the geographic characteristics of the global CAD/CAM industry. The following geographic regions and regional segmentation are covered:

- **North America**
  - — United States

  - Canada
  - Mexico
- **Europe**
  - United Kingdom
  - France
  - German region
  - Italy
  - Benelux
  - Scandinavia
  - Rest of Europe
- **Asia**
  - Japan
  - Taiwan
  - Korea
  - Singapore
  - Hong Kong
  - People's Republic of China (PRC)
- **Rest of World (ROW).** This segment includes the sale of CAD/CAM systems into categories not included in the North American, European, or Asian regions.

Platform

Platform segmentation identifies three major architectures being delivered into the CAD/CAM market. This segmentation will help you understand the trends related to the type of systems being purchased.

The three types of systems are personal computers, technical workstations, and host-dependent systems. The major distinction among these product types is that personal computers and technical workstations contain their own CPUs and operating systems and therefore are classified as being fully distributed systems. Host-dependent systems, however, are considered shared-logic systems because their CPUs and operating systems are used as shared resources. For counting purposes, Dataquest treats personal computers and technical workstations as both CPU units and workstation units. This approach allows comparison between total distributed versus shared-logic CPUs, along with comparison of the total number of workseats that reside in the personal computer and technical workstation class versus total seats on

host-dependent systems. Platforms are further distinguished by the following characteristics:

- **Personal computer**
  - — DOS, OS/2, or OS operating system
  - — Single processing capability
- **Technical workstation**
  - — Resident operating system
  - — Full virtual operating system, such as UNIX or VMS
  - — Multitasking
  - — Networked communications support
  - — Integrated graphics
- **Host dependent**
  - — CPU external from the workstation
  - — No local operating system at the workstation level
  - — Conditioned environment requirement

Forecasting Methodology

Fundamental to the way Dataquest conducts its research is an underlying philosophy that says the best data and analyses come from a wellbalanced program. This includes 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.

The CAD/CAM industry 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 CCIS, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by channel, 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 (TAM) model and a satisfied available market figure to accurately assess the levels of penetration. In addition, Dataquest analysts 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, constraint is capable of keeping shipments below the demand level.

Dataquest's revenue and shipment estimates are based on the following sources:

- Information supplied by company management or gathered from publicly available published sources
- Large-scale end-user surveys
- Information supplied by other Dataquest industry services relating to components/ subsystems of CAD/CAM
- Information provided by OEMs or resellers of the manufacturers' products
- Senior staff estimates based on reliable historical data and in-depth understanding of a company's products and strategies

CCIS data are based on revenue and unit data of systems sold to end users. Rigorous cross-checking is undertaken to assure that no double counting exists in our unit and revenue numbers. To augment your understanding of the information structure, we offer these caveats regarding the interpretation of the data:

- Certain assumptions, definitions, or conventions implicit in our forecasts may differ from those of others. Please refer to our Industry Overview and Application notebooks for definition of forecasting terms, and analysis and interpretation of the data.
- Our shipment estimates of systems and workstations include only those delivered to paying customers, not the total that is manufactured (the backlog).
- Revenue and average selling price estimates are based on transaction prices, not on list prices.
- All data elements have been adjusted to reflect the forecast period, which is the calendar year.
- Manufacturers do not release their actual unit sales, application distribution, geographic distribution, or platform distribution. In order to provide our clients with the most accurate forecasts, we have given careful consideration to estimating these companies' data.

- Prior to 1983, Dataquest did not segment revenue geographically other than into U.S. and non-U.S. markets. To accommodate the expanded geographic segmentation, we added all non-U.S. data into the ROW segment for 1981 and 1982.
- Prior to 1983, Dataquest did not differentiate products based on hardware type. To accommodate our expanding platform segmentation, we have grouped all platforms prior to 1983 into the host-base category. Although not all systems shipped prior to 1983 were of the host-based variety, the vast majority were.

Figure 3 is a pictorial summary of the information compendium offered by the Dataquest CAD/CAM Industry Service.

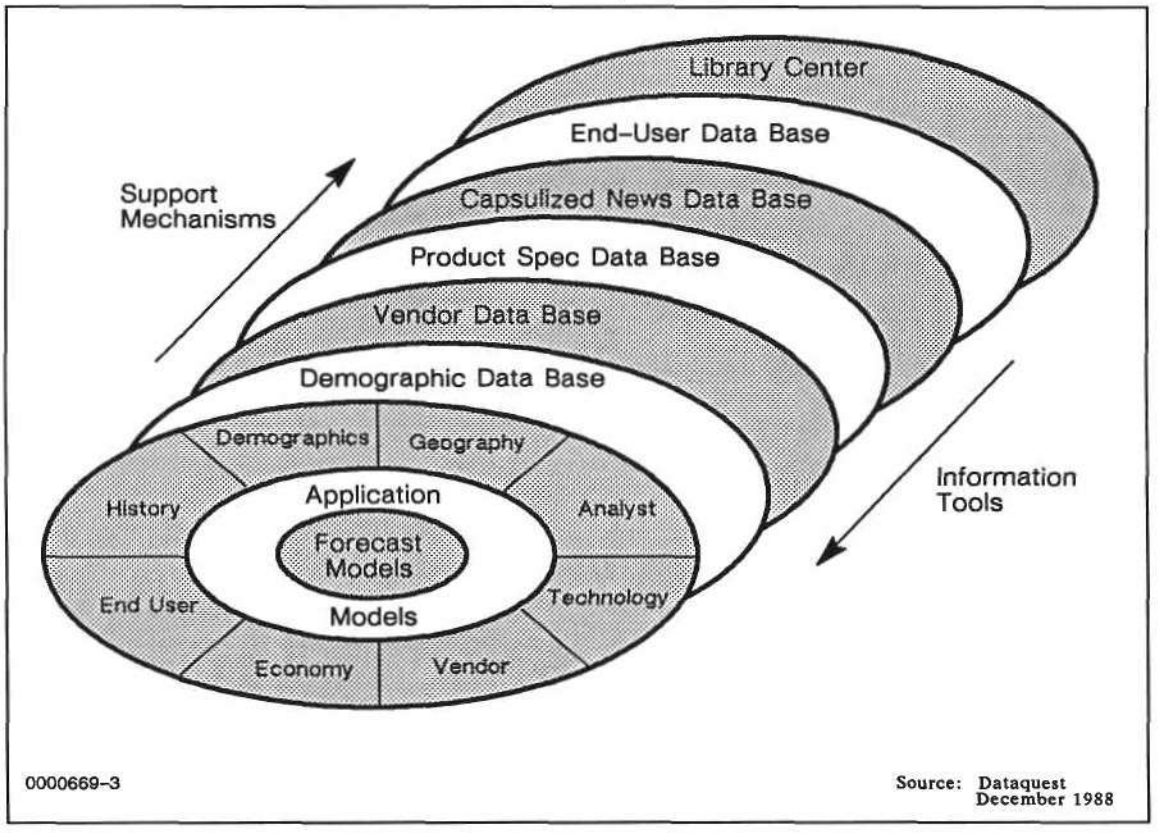


Figure 3. A pictorial summary of the information compendium offered by the Dataquest CAD/CAM Industry Service

Companies

CCIS continues to expand the number of companies included in our forecast model. The model consists of two groups of companies: those listed individually, or "main companies," and those consolidated into the "other" category. A company is listed individually only if its total CAD/CAM end-user revenue is $15 million or more. Conversely, a company is in the "other" category if its total CAD/CAM end-user revenue is less than $15 million.

Main Companies

- Apollo Computer
- Apple Computer
- Asahi Optical
- Autodesk
- Auto-Trol
- C. Itoh Techno-Science
- CADAM
- CISIGRAPH
- Cadnetix
- Calay Systems
- Calma
- Cimlinc
- Compaq Computer
- Computervision
- Control Data
- Daisy Systems
- Dassault Systems
- Digital Equipment
- ECAD
- ESRI
- Exapt
- Ferranti Infographics
- Fujitsu
- Futurenet
- Gerber Systems
- Hewlett-Packard
- Hitachi
- Hitachi Zosen
- Holguin
- IBM
- ICL
- ISICad
- Info. Services Int'l. Dentsu
- Intergraph
- ItalCAD
- MacNeal-Schwendler
- Matra Datavision
- McDonnell Douglas
- Mentor Graphics
- Mitsubishi Electric
- Mutoh Industries
- NEC
- Nippon Univac Kaisha
- Norsk Technovision
- Olivetti
- PAFEC
- PDA Engineering
- Personal CAD Systems
- Prime Computer
- Racal-Redac
- Robo Systems
- SDA

- SDRC
- Schlumberger (Applicon)
- Scientific Calculations
- Seiko Instruments
- Sharp System Products
- Siemens
- Silicon Compiler Systems
- Silicon Graphics
- Silvar-Lisco
- Sun Microsystems
- Swanson Analysis Systems
- Synercom Technology
- Syscan
- Technodia
- Tektronix
- Tokyo Electron
- Toshiba
- Unisys
- Valid Logic Systems
- ViewLogic Systems
- Zenith
- Zuken
- Zycad

Other Companies

- A/SA Software
- ACDS
- Accel Technologies
- Accugraph
- Advanced Geographics Systems
- Aida Engineering
- Albert Nestler
- Algor Interactive Systems
- Altera
- American Int'l Systems
- American Small Business Computers
- Analog Design Tools
- Andor
- Aptos Systems
- Aries Technology
- Asahi Giken
- Assigraph
- Autokon CIM Systems
- Automated Systems
- Automated Technology Products
- BV Engineering
- BYG
- Bentley
- Bishop Graphics CAD Systems
- CAD Centre

- CAD Lab
- CAD Software
- CADKEY
- CPU
- Cade
- Caeco
- Cambridge Interactive Systems
- Cascade Graphics Development
- Case Technology
- Century Research Center
- Challenger Software
- Cognition
- Cubicomp
- DFI
- Datagraph
- Dennis Klein & Associates
- Design Automation
- ECAD
- ECS
- EESOF
- EIE
- ERDAS
- ESRI
- Engineered Software
- European Silicon Structures
- Evans & Sutherland Computer
- Evolution Computing
- Exapt
- Foresight Resources
- Gateway Design Automation
- Generic Software
- Genrad
- Geobased Systems
- Geographic Data Technologies
- Geomath
- Geovision
- Gerber Scientific
- Graphtec Engineering
- HHB Systems
- HOK/CSC
- Hakuto
- Harris Computer
- Hitachi Seiko
- ICAD
- ISYKON Software
- Ikos Systems
- Infinite Graphics
- Info. Services Int'l Dentsu
- Innovative Data Design
- Integrated Information Systems
- ItalCAD
- Ithaca Software
- Kanematsu Semiconductor
- Kork Systems

- LSI Logic
- Logic Automation
- MAGI
- MARC
- MATC CAD
- MDSI
- MPSI Systems
- Manufacturing Consulting Services, Inc.
- Mapinfo
- Maptech
- Marconi CAE Systems
- Marubeni Hytech
- Mechanical Dynamics
- Mega CADD
- Meta-software
- Micro CAD/CAM
- Microsim
- Mitsui Engineering
- Olivetti
- Omation
- Orcad Systems
- Pafec
- Point Line Company
- Quadtree
- Quantic Laboratories
- Quwat (Shukosha)
- Rikei
- Robocom
- SDA
- Seattle Silicon Technology
- Secagraphics
- Secmai
- Shape Data
- Sigma Design
- Simucad
- Skok Systems
- Sony
- Strategic Locations Planning
- Sukosha
- Sumisho Electronics
- Sumitomo Electric Industries
- Supercads
- Superdraft
- TT Solutions
- Tangent Systems
- Technodia
- Teradyne
- Terr-Mar
- Test Systems Strategies
- The Great Softwestern Co.
- Thom 6
- Tokyo Keiki
- Toyo Information Systems
- Toyoelectric Manufacturing

- Transformer CAD
- Uchida Yoko
- Unicad
- Univac Information Systems
- Ustation
- VLSI Technology
- Vamp
- Versacad
- Via Systems
- ViewLogic Systems
- Visionics
- WPS Development
- Wacom
- Wild Heerbrugg Systems
- Xerox
- Yamashita Electric Design
- Yokogawa Electric
- Ziegler Instruments GmbH
- Zycor

Other Dataquest Services

The CAD/CAM Industry Service is just one of more than 30 high-technology services offered by Dataquest. The following is a list of other Dataquest services that may benefit your company:

- Semiconductors
  - Products, Markets, and Technology
  - ASIC and Standard Logic
  - Analog IC
  - Memory
  - Microcomponents
  - Digital Signal Processing
  - Gallium Arsenide
- European Semiconductors
- Japanese Semiconductors
- Asian Semiconductor and Electronics Technology
- Semiconductor Equipment and Materials
- Semiconductor User Information
- Semiconductor Application Markets
- European Semiconductor Application Markets
- Japanese Semiconductor Application Markets
- MilAero Technology
- Personal Computers
- European Personal Computers
- Technical Computer Systems
  - Minisupercomputers
  - Technical Workstations
- Business Computer Systems
- European Computers
- Superperformance Computing
- Office Systems

- UNIX Systems Software
- Software
- CIO Advisor
- Telecommunications
- European Telecommunications
- Graphics and Imaging
- Manufacturing Automation
  - Computers and Software
  - Material Handling and Robotics
- Computer Storage
  - Tape
  - Rigid
  - Flexible
  - Optical
  - Subsystems
- Display Terminals
  - European Display Terminals
- Electronic Printers
- Western European Printers
  - European Pricing
- Electronic Publishing Market Analysis
- Copying and Duplicating
- Electronic Typewriter
- Imaging Supplies

In addition to standard services, Dataquest also offers a variety of special reports, newsletters, competitive guides, and directories. To obtain additional information or a complete catalog of products offered by Dataquest, please call us toll free at (800) 624-3282.

Dataquest

a company of
The Dun & Bradstreet Corporation

Dataquest Research and Sales Offices:

Dataquest Incorporated
1290 Ridder Park Drive
San Jose, California 95131-2398
Phone: (408) 437-8000
Telex: 171973
Fax: (408) 437-0292

Direct Marketing Group
Phone: (800) 624-3280

Dataquest Australia
Suite 1, Century Plaza
80 Berry Street
North Sydney, NSW 2060
Australia
Phone: (02) 959-4544
Telex: 25468
Fax: (02) 929-0635

Dataquest Boston
1740 Massachusetts Ave.
Boxborough, MA 01719-2209
Phone: (508) 264-4373
Telex: 171973
Fax: (508) 635-0183

Dataquest GmbH
Rosenkavalierplatz 17
D-8000 Munich 81
West Germany
Phone: (089)91 1064
Telex: 5218070
Fax: (089)91 2189

Dataquest Hong Kong
Unit 603, Citicorp Centre
18 Whitfield Road
Causeway Bay, Hong Kong
Phone: (05)8072236
Telex: 80587
Fax: (05)8071503

Dataquest Israel
1 Aharon Goldstein Street
Givataim, Israel (Giva Tayim)
or
P.O. Box 18198
Tel Aviv, Israel
Phone: (052)447205
Telex: 341118
Fax: (052)447205

Dataquest Japan Limited
Taiyo Ginza Building/2nd Floor
7-14-16 Ginza, Chuo-ku
Tokyo 104 Japan
Phone: (03)546-3191
Telex: 32768
Fax: (03)546-3198

Dataquest Korea
Daeheung Bldg., Room 406
648-23 Yeoksam-dong
Kangnam-gu
Seoul, Korea 135
Phone: 011-82-2-556-8024
Fax: 011-82-2-554-1273

Dataquest SARL
Dataquest/Intelligent Electronics
Tour Gallieni 2
36, avenue Gallieni
93175 Bagnolet Cedex
France
Phone: (1)48 97 31 00
Telex: 233 263
Fax: (1)48 97 34 00

Dataquest Singapore
4012 Ang Mo Kio Industrial Park 1
Ave. 10, #03-10 to #03-12
Singapore 2056
Phone: 4597181
Telex: 38257
Fax: 4563129

Dataquest Taiwan
Room 801/8th Floor
Ever Spring Building
147, Sect. 2, Chien Kuo N. Rd.
Taipei, Taiwan R.O.C. 104
Phone: (02)501-7960
Telex: 27459
Fax: (02)505-4265

Dataquest UK Limited
13th Floor, Centrepoint
103 New Oxford Street
London WC1A 1DD
England
Phone: (01)379-6257
Telex: 266195
Fax: (01)240-3653

Dataquest West Germany
In der Schneithohl 17
6242 Kronberg 2
West Germany
Phone: (06173)61685
Telex: 418089
Fax: (06173)67901

Dataquest
a company of The Dun & Bradstreet Corporation

Research Newsletter

GRAPHICAL USER INTERFACE: WHAT IS BEHIND ALL THE FUROR?

EXECUTIVE SUMMARY

In spite of all the informative and technical material that has been published over the issues of graphical user interface (GUI), confusion remains in the UNIX industry over which user interface will be adopted as an official standard. Uncertainty exists over what X/Open is doing to establish a GUI standard, and many people are wondering why any of this is important to the end user or commercial markets.

Currently, four major GUIs are being implemented: Open Look, Motif, Presentation Manager, and NeXT Step. In addition, several computer companies are implementing their own proprietary GUIs, such as Apple Computer and Xerox, and some companies are designing a better mousetrap. For example, Visix has reengineered Motif to obtain a GUI with improved speed and performance while maintaining full compliance with the specifications.

This newsletter discusses the following issues:

- The importance of the GUI issue to the developers, ISVs, and end users
- A review of GUI vendors' claims of increased productivity
- The significant issues of standardization GUIs

Dataquest believes that UNIX GUIs have not been around long enough for applications developers to know all the problems associated with each one. We conclude that multiple GUIs should exist to spur both competition and innovation in products. Proponents of Motif or of Open Look are unlikely to abandon their products easily. Consequently, government standards agencies or large-volume UNIX purchasers, such as the U.S. Navy or General Motors, must pressure the UNIX hardware manufacturers to adopt a common application programming interface (API). Such an agreement would ease the programmer's burden of having to support multiple interfaces, while letting each of the hardware manufacturers sell GUIs with their own added competitive features.

OVERVIEW

If Apple Computer had licensed the GUI technology that many major computer companies are trying to imitate, we would not be embroiled in the current confusion over which graphical user interface (GUI) has superior features, or which one will triumph. As the feuding continues among the different technical managers, software developers, and engineering staffs that support the variety of available GUIs, many business and MIS managers are asking themselves what the furor is all about. More importantly, they are asking also what the GUIs will provide to their companies in terms of increased productivity and future sales.

DOES IT REALLY MATTER WHICH GUI IS RUNNING ON YOUR SYSTEM?

The answer is probably no if you are using a GUI to make computing easier. The very nature and appearance of a GUI allows one product to be used as easily as any other. Once someone has been trained on one GUI, it will not take that person very long to learn how to use another GUI. For example, on most GUIs, to delete a file you move the file icon into a trashcan icon. Trashcan icons are recognizable whether they are depicted as the 32-gallon containers in your garage or as the little round receptacle under your desk.

The answer is also probably no if you are a UNIX programmer. These individuals are

©1989 Dataquest Incorporated October–Reproduction Prohibited
CCIS General Newsletters 1989-6

0005283

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

conversant in shell scripts, C Language, and other UNIX tools. They have learned to work with the X Window technology without the need for the GUI sitting on top of X Window. The GUI adds convenience only in certain instances.

The answer is yes if you are a software developer, ISV, or programmer trying to implement the GUI on your computer, or if you are trying to write an application that must interface to a specific GUI. Differentiation exists because applications take advantage of APIs, and APIs are different for each window system. The differences between GUIs exist at the toolkit level—C libraries that interact with the operating system and hardware. Although it is possible to write applications to several kinds of APIs, supporting two or more APIs in terms of software engineering, maintenance, service, and customer support is expensive.

The answer is also yes if you are a hardware vendor or ISV competing for market share. If you support the "wrong" GUI you cannot attract buyers for your systems. What may be even worse is that if you support one GUI to the exclusion of another, you may not be able to run the application packages that your customers want to use.

DOES A GUI INFLUENCE PRODUCTIVITY?

As workstations move out of the hands of engineers and into the world of business and commercial applications, a need to make UNIX more accessible to the business community has become apparent. Many people buying UNIX are not programmers but accountants, doctors, dentists, attorneys, stockbrokers, and other noncomputer professionals. These people are used to handling files on their own systems or working with predefined data-entry fields. They are baffled by UNIX's terse command language. After these individuals log in and issue their passwords, they are faced with a prompt and no knowledge of how to access their files. Their files may be resident in any one of a multitude of directories. If their computers are tied into a network, their files may be spread across any number of systems on a network. These users want a common, easy-to-learn interface that will allow them to move easily through directories to access their files.

Companies that have to deal with large numbers of users who are not UNIX initiates realize that there is a need for a GUI to make some sense out of the apparent chaos of such UNIX features as shell scripts, complex path names, sockets, streams, and cryptic commands such as grep, awk, nroff, and others. These companies are discovering that it is less expensive and less time consuming to train someone on an icon-based system then on a character-based system. Mouses, menus, windows, and dialog boxes replace the command languages. Icons simplify concepts of files and commands. Using a mouse to point to a file is easier and faster than typing in lengthy commands or trying to remember.

The intuitive approach of a GUI invites experimentation with commands, instead of guessing at exhaustive passwords and possible command combinations. People using GUIs are more willing than others to experiment with these tools to figure out what to do next in order to access their word processor or to bring up a spreadsheet. If they try, they will often succeed.

GUIs also facilitate moving employees from single-user, dedicated PCs to networked environments with access to shared resources, data bases and applications. For many companies, this move results in savings in software license fees and gives employees the ability to share resources. Multiuser, multitasking networks allow many tasks to run in parallel, resulting in increased productivity.

WHERE'S THE STANDARD?

As commercial users and ISVs evaluate the benefits of GUIs, they are demanding a standard GUI that guarantees application portability and a minimum of user retraining costs. They are asking for one common GUI across various hardware platforms that is exactly the same or so similar as to be negligent.

These standards can be established only by official standards organizations such as ANSI and ISO rather than through the efforts of the Open Software Foundation (OSF) and UNIX International (UI). The GUI argument centers around which organization will prevail in the standards war—UI or OSF? UI and OSF do not create standards; they only implement the standards set by standards bodies. The only standards bodies that will be deciding the future of GUIs are ANSI and ISO; IEEE operates with the sanction of ANSI to establish a user interface standard. The major obstacle of waiting for this to occur is the time involved.

Although X/Open is thought to be the deciding standard mediator, X/Open's stated charter is to

©1989 Dataquest Incorporated October–Reproduction Prohibited

create the procurement specs to be used by large purchasers of open systems such as the European Community, the U.S. government, and commercial enterprises. X/Open specifies the interface definitions, not specific products. Developers then take the specifications and create competing products, which are developed to those specifications.

UI has taken an official position to support multiple GUIs, believing that this stand is as essential to the future of UNIX as the support of multiple data bases. Just as UI will not decide if UNIFY or Oracle or Informix or Ingress should be the only sanctioned UNIX data base product, the organization will not specify either Open Look or Motif to the exclusion of the other product.

DATAQUEST ANALYSIS

The GUIs are leading us to a time in the not-so-distant future when we will turn on our computer and find a wonderful assortment of goodies popping up in windows on our terminal, including multimedia applications, extremely high-resolution graphic images, and video displays. Dataquest anticipates a host of new methods for interacting with data through the development of intelligent interfaces that both automate frequently repeated tasks and anticipate human actions in order to increase productivity. However, long before this type of development can occur, we need to resolve the issues of a standard interface.

On one hand, the establishment of a standard GUI is necessary if UNIX is to successfully penetrate the commercial market. Currently, software developers and ISVs are reluctant to commit to one GUI over another. They fear the financial impact if the majority of the industry selects some other GUI. Hardware manufacturers and OSF (the developers of Motif, Open Look, Next Step, and others) are not willing to give up the competitive edge derived from having a unique GUI.

ISVs want a standard established in order to reduce their costs of bringing a product to market. No one wants to do the same job two or three times if they can do it once. Companies find it expensive to support multiple products of similar characteristics.

On the other hand, selecting Motif, Open Look, Next Step, or Presentation Manager as a standard based upon the product's technical superiority is not the solution. Certainly, superior technology does not always win the standards game. If you doubt this is true, look at the video cassette market. VHS was not as good as Beta, but how many Beta tapes can be rented at video stores these days?

We believe that a more desirable solution to the GUI problem exists. A common API for the two leading UNIX interfaces, Motif and Open Look, *is* possible, and nothing is technically wrong with this approach. In theory, this API could also easily be designed to support multiple "look-and-feel" options. Although UI has presented this proposal to OSF, OSF is not willing to discuss this solution at this time.

If the problems of different toolkits and their multiple APIs can be resolved by a common API, software developers will not have to write multiple versions of each application. Having one common interface would also include the benefits of application portability, interoperability of applications, and a protected software investment because the ISV is not locked into a single hardware manufacturer's system.

It is time to send a message to the government standards bodies and tell them to focus on the needs of the UNIX industry and market as a whole. Instead of adopting one GUI product as a standard, Dataquest prefers that these standards bodies adopt one common API and allow multiple GUIs to exist and compete with each other. Until programmers have worked sufficiently with existing GUIs, implemented applications on them, and used the interfaces for several years, they will not be able to determine the best GUI product for the requirements of applications developers, users, and vendors.

Dataquest believes that the GUI developers should be allowed to add whatever features that they think they absolutely need to be competitive. Two or more GUI products can coexist as long as one standard API exists. UNIX's legacy has been the promotion of creativity and innovation. More advanced technical work has been done on UNIX than on any other operating system. Competition is healthy and promotes diversity and an explosion of ideas. Two or more GUIs would only enhance this innovation through competition.

(This document is reprinted with the permission of Dataquest's UNIX Systems Software Service.)

David Burdick
Kathleen Hurley
Rikki Kirzner

©1989 Dataquest Incorporated October–Reproduction Prohibited

Dataquest
a company of The Dun & Bradstreet Corporation

Research Newsletter

WORKSTATIONS: THE BATTLEGROUND FOR THE 1990s

EXECUTIVE OVERVIEW

As we approach the end of the 1989 calendar year, Dataquest pauses to review the events of the fastest-growing computer industry—the workstation market. For the first time in the workstation market's history, a consolidation occurred: Hewlett-Packard bought Apollo to gain market share, and Ardent and Stellar merged to compete more aggressively in the high-end workstation market.

Workstation vendors are still fighting the price/performance battle, keeping the workstation industry constantly on the move. Vendors are in the never ending stages of price slashing and performance enhancements. But will this be enough to keep the installed base satisfied in the 1990s? In the 1980s, vendors captured market share by offering high-performance systems; in the future, this will not be the case! Users want freedom of choice—they do not want to be owned by a vendor's architecture; they want to own the architecture. The power has moved to the user. This newsletter sheds some light on trends, issues, and strategies vendors must investigate, other than "mips-manship," in order to stay ahead of the game.

Table 1 shows Dataquest's estimate of the 1989 market share in terms of revenue.

THE LINEUP

As you will notice, fewer players are in the lineup this year. Two alliances occurred this year, Hewlett-Packard/Apollo and Ardent/Stellar, now dubbed Stardent.

Once the star of the show, Sun Microsystems is becoming overshadowed by its competitors. Sun Microsystems now has a narrower margin in market share, and Hewlett-Packard/Apollo has encroached on Sun's market share because of the merger. Digital has learned from the past that one

TABLE 1
Estimated 1989 Worldwide Revenue and Market Share of Dominant Workstation Vendors (Millions of Dollars)

Vendors	Revenue	Market Share	1988-1989 Growth
Sun	$1,735	28.7%	48.9%
HP/Apollo	1,595	26.4	27.0%
Digital	960	15.9	26.5%
Intergraph	365	6.0	23.7%
Silicon Graphics	315	5.2	75.0%
Others	1,081	17.8	63.8%
Total	$6,051	100.0%	40.2%

Source: Dataquest
January 1990

©1990 Dataquest Incorporated January–Reproduction Prohibited
CCIS General Newsletters 1990-2

0006226

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

must make haste in order to gain market share, Intergraph is maintaining its market share, and Silicon Graphics has been busy churning out new products.

THE WORKSTATION OUTLOOK

Despite the cutthroat competition, the workstation market is still revealing breakneck growth. Dataquest anticipates that the workstation market will experience 30 percent growth in sales over the next five years, whereas the total technical computing industry anticipates a compound annual growth rate (CAGR) of 17 percent in sales for that period. Nevertheless, to maintain this growth, vendors must look beyond selling hardware solutions. Vendors must focus their efforts on the following issues in order to maintain market share:

- Globalization of market
- Expansion of distribution channels
- Sales to nonengineering environments
- Service and support
- Shortened development cycles
- Standards as an ideal situation
- High-speed LANs
- Client/server configurations
- Multivendor environments
- Distributed systems
- Partnerships

Selling into the commercial market will provide a greater opportunity for workstation vendors. It will increase market share, strengthen the installed base, and increase profitability. But workstation vendors must realize that penetrating this market requires skills different from those required to reach the technical community. For instance, commercial users are not enthused about UNIX and RISC, which were the factors that drove the growth in the technical markets. The crossover of workstations into the commercial market still is not complete; it is blocked mostly by lack of commercial software.

The industry is moving from a standalone environment into a heterogeneous environment. Users want a coherent, integrated network environment. Hardware basically will look the same, but the software will be the driving force. The software will make the workstation look like an integrated system. Users will not know or care what hardware they are working on. The more pressing issue for workstation vendors is not performance alone; instead, software support and professional services are the key issues for success.

THE PLAYERS

Sun Microsystems

A cloud has been forming over Sun Microsystems' sunrise. Sun Microsystems felt some hard times in the 1989 time frame. Sun Microsystems posted a $20 million loss for its fourth quarter ending June 1989. But this loss did not hurt Sun as much as the industry thought it might; Sun is still the industry leader. Meanwhile, competition from HP/Apollo and Digital is heating up. Sun no longer is leading by a comfortable margin and must pay serious attention to HP/Apollo and Digital.

In April 1989, Sun revamped its SPARC product line, decreasing prices and increasing performance. While Sun was emphasizing the SPARC product line, the 68XXX product line became the less desirable solution.

In November 1989, Sun announced a 486 upgrade package for the 386i product line. This announcement, coupled with the revamping of the SPARC line and the absence of a 68040 commitment, leads us to believe that Sun will drop the 68XXX product line, which we feel is a wise move. Supporting three architectures is a fine way to confuse the client base, and it can be expensive.

In December 1989, Sun announced two servers: the SPARCserver 1, targeting the low end of the market, and the SPARCserver 490, targeting the high end of the market. Now Sun's SPARC offerings span from $9,000 to $100,000. The advent of Sun's last two SPARC announcements changes the perception of Sun. It no longer is viewed as only a technical workstation vendor, but now also as a general-purpose computer vendor selling into both the commercial and the technical marketplaces. The question remains, does Sun offer enough commercial software applications to support its new strategy? More importantly, does the commercial marketplace view Sun as a viable solution since this environment is more concerned about reliability than performance?

©1990 Dataquest Incorporated January–Reproduction Prohibited
CCIS General Newsletters 1990-2

While Sun is busy licensing its SPARC technology to various vendors, it must be careful not to lose sight of who its customers are and what market areas it wants to participate in.

HP/Apollo

Now here is an interesting story. In a click of a mouse, the coalition of Hewlett-Packard and Apollo Computer changed the map of the workstation industry. This merger places Sun in a more vulnerable position in terms of market share dominance and places Hewlett-Packard/Apollo in a more aggressive, stronger competitive situation. Buying out the competition is always a good way to increase market share. But, at the same time, it promotes friction within the unified company—friction such as laying off redundancies in the work force, East Coast-West Coast cultural differences, and potential job changes that entail moving employees from their resident states.

Hewlett-Packard/Apollo now faces two issues: integrating its midrange 68XXX product line and deciding which RISC architecture will prevail. In conjunction with these two issues, HP/Apollo must carefully monitor Apollo's installed customer base so the customers, especially those interested in 3-D graphics, will not start looking elsewhere for long-term solutions. On the other hand, Hewlett-Packard's customers, seeing the lower prices from Apollo, may now pressure Hewlett-Packard for lower equivalent prices.

Dataquest still believes that this coalition will be successful in the years to come and the acquisition will make Hewlett-Packard a better competitor. Following are a few factors that substantiate our beliefs:

- Hewlett-Packard has established an installed base outside the technical markets with its 3000 line. This base can be used as a springboard for success as nontechnical users begin to look toward UNIX and workstations.
- Hewlett-Packard products possess both high quality and reliability.
- Apollo has a large OEM installed base, such as Mentor Graphics, Nixdorf, and Siemens.
- Apollo's DN10000VS product is an excellent solution to 3-D graphics capabilities. This advantage comes with a downside; Hewlett-Packard now owns two different proprietary RISC architectures.

Because it has made a commitment to support the Motorola 68040 chip, Hewlett-Packard/Apollo can benefit from Sun's indecisiveness as to whether it should support this chip. Hewlett-Packard/Apollo can easily attract Sun's installed base of 68XXX customers.

Digital Equipment

Digital Equipment fell to third place in the lineup, mainly because of the HP/Apollo merger.

Historically slow to move to new technology, since the beginning of 1989 Digital Equipment has been taking a much more aggressive attitude toward adopting the latest technology. This change is evident with the announcement of the DEC 2100, a product whose price/performance rates just below Sun's SPARCstation 1. This rating is noteworthy, since Sun was historically the champion in price/performance.

Digital has proved its commitment to UNIX by introducing its RISC/ULTRIX product offerings. By announcing these products, Digital solved its product position problems. Before 1989, Digital's product line hovered around the 1- to 4-mips performance range, and the company did not offer a RISC-based solution. Now, not only does Digital have a full range of RISC offerings, but its product line, including the DECsystem 5820, ranges from 10 to 36 mips.

Even though Digital's new strategy will bring it new customers, it does have a disadvantage. Now that Digital has all these choices, (ULTRIX, VMS, and DOS), its customers are confused. One of Digital's successes in the 1980s was that all of its machines ran the same software, now they do not.

Although Digital has a broad offering in the RISC/ULTRIX product line, Digital still is predominantly a proprietary-based company. While the industry is screaming "standards!," most of Digital's sales still are VMS-based. This problem is hard to ignore, because VMS is Digital's bread-and-butter product line. Digital must keep its installed base happy, so when announcing new products it must balance between both VMS and ULTRIX users to defer any thoughts of favoritism toward one of the architectures.

Intergraph

Out of the coals and into the fire is the path that Intergraph has followed. The company decided that the CAD/CAM market alone was not going to

©1990 Dataquest Incorporated January–Reproduction Prohibited

sustain the growth it desired; thus, it set its strategic sights on the general-purpose workstation market. The year 1988 was a very prosperous time for Intergraph with growth greater than the market growth. However, 1989 was not as generous. Intergraph grew 23.7 percent—much less than the overall market. Much of this slowdown is due to the fierce competition and price erosion in the workstation market.

Intergraph already has an impressive installed base in the CAD/CAM market and was the number-three CAD/CAM vendor in 1989. The revenue shown in Table 1 reflects Intergraph's general-purpose workstation revenue amount. The strengths that Intergraph has are also, in a sense, its weaknesses. As one of the top vendors in the CAD/CAM market, it is having difficulty expanding that image to be considered a general-purpose vendor. Its best customers are its loyal installed base, but this installed base is small—in the tens of thousands versus hundreds of thousands for Sun Microsystems.

Intergraph has attempted diligently to change this image. It announced the adoption of X Window and OSF as its application program interfaces (APIs) in order to move away from its proprietary windowing system. But in adopting these open standards, the company must be careful not to alienate its installed base.

If being a general-purpose workstation vendor is really how Intergraph wants to be perceived, the company must continue to port to its system software from areas other than CAD/CAM. We believe that the company also is lacking a competitive low-end product, which is the driving force in many markets. We estimate that, of the total 1989 workstation market, 25 percent can be attributed to the low end.

Silicon Graphics

In 1989, Silicon Graphics (SGI) leveraged off its reputation and success in the 3-D graphics market to enter new markets. At its $13,500 price tag, the Personal IRIS made 3-D graphics attractive to many typical 2-D users and opened the door for Silicon Graphics to penetrate a much larger low-end market. In contrast, the Power Series positioned the company to expand its system offerings toward the high end of the market. SGI has successfully sold the Power Series into its installed base. Focusing on the client/server model, Silicon Graphics is successfully selling into areas where Convex and Alliant are playing.

The acceptance of the Personal IRIS and the Power Series resulted in SGI's revenue growth of 75 percent in 1989, compared with an industry growth of 40 percent. These systems and supporting software have catapulted SGI into the top five of both the workstation and the supercomputering markets.

Silicon Graphics' strategy was to slowly move away from its niche-player position and into the broader technical computer marketplace. SGI has taken the first step by broadening its product line. It has gained market share in the low end and leaped ahead of the other contenders in the high-end workstation market. In fact, it showed such strength that Stellar and Ardent merged in order to better compete with SGI. To continue to be competitive, however, SGI will need to strengthen its application base. Currently, SGI has approximately 400 software packages, most of which are heavily oriented toward 3-D graphics, compared with more than 1,400 packages available on SPARC-based platforms and about 1,000 packages available on HP/Apollo RISC-based systems.

Today, SGI's 3-D graphics and binary compatibility across its product line are competitive advantages over most workstation vendors. SGI must continue to push 3-D graphics down the price curve and increase its software offering in order to capitalize on its advantage before it disappears.

SGI has an advantage over its competitors in the high end of the market. Silicon Graphics will benefit from the recent mergers by Ardent/Stellar (Stardent) and HP/Apollo. Silicon Graphics is the one stable firm in the midst of turmoil in this market. While both Stardent and HP/Apollo are trying to decide which architecture will succeed, customers may decide to go to Silicon Graphics.

ISSUES

The User Is King

Workstation users never had it so good. New workstations are being added to the abundance of products already available. Price/performance seems to drop dramatically with the advent of each new announcement. Although this trend is especially true in the entry-level segment of workstations, this is not the main issue for users. Users demand availability of applications, upgradeability and expandability, vendor credibility, service, support, and adherence to standards.

©1990 Datequest Incorporated January–Reproduction Prohibited
CCIS General Newsletters 1990-2

In short, the workstation market is beginning to display some traits of the traditional superminicomputer market. The workstation market is expanding into the commercial space, with applications such as finance and office automation.

The only certain winner is the user, who can look forward to ever-lower prices and a blizzard of new features. For the user, it is a win-win situation.

The Workstation of Tomorrow

What will the workstation of tomorrow look like? Following is a list that will give some insights into tomorrow's workstation:

- Mips will turn into bips.
- MB will turn into GB for memory configurations.
- GB will turn into TB for storage configurations.
- Users will have no idea what hardware is under the software.
- It will use a standard user interface.
- It will use a standard program interface.
- Mbps will turn into Gbps.
- It will use multimedia and full-motion video.
- It will integrate voice recognition.
- Computers will be used as human interfaces. (They will be like television; it will be hard to find a home without one.)
- UNIX will be a shrink-wrapped workstation software package.

It is inevitable that this list is the direction computers will be heading toward in the 1990s. The list does not apply just to workstations, but to the other classifications of computers as well.

In addition, all the numerous classifications of computers are giving the industry a headache, not to mention confusing the installed base. In the future, no one is going to give a hoot about the hardware, because software and networking will be the major issues of the 1990s. With this in mind, Dataquest believes that there will be only two classes of computers, single user and multiuser, regardless of the performance and price. Maybe this will be the Tylenol for the computing industry.

(This document is reprinted with the permission of Dataquest's Technical Computer Industry Service.)

David Burdick
Kathleen Hurley
Laura Segervall

©1990 Dataquest Incorporated January–Reproduction Prohibited

Dataquest
a company of The Dun & Bradstreet Corporation

Research Newsletter

TECHNICAL COMPUTERS IN 1989: THE YEAR IN REVIEW

INTRODUCTION

The technical computer industry continues to be one of the most exciting industries in business. It was rocked by fundamental changes as it matured through 1989. This newsletter provides Dataquest's year-end revised forecast for the technical computer industry in 1989 and discusses the elemental changes that affected it.

This newsletter includes a snapshot of the market segmentation sizes, the expected factory revenue of the players, a summary of major events, and an insight into evolving trends as Dataquest sees them.

THE MARKET SNAPSHOT

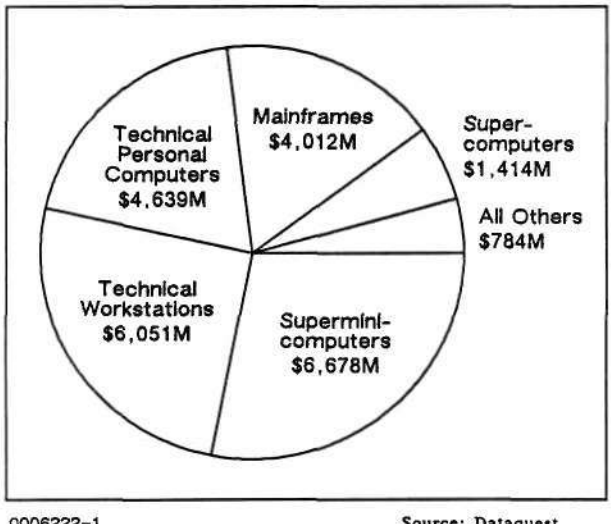
Dataquest projects the 1989 revenue for the technical computer industry to be $23.6 billion, a 17.1 percent increase over 1988. Figure 1 indicates the six segments that make up the industry and their rank order of performance.

Superminicomputers, as expected, have once again placed in the number-one position, accounting for 28 percent of the industry. For the first time in history, however, technical workstations have outsold mainframes. All trends indicated that this would happen eventually; 1989 was the year. Mainframes grew at a compound annual growth rate (CAGR) of 7.9 percent between 1984 and 1988; the CAGR for technical workstations over the same period was 73.8 percent.

Table 1 denotes the top ten players in this industry, which account for nearly 66 percent of the factory revenue.

Digital and IBM have been running neck and neck all year, with IBM pulling ahead for the number-one position. Hewlett-Packard's acquisition of Apollo earned that company the number-three revenue position, with a dramatically increased portion of the workstation market share. Sun's phenomenal growth has continued despite much-heralded financial problems this past year. That growth has earned the company the number-four position behind IBM, Digital, and HP—certainly heady company for such a young firm to be rubbing shoulders with.

FIGURE 1
Technical Computer Systems Industry Estimated 1989 Factory Revenue (Millions of Dollars)



0006222-1

Source: Dataquest December 1989

©1990 Dataquest Incorporated January–Reproduction Prohibited
CCIS General Newsletters 1990-3

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

TABLE 1
Estimated 1989 Worldwide Factory Revenue and Market Share for Technical Computers Sold by the Top Ten Vendors (Millions of Dollars)

Vendor	Revenue	Market Share
IBM	$4,662	19.8%
Digital	$4,467	18.9%
HP/Apollo	$2,224	9.4%
Sun	$1,735	7.4%
Apple	$ 650	2.8%
Cray Research	$ 616	2.6%
Harris	$ 387	1.6%
Intergraph	$ 365	1.5%
Silicon Graphics	$ 315	1.3%
Concurrent	$ 271	1.1%

Source: Dataquest
January 1990

RESEARCH METHODOLOGY

This revised forecast (for original 1989 forecast, see TCSIS newsletter number 1989-19, entitled "Technical Computers Deliver Sizzling Performance in 1988") is a six-step process based on projections for each vendor's year-end financial results, historical contribution to each product segment (i.e., supercomputers, mainframes), and analytic insight.

In brief, Dataquest projects year-end vendor gross revenue based on topical industry news and quarterly reports (when available). We combine historical information detailing vendor contribution to industry segment along with analytic insight to form a projection for 1989. We can then back our way into an absolute dollar estimate for each vendor for each industry segment. As a final check, we assess anticipated market share data against historical market share and current events.

SUPERCOMPUTERS

The year 1989 proved to be one of turmoil in which very little growth occurred. The industry had surprises in every segment. Many companies were affected; some merged, some split, and others went under. The industry shakeout hit a peak in 1989 as a significant trend developed toward smaller supercomputers.

Table 2 details expected results for the top five competitors in the supercomputer marketplace.

In balancing the successes and failures of 1989, it is important to note that the sale of as few as 15 units can mark the difference between a strong and weak performance for the industry or an individual company. Dataquest believes that factors such as technologies, applications, and user-based development should be considered when analyzing the supercomputer industry. As such, we encourage the TCSIS supercomputer clients to consult the newsletter entitled "Supercomputing in 1989: A First Look" (TCSIS Code: Newsletters 1990-2) for a more complete review.

MAINFRAMES

Despite the many dire predictions for mainframes, the continuing onslaught of superminicomputers and technical workstations enabled the mainframe marketplace to hold its own; it grew nearly 4 percent in 1989 from the previous year.

©1990 Dataquest Incorporated January–Reproduction Prohibited

TABLE 2
Estimated 1989 Worldwide Factory Revenue and Market Share for Supercomputers Sold by the Top Five Vendors (Millions of Dollars)

Vendor	Revenue	Market Share
Cray Research	$616	38.5%
IBM	$255	15.9%
Convex	$127	7.9%
Silicon Graphics	$ 95	5.9%
Fujitsu	$ 84	5.3%

Source: Dataquest
January 1990

Table 3 indicates the top factory revenue producers in 1989.

Many vendors are seeing the mainframe as the last bastion of hardware profit margins, and 1989 saw the introduction of several new systems. CDC introduced its new top-end Cyber 2000 mainframe. The air-cooled machine is rated at twice the power of the Cyber 990 and is described as providing the best attributes of both a mainframe and a supercomputer.

Digital has altered its strategy and is claiming that a mainframe is now an appropriate addition to clustered computing. The new VAX 9000 is a powerful, air-cooled machine emphasizing balanced performance between raw compute power and high I/O rates.

IBM continues to be the absolute market leader in mainframes, both technical and commercial, and is extending the life of the 3090 family by introducing the J series of models. The industry anxiously continues to await the arrival of the follow-on family, often referred to as Summit. Dataquest currently expects Summit to be announced in early to mid-1991.

Dataquest expects the mainframe to continue to be a dominant player in each of the evolving compute architectures. Regardless of whether the standalone compute concept, three-tier strategy, or client-server architecture becomes dominant, there will always be a healthy need for mainframes.

Mainframes increasingly will be positioned as database managers and file servers in the technical computer industry. The mainframes will provide data management, security, and integrity functions for the distributed technical workstations and personal computers. Product improvements increasingly will come along the lines of increased I/O bandwidth and enhanced communications to their proprietary operating systems.

The major vendors will continue to hedge their bets by providing increasingly powerful and easy-to-use vector facilities to enhance raw compute power. Compiler design, and development of applications that use the vector facilities, will continue to be great priorities with the vendors.

SUPERMINICOMPUTERS

The year 1989 was time of transition for superminicomputer vendors as systems shifted from their traditional roles and vendors realigned for more effective positions in the market. The continued push toward standards brought some changes to the fundamental way vendors did business.

Overall, the superminicomputer market kept a steady rate of growth, with a 7.8 percent increase over 1988 revenue. Table 4 outlines the predominant players.

Digital maintained its dominant position with new additions to its product line, both in its proprietary VAX architecture and a RISC-based product family that utilizes the MIPS R3000 processor. Digital demonstrated its commitment to standards by introducing a high-end, RISC-based system that utilizes a UNIX operating system.

The number two player, IBM, appears to be still scratching its collective head about the strategic direction of its "VAXkiller," the 9370. The 9370, which has suffered much criticism because of lack of software and power/memory to run MVS, did get a boost in image when IBM announced it will continue to enhance DOS/VSE.

©1990 Dataquest Incorporated January–Reproduction Prohibited

TABLE 3
Estimated 1989 Worldwide Factory Revenue and Market Share for Technical Mainframe Computers Sold by the Top Five Vendors (Millions of Dollars)

Vendor	Revenue	Market Share
IBM	$3,059	76.2%
Amdahl	$ 236	5.9%
Unisys	$ 166	4.1%
Hitachi Data Systems	$ 90	2.2%
Control Data	$ 68	1.7%

Source: Dataquest
January 1990

TABLE 4
Estimated 1989 Worldwide Factory Revenue and Market Share for Technical Superminicomputers Sold by the Top Five Vendors (Millions of Dollars)

Vendor	Revenue	Market Share
Digital	$3,365	50.4%
IBM	$ 658	9.9%
Hewlett-Packard	$ 459	6.9%
Harris	$ 387	5.8%
Concurrent	$ 271	4.1%

Source: Dataquest
January 1990

Even though DOS/VSE primarily is a commercial operating system, the move indicates that the 9370 will be with us for some time to come. On the technical side, Dataquest believes that the 9370 will continue to find its home as a standalone machine and distributed network server.

Two of the top five vendors, HP and Concurrent, merged with other companies (Apollo and MASSCOMP, respectively), resulting in some difficulties for both companies. For Concurrent and MASSCOMP, problems in manufacturing and product line integration initially dampened the synergy of the two firms.

HP has embraced standards-based computing as it announced three new additions to the HP 9000 800 family. HP has shifted its position regarding the HP 9000 family being used solely for technical applications; the company now is positioning the HP 9000 computers as general-purpose (i.e., including commercial) machines. For Harris, 1989 brought the introduction of the Nighthawk 4000 computer system and a corporate restructuring.

The role of superminicomputers has evolved as the idea of client/server relationships has permeated through the user community and system vendors. In 1989, superminicomputers were positioned to be file and database servers in addition to their familiar role as standalone machines.

The superminicomputer vendors face danger as standards-based computing becomes more predominant. The vendors will continue to enhance their proprietary operating systems to entice customers with a high degree of functionality. They will, however, need to scramble to differentiate their standards-based products and services as hardware becomes more of a commodity. The difference in profit margins between proprietary and standards-based equipment is huge, as the difference in list price is often a 2:1 ratio.

And finally, a relative newcomer to watch will be MIPS Computer Systems. MIPS has a broad distribution strategy for its technology, which has received broad acceptance by the other manufacturers, and the company recently announced its own 55-mips and 13.3-mflops uniprocessor. Its new machine, which is a standards-based RISC and UNIX box, is positioned to be a very competitive player in the market.

©1990 Dataquest Incorporated January–Reproduction Prohibited
CCIS General Newsletters 1990-3

TABLE 5
Estimated 1989 Worldwide Factory Revenue and Market Share for Technical Workstations Sold by the Top Five Vendors (Millions of Dollars)

Vendor	Revenue	Market Share
Sun	$1,735	28.7%
HP	$1,595	26.4%
Digital	$ 960	15.9%
Intergraph	$ 365	6.0%
Silicon Graphics*	$ 315	5.2%

*Includes $95 million of revenue that also is included in the supercomputer category.

Source: Dataquest January 1990

TECHNICAL WORKSTATIONS

The high-flying technical workstation marketplace entered a period of more-controlled expansion in 1989. The typical characteristics of a market in this stage—lower margins and a good acquisition climate—were clearly seen this past year.

Table 5 lists the expected results for the top vendors.

Industry leader Sun was placed in a vulnerable position with Hewlett-Packard's acquisition of Apollo early in 1989. Sun's contender, HP, is now facing two issues: integrating its 68XXX product line and deciding which RISC architecture to emphasize.

Sun saw its first stumble as it announced a $20 million loss for fiscal year 1989 fourth quarter, which ended in June. In conjunction with this falter, Sun has revamped its product line to emphasize the SPARC products.

Digital announced a family of workstations that, outside of Data General's product line, are the current industry leaders in price/performance for RISC-based technical workstations.

The year 1989 saw the merger of two fierce competitors, Ardent and Stellar. Stardent, the resulting company, must now work out the problems associated with redundancy in management and support of two architectures. Stardent plans to have a unified product line with a single instruction set by early 1991.

Margins are being buffeted as price wars are now being waged at the low end. After the HP buyout, Apollo announced a new low-end 68030 workstation, starting at approximately $4,000, the lowest-priced 68030 workstation available today. Silicon Graphics also announced price cutting in its low-end product line as it enhanced performance.

Dataquest expects the technical workstation industry to continue to grow at a CAGR of 30 percent for the next five years and become a $16.0 billion industry by 1993. Dataquest expects RISC technology to overtake CISC in 1993, becoming responsible for 61 percent of the factory revenue generated in the industry.

For a more elaborate discussion of the key events and underlying trends in the technical workstation industry, we encourage the TCSIS workstation clients to refer to the TCSIS newsletter 1990-3, entitled "Workstations: The Battleground for the 1990s."

TECHNICAL PERSONAL COMPUTERS

The battle for the desktop continued to rage as the performance level of technical PCs increased dramatically. The dividing line between technical PCs and technical workstations became even less distinct. As a result, personal computers being used in technical applications gained ground in 1989.

The three top vendors in this market made strong gains during this time period, with systems for the technical applications market. See Table 6 for the expected results of the three major competitors.

Apple introduced more-powerful versions of the Macintosh II (i.e., Macintosh IIcx) that are effective alternatives to entry-level workstations. IBM introduced a 486-based daughterboard for its PS/2 Model 70 computer in order to boost its offerings in the performance-class PC category.

©1990 Dataquest Incorporated January–Reproduction Prohibited

At Comdex, IBM demonstrated its 486 system with MCA architecture, running five RISC-based, i860 Bus Master cards.

Compaq announced its DeskPro 486/25, a 486-based 25-MHz PC that adds a high-end complement to the company's recent introductions of DeskPro 386/25 and SystemPro 386/33 machines. Compaq continued to compete against the low end of the workstation market and the minicomputer market by introducing its SystemPro series, which will incorporate the 486 33-MHz chip when it is available. The SystemPro functions as a multiuser PC server, one with a new 32-bit fixed disk drive array technology. Up to eight 210Mb drives may be added to provide disk mirroring and data guarding, enhancing its role as a server.

The technical PC segment continued its growth as technical PCs became stronger alternatives to low-end technical workstations and were used as PC file servers, contributing to the eroding minicomputer market. With the introduction of Intel's 80486 chip and the use of UNIX emulators, technical PCs not only have become more of a threat to the workstation market, but also can outperform the 16-bit proprietary-based minicomputer at a lower cost per seat.

OTHER TECHNICAL COMPUTERS (MINICOMPUTERS AND MICROCOMPUTERS)

This market segment clearly is in the advanced stages of decline. The market has continued to erode from the pressure of smaller, higher-performing PCs and powerful workstations. See Table 7 for a list of vendors competing in this area.

IBM continued its lead in this segment of the market, with older offerings and multiuser versions of desktop systems. All of the top five vendors' systems are based on proprietary operating systems, which, considering the current emphasis on standards, does not bode well. Almost all vendors had declining revenue for these market segments, with the exception of IBM in microcomputers and HP in minicomputers.

The minicomputer still retains a role as a single-solution machine and as a server to link smaller systems to computationally intensive machines. However, in the majority of technical applications, personal computers, with their more sophisticated bus structures and mighty CPUs, have taken over the functionality that once was the domain of minicomputers.

TABLE 6
Estimated 1989 Worldwide Factory Revenue and Market Share for Technical Personal Computers Sold by the Top Three Vendors (Millions of Dollars)

Vendor	Revenue	Market Share
Apple	$650	14.0%
IBM	$400	8.6%
Compaq	$200	4.3%

Source: Dataquest
January 1990

TABLE 7
Estimated 1989 Worldwide Factory Revenue and Market Share for Technical Minicomputers and Microcomputers Sold by the Top Five Vendors (Millions of Dollars)

Vendor	Revenue	Market Share
IBM	$180	23.0%
HP	$170	21.7%
Digital	$142	18.1%
Encore	$ 49	6.2%
Data General	$ 36	4.6%

Source: Dataquest
January 1990

©1990 Dataquest Incorporated January–Reproduction Prohibited

DATAQUEST CONCLUSIONS

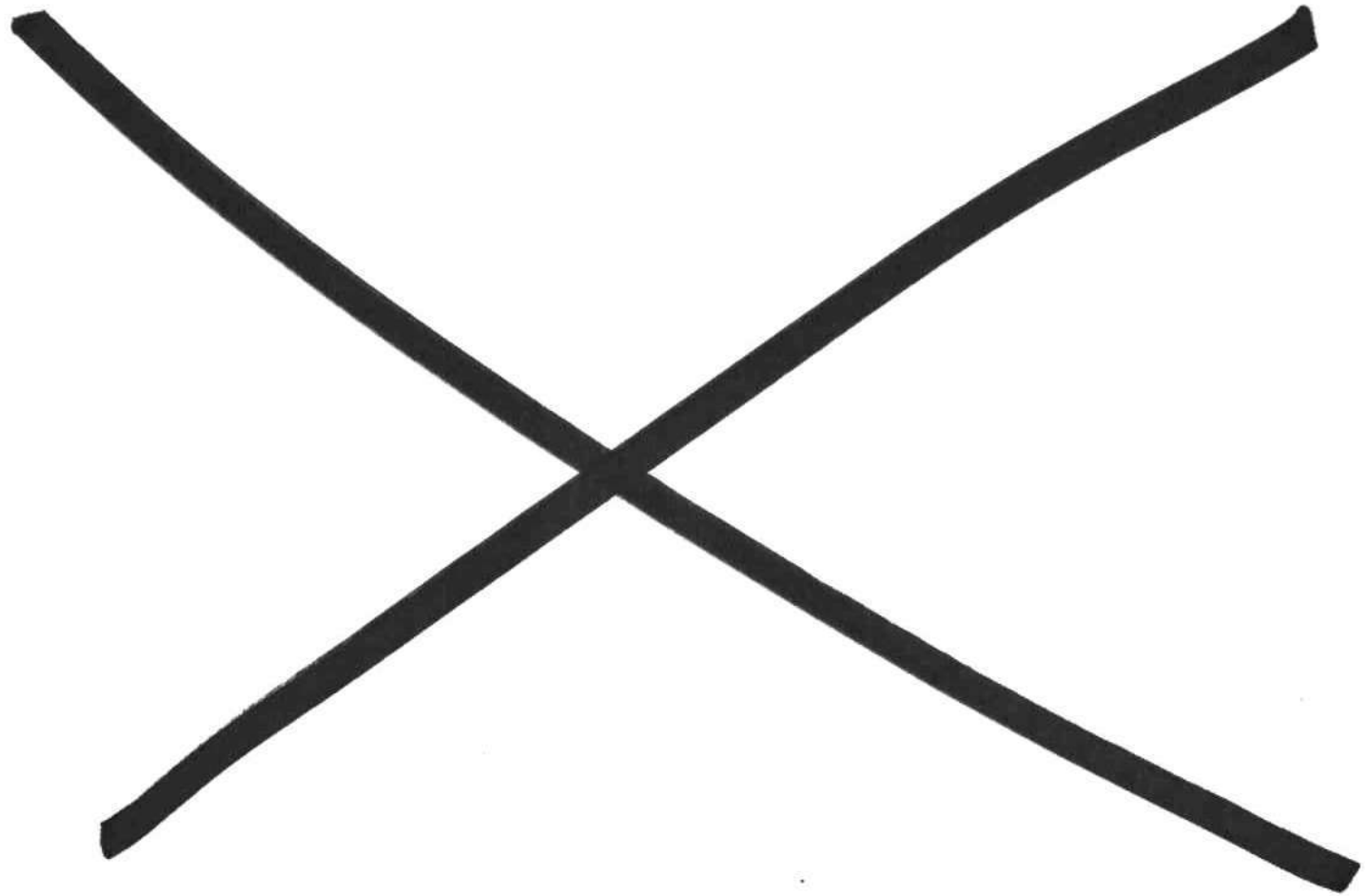
The technical computer industry is being rocked by several fundamental changes. The industry has shifted from being technology-driven to market-driven. And the primary vendors are scrambling to realign their corporate strengths (and internal cost structures) as acceptance of proprietary standards begins to decline, RISC begins to overrun CISC, the division between PCs and technical workstations blurs, the file server market continues to develop, mainframes with vector hardware facilities become more readily accepted, and vendors rush to embrace standards while continuing to enhance and lock in customers with proprietary systems.

The evolution of software architectures will take on a greater role in the future as client-server applications become more sophisticated, perhaps to the point where networked computers become distributed parallel processors. The technical computer industry has continued to grow, in terms of units and revenue, through this turmoil; it is still on track to becoming a nearly $45 billion industry by 1993.

(This document is reprinted with the permission of Dataquest's Technical Computer Systems Industry Service.)

David Burdick
Doug Crook
Alea M. Fairchild

©1990 Dataquest Incorporated January–Reproduction Prohibited



Dataquest
a company of The Dun & Bradstreet Corporation

Research Newsletter

EUROPEAN MOS GATE ARRAY AND CBIC DESIGN STARTS ANALYSIS

INTRODUCTION

For the past two and a half years, Dataquest's European Semiconductor research staff have been compiling data on ASIC design starts. This newsletter presents the results of two major in-depth ASIC surveys and numerous face-to-face interviews conducted during that time period.

According to Dataquest, a design start occurs when a nonrecurring engineering (NRE) fee for an ASIC design is billed to the customer. Some of the tables in this newsletter refer to gate count per design. This refers to gross gates per chip, not gates used.

SUMMARY

Table 1 shows estimated European design starts broken down by MOS gate arrays and MOS cell-based ICs (CBICs). Historic estimates for 1987 and 1988 are given, along with a projection for 1989.

MOS gate arrays represent the majority of design starts. The technology is more mature than CBIC, and design tools have made gate arrays more accessible to designers. Nevertheless, as Table 1 shows, CBIC design starts are increasing rapidly. All of the MOS gate array design starts are pure digital designs. However, of the 570 CBIC design starts in 1988, one-third (190) were mixed analog/digital designs.

Our research highlights the high proportion of mixed-signal ASIC design that is taking place in Europe in CBICs. This amount is due to the strength of the telecommunication, industrial, and consumer segments in Europe. (A more detailed discussion of this can be found in ESIS Research Newsletter number 1989-22, entitled "Mixed Analog/Digital ASIC—An Embryonic Market.")

This newsletter analyzes MOS gate array and CBIC design starts by European region, by application, and by gate count for 1988 and 1989 and, where available, 1987.

TABLE 1
European MOS Gate Array and MOS CBIC Design Starts, 1987 to 1989

	1987	1988	CAGR % 1987-1988	1989	CAGR % 1988-1989
MOS Gate Array	830	1,116	34.5%	1,432	28.3%
MOS Cell-Based	385	570	48.1%	780	36.8%
Total	1,215	1,686	38.8%	2,212	31.2%

Source: Dataquest
December 1989

©1989 Dataquest Incorporated December–Reproduction Prohibited
CCIS Electronic Newsletters, 1989-8

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

TABLE 2
European MOS CBIC Design Starts by Region

	1988 Starts	%	1989 Starts	%	% Growth 1988-1989
Benelux	6	1%	16	2%	174%
France	160	28	250	32	56%
Italy	103	18	133	17	29%
Scandinavia	11	2	23	3	105%
U.K. and Ireland	51	9	109	14	113%
West Germany	205	36	218	28	6%
Rest of Europe	34	6	31	4	(9%)
Total	570	100%	780	100%	37%

Source: Dataquest
December 1989

Table 2 lists European MOS CBIC design starts by region. The following points should be noted:

- France and West Germany represent more than 50 percent of European CBIC design starts, with a strong element of mixed-signal designs in each of these countries.
- The fastest-growing region is Benelux, due to the presence of Alcatel/Bell Telephone, Philips, and Siemens/GTE. However, Philips' major activity here is in the consumer arena, and because of the large quantities of products involved, full-custom designs still are preferred to CBICs in most designs.
- Northern Europe, including U.K./Ireland and Scandinavia, shows the next fastest percentage of growth but altogether represented only 17 percent of total European CBIC design starts in 1989.
- Design of CBICs into PCs is a major activity in U.K./Ireland. The two main applications here are as follows:
  - Replacement of existing gate array designs, absorbing 2 or 3 gate arrays and extra discrete logic
  - Mixed-mode CBIC design for disk storage and display

©1989 Dataquest Incorporated December–Reproduction Prohibited
CCIS Electronic Newsletters, 1989-8

TABLE 3
European MOS CBIC Design Starts Percentage by End Use

	1987 Starts	%	1988 Starts	%	% Growth 1987-1988	1989 Starts	%	% Growth 1988-1989
Data Processing	69	18%	80	14%	15%	148	19%	86%
Communications	162	42	211	37	30%	243	31	15%
Industrial	73	19	108	19	48%	148	19	37%
Military	50	13	74	13	48%	101	13	37%
Transportation	12	3	40	7	245%	62	8	56%
Consumer	19	5	57	10	196%	78	10	37%
Total	385	100%	570	100%	48%	780	100%	37%

Source: Dataquest
December 1989

Table 3 lists European MOS CBIC design starts by end use. The following points should be noted:

- Communications clearly represents the largest applications segment for CBICs, although its overall share of design starts is decreasing. The key applications are modems, signal-processing applications, and mobile communications.
- Data processing and industrial applications represent the second-largest group of CBIC users. Key applications are in PCs, printers, and memory storage including tape, floppy, and hard disk.
- The biggest growth from 1987 to 1989 was in the transportation segment. Although it represents only 8 percent of total design starts in 1989, its rapid growth indicates that CBICs are adapting quickly to the requirements of this segment. Mixed analog/digital technology is important here.
- Military applications represent a considerable proportion of CBIC designs. Several companies, such as MEDL, specialize in servicing this segment. Military applications include avionic control systems, missile guidance, and communications systems. Most of the leading players, including AT&T, ES2, Texas Instruments, and VLSI Technology, draw significant revenue from military applications.

©1989 Dataquest Incorporated December–Reproduction Prohibited

TABLE 4
European MOS CBIC Design Starts Percentage by Gate Count

	1987 Starts	%	1988 Starts	%	% Growth 1987-1988	1989 Starts	%	% Growth 1988-1989
0-1K	65	17%	80	14%	22%	70	9%	(12%)
1K-2K	54	14	34	6	(37%)	39	5	14%
2K-3K	31	8	29	5	(7%)	62	8	119%
3K-5K	130	34	202	36	55%	155	20	(23%)
5K-7K	12	3	17	3	48%	86	11	402%
7K-10K	23	6	57	10	147%	78	10	37%
10K-15K	12	3	29	5	147%	55	7	92%
15K-20K	12	3	34	6	196%	47	6	37%
20K-30K	27	7	57	10	112%	109	14	92%
30K-50K	19	5	29	5	48%	70	9	146%
50K-100K	0	0	2	0	N/A	9	1	368%
100K+	0	0	0	0	N/A	0	0	N/A
Total	385	100%	570	100%	48%	780	100%	37%

N/A = Not Available

Source: Dataquest
December 1989

Table 4 lists European MOS CBIC design starts by gate count, and Figure 1 shows these data graphically. The following points should be noted:

- In 1989, 60 percent of design starts had gate counts of less than 10K gates, compared with 81 percent in 1987.
- Although the percentage of total designs with 2K gates or less has decreased considerably since 1987, the largest number of designs during the 1987 through 1989 time frame have been between 3K and 5K gates.
- As expected, gate counts per design is spreading to higher gate densities. In 1989, the second most popular gate range was 5K to 7K gates. However, in 1989, only 11 designs will be completed with greater than 50K gates.
- Designs in the 0 to 1K gate count area primarily are for mixed-mode devices. Design activity will continue steadily in this area.
- The 20K to 30K gate peak that emerged this year reflects the increase in designs that contain memory.

©1989 Dataquest Incorporated December–Reproduction Prohibited
CCIS Electronic Newsletters, 1989-8

TABLE 5
European MOS Gate Array Design Starts by Region

	1988 Starts	%	1989 Starts	%	% Growth 1988-1989
Benelux	33	3%	72	5%	114%
France	179	16	272	19	52%
Italy	257	23	258	18	0
Scandinavia	67	6	100	7	50%
U.K. and Ireland	235	21	301	21	28%
West Germany	312	28	372	26	19%
Rest of Europe	33	3	57	4	71%
Total	1,116	100%	1,432	100%	28%

Source: Dataquest
December 1989

Table 5 lists the European MOS gate array starts by region. The following points should be noted:

- West Germany has the most gate array design starts of any European region with 372 designs in 1989. However, the number of designs in 1989 grew by only 19 percent compared with 1988.
- France's design activity in gate arrays, unlike in CBICs, was less than in both U.K./Ireland and Italy in 1988.
- Design activity in Benelux, Spain, and Portugal is increasing rapidly. Philips' decision to promote its gate array capability stimulated Benelux activity.
- France tends to have higher gate count per design than U.K./Ireland. U.K./Ireland focuses on second revision equipment design using gate arrays to mop up standard logic. In France, Alcatel and Bull focus on a high gate count "system on a chip" approach.
- In Italy, Olivetti's data processing business drove very high design start activity in 1988. Although we expect design starts to decrease in 1989, Italy still will represent a considerable 18 percent of European designs.

©1989 Dataquest Incorporated December–Reproduction Prohibited

TABLE 6
European MOS Gate Array Design Starts Percentage by Application

	1988 Starts	%	1989 Starts	%	% Growth 1988-1989
Data Processing	413	37%	486	34%	18%
Communications	290	26	444	31	53%
Industrial	279	25	301	21	8%
Military	56	5	72	5	28%
Transportation	11	1	29	2	157%
Consumer	67	6	100	7	50%
Total	1,116	100%	1,432	100%	28%

Source: Dataquest
December 1989

Table 6 lists European MOS gate array design starts by region. The following points should be noted:

- The largest amount of design activity occurs in the data processing application segment. Gate arrays that are used to condense standard logic in PCs and other fast-changing systems are driving this activity.
- Strong design activity still exists in communications and industrial applications. Together, they represent 50 percent of all designs.
- Although the number of designs in transportation is small, design activity should increase by 157 percent in 1989 compared with 1988. This increased design activity is also seen in CBICs. Gate array design activity here is largely prototyping. Once production ramps up, automotive companies seek to reduce costs by moving to CBICs or full-custom ICs, thus reducing component costs.
- In consumer applications, average gate counts are low, around 2K to 3K at most. These arrays perform simple logic functions.
- In data processing, there is evidence of second-iteration gate array design taking place. Here, first-generation lower gate count designs are being replaced by one bigger gate array. Thus, the number of gate arrays in the system is decreasing.

©1989 Dataquest Incorporated December–Reproduction Prohibited
CCIS Electronic Newsletters, 1989-8

TABLE 7
European MOS Gate Array Design Starts Percentage by Gate Count

	1987 Starts	%	1988 Starts	%	% Growth 1987-1988	1989 Starts	%	% Growth 1988-1989
0-1K	75	9%	123	11%	64%	143	10%	17%
1K-2K	158	19	201	18	27%	215	15	7%
2K-3K	222	27	276	25	24%	172	12	(38%)
3K-5K	125	15	212	19	70%	484	34	128%
5K-7K	83	10	78	7	(6%)	115	8	47%
7K-10K	83	10	78	7	(6%)	86	6	10%
10K-15K	42	5	67	6	61%	72	5	7%
15K-20K	25	3	45	4	79%	29	2	(36%)
20K-30K	17	2	33	3	102	100	7	199%
30K-50K	0	0	3	0	N/A	14	1	377%
50K-100K	0	0	0	0	N/A	2	0	N/A
100K+	0	0	0	0	N/A	0	0	N/A
Total	830	100%	1,116	100%	34%	1,432	100%	28%

N/A = Not Available

Source: Dataquest December 1989

Table 7 lists European MOS gate array design starts by gate count, and Figure 2 shows these data graphically. The following points should be noted:

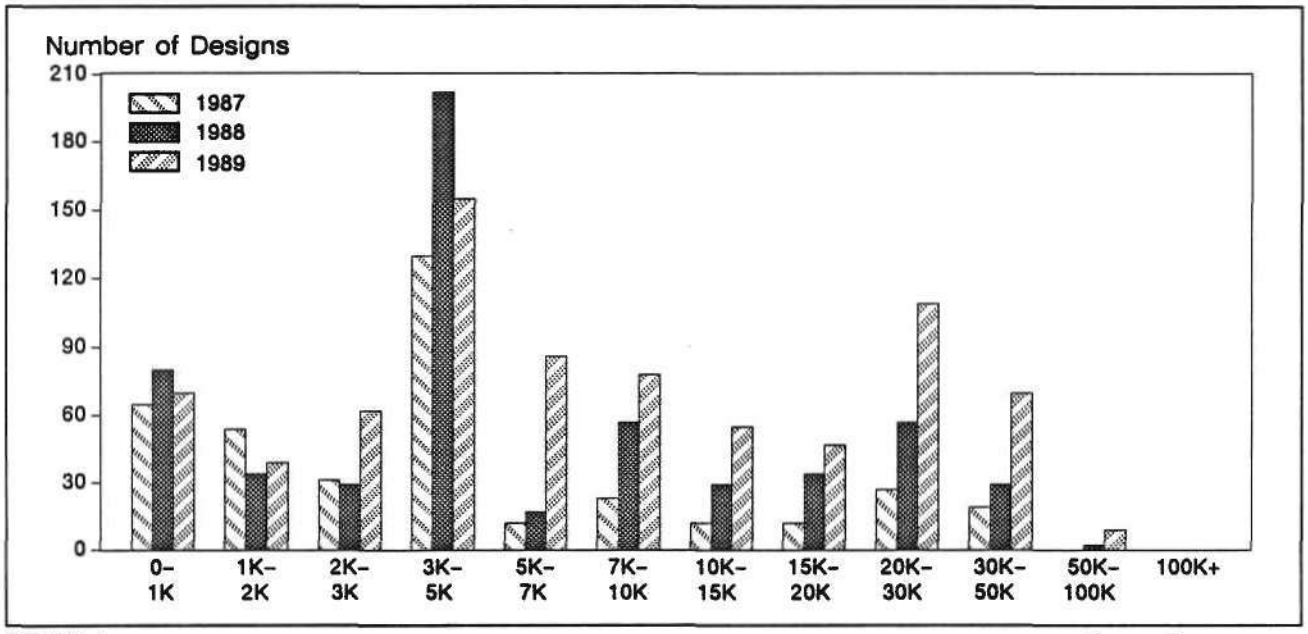
- In both 1987 and 1988, 70 percent of gate array design starts were 5K gates or less. This percentage shows that there is still considerable concentration on commodity low-gate-count arrays.
- The data show that the peak design activity transferred from the 2K to 3K gate area in 1987 to the 3K to 5K gate area in 1988 and 1989. A further peak is emerging around the 20K to 30K gate area, caused by second-generation gate array design.
- A comparison between gate array and CBIC gate counts shows that arrays are very much concentrated on the lower gate count area. Only 10 percent of array designs had gate counts of 20K or more gates in 1989 compared with 27 percent of CBICs.

(This document is reprinted with the permission of Dataquest's European Semiconductor Industry Service.)

Ron Collett
Jim Eastlake

©1989 Dataquest Incorporated December–Reproduction Prohibited

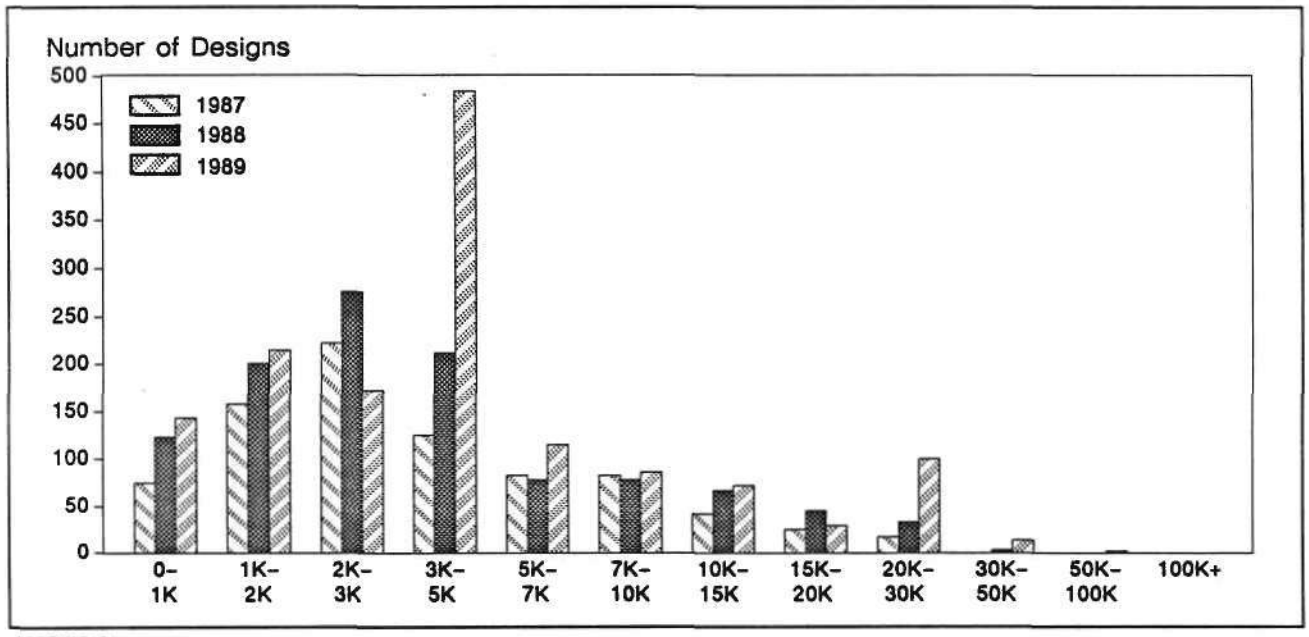
FIGURE 1
European MOS CBIC Design Starts
Percentage by Gate Count



0005746-1

Source: Dataquest
December 1989

FIGURE 2
European MOS Gate Array Design Starts
Percentage by Gate Count



0005746-2

Source: Dataquest
December 1989

©1989 Dataquest Incorporated December–Reproduction Prohibited

Dataquest
a company of
The Dun & Bradstreet Corporation

Research *Bulletin*

CCIS Code: Electronic Newsletters
1989-7
0005152

CADENCE DESIGN SYSTEMS MARCHES INTO ELECTRONIC CAE; BUYS GATEWAY DESIGN AUTOMATION

INTRODUCTION

In a deal valued at approximately $74 million, IC layout market leader Cadence Design Systems Incorporated purchased Gateway Design Automation. Gateway's primary product line is the Verilog digital simulator, but the company also has been addressing the test-automation market. Prior to the acquisition, Cadence had been marketing Verilog jointly with Gateway. This acquisition demonstrates Cadence's continuing determination to expand beyond the IC layout market and into the system's electronic design automation (EDA) market. Table 1 shows Cadence's overall position in the EDA market.

Table 1

1988 EDA Market (Millions of Dollars)

Company	Total EDA Revenue[1]
Mentor Graphics	$295.9
Daisy Systems	$191.2[2]
Valid Logic	$141.0[3]
Racal-Redac	$ 87.0[4]
Cadence	$ 77.7[5]

[1]Does not include OEM revenue
[2]Includes Daisy Systems, Cadnetix, and Simucad
[3]Includes Valid Logic, IMS, ADT, and Calma IC division
[4]Includes Racal-Redac and HHB Systems
[5]Includes Cadence, Gateway Design Automation, and Tangent

Source: Dataquest
October 1989

DETAILS OF THE DEAL

Under the terms of the agreement, Gateway will merge with Cadence in a transaction that is considered a pooling of interests. Cadence will issue approximately 4 million shares of its common stock in exchange for all Gateway stock, at an exchange ratio of 0.97 shares of Cadence common stock for each share of Gateway. Cadence stock closed at $18.50 on the day of the agreement.

© 1989 Dataquest Incorporated October—Reproduction Prohibited
The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by DATAQUEST may be clients of this and/or other DATAQUEST services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securites. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

The agreement between Cadence and Gateway positions the deal as a merger, with Gateway becoming a Cadence division. Gateway's 150-person work force increases Cadence's personnel to a total of 900 employees. Gateway's founder and president, Prabhu Goel, reports directly to Joseph Costello, Cadence's president.

DATAQUEST ANALYSIS

Although the acquisition clearly strengthens Cadence's CAE market position, the company's ability to attack the electronic-systems market remains relatively weak. This weakness is particularly apparent when we compare Cadence with competing companies such as Daisy/Cadnetix, Mentor Graphics, Racal-Redac, and Valid Logic.

For example, Cadence offers only a handful of ASIC design kits, whereas its major competitors offer in the range of 100 to 200 such kits. From the Gateway merger, Cadence gains several standard components libraries (TTL, ECL, and CMOS) but only 12 ASIC design kits. Also, Cadence currently does not offer a printed circuit board layout product, which is an essential tool for system manufacturers. Moreover, Cadence's distribution and customer support channels have been tailored primarily to address the IC CAD marketplace, not the systems design marketplace.

The installed base of the Verilog simulator exists primarily within the IC design market, specifically semiconductor manufacturers, with only a handful of systems manufacturers currently using the products.

At the same time, the Verilog hardware description language (HDL) has been moving toward de facto standard status within the industry. Its inability to become the undisputed de facto standard is due to the limited marketing and distribution resources of Gateway Design Automation together with the growing presence of the VHSIC hardware description language (VHDL). VHDL currently is the IEEE standard, and it enjoys the backing of the U.S. Department of Defense. With Cadence applying its marketing muscle to the Verilog HDL, we believe that it may become an industry standard alongside VHDL, which Cadence also plans to support.

Whether or not Verilog HDL can coexist with VHDL depends on the commercial market's willingness to accept two hardware description languages. We believe that the market will accept a second standard provided Verilog demonstrates industry-wide staying power--and that will depend largely on Cadence's marketing savvy. If such coexistence between VHDL and Verilog HDL becomes a reality, Cadence will gain a powerful advantage over its competitors by delivering to its customers access to two powerful HDLs.

DATAQUEST CONCLUSIONS

Dataquest believes that the merger brings strength not only to Cadence, but to Gateway as well. Cadence's strength also stems from the fact that the company already has managed a successful merger: the early-1988 merger between ECAD and SDA Systems that resulted in Cadence Design Systems. In 1988, the combined company increased revenue 62.9 percent over the 1987 sales of the individual entities--an unusual after-merger result. This current merger clearly fills a gap in Cadence's product line, and Gateway's products are fully complemented by the Cadence EDA environment. Gateway, too, will surely benefit from the powerful combination of Cadence distribution channels and marketing know-how.

Ron Collett
Tony Spadarella

© 1989 Dataquest Incorporated October

Dataquest
a company of
The Dun & Bradstreet Corporation

Research Newsletter

ANALOG ICs IN THE 1990s: THE FUTURE IS MIXED

INTRODUCTION

The analog IC market has remained at a fairly consistent 20 percent of the total IC market for nearly two decades, yet analog products have been going through significant changes during this period. The pure analog signal processing ICs such as amplifiers, regulators, timers, and other mature product types are losing ground to more advanced products that feature mixtures of analog and digital circuits. Although much has been made of mixed-mode ASIC as a growth area for the next decade, this area represents only a small part of the substantial growth that will be experienced by mixed analog/digital ICs in the coming years. Irrespective of design methodology—ASIC, full-custom, or standard—the market is looking for more complex ICs that simplify design, reduce board space, increase reliability, and lower costs. Mixed signal or mixed-mode ICs provide this solution for the analog/digital interface.

Dataquest estimates that the mixed analog/digital portion of the market is growing 34 percent faster than the analog IC market in general. We expect the mixed-mode products to grow by more than 16 percent compounded over the next five-year period, a period that is expected to see a significant IC sales slowdown in 1989 and 1990. This growth is paced by the 21.4 percent compounded growth anticipated for the mixed ASIC market during the next five years.

MIXED-MODE PRODUCTS AND MARKETS

A mixed-mode or mixed-signal IC combines both analog and digital signal processing functions on the same chip. As Figure 1 shows, the $2.29 billion market for mixed-signal ICs is made up of products from many traditional segments. For this evaluation, we have excluded any mixed-signal portion of the consumer-specific IC market because of the difficulty in quantifying these product types at this time.

Forecast Growth Rates

A comparison of the anticipated compound annual growth rates (CAGRs) for the various analog product categories is given in Figure 2. It is significant that most of the fastest-growing product categories are the categories of mixed products, which are identified by an asterisk (*) on the chart. In addition to the identified mixed-mode categories, the fastest-growing subsegments of largely nonmixed products (such as the switching regulator portion of voltage regulators) also are included in the consolidated mixed-mode products.

The combination of the identified mixed-mode segments and subsegments and their individual forecasts yields the mixed IC forecast listed in Table 1 and depicted graphically in Figure 3.

Figure 3 shows the individual contributing categories to this aggregate five-year growth forecast for mixed-mode ICs.

Analog Market Segments

Partitioning the analog IC market into mixed-mode (or mixed-signal) ICs, pure analog ICs, consumer-specific ICs, and hybrid ICs shows that the mixed-mode ICs will be growing faster than the pure analog products, gaining an additional 5 percent share of the analog market in just five years. Market share will be lost by both hybrid ICs and the traditional analog signal processing ICs to the mixed monolithic ICs. Figure 4 shows the proportional growth of the mixed-mode ICs versus the three other categories. It should be noted that the consumer-specific ICs also will show a rapid

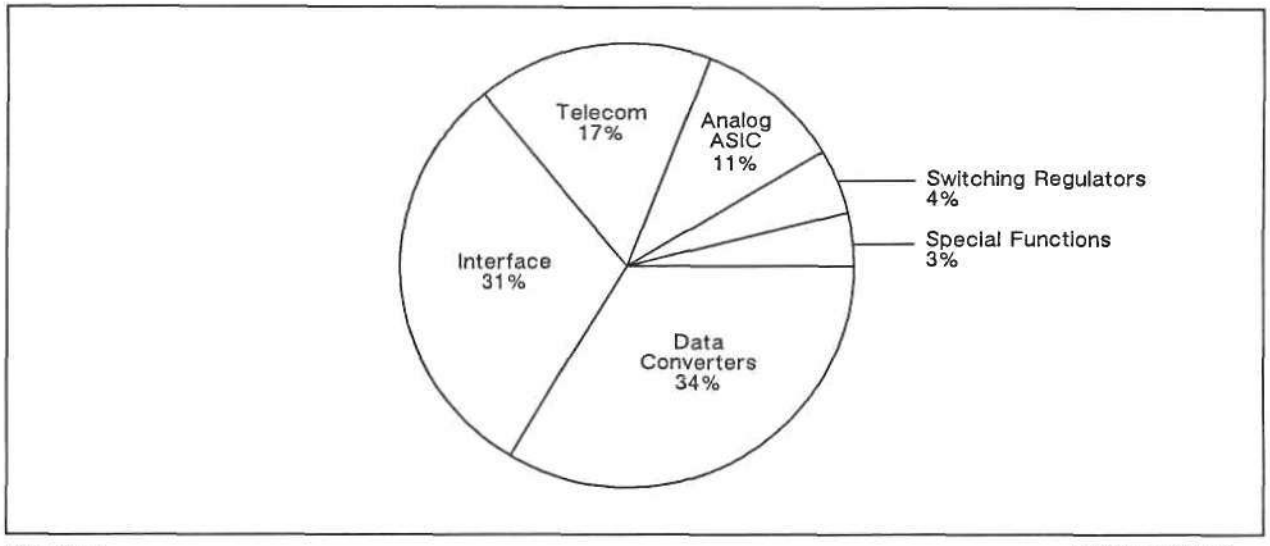
©1989 Dataquest Incorporated October–Reproduction Prohibited
CCIS Electronic Newsletters 1989-6

0005156

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

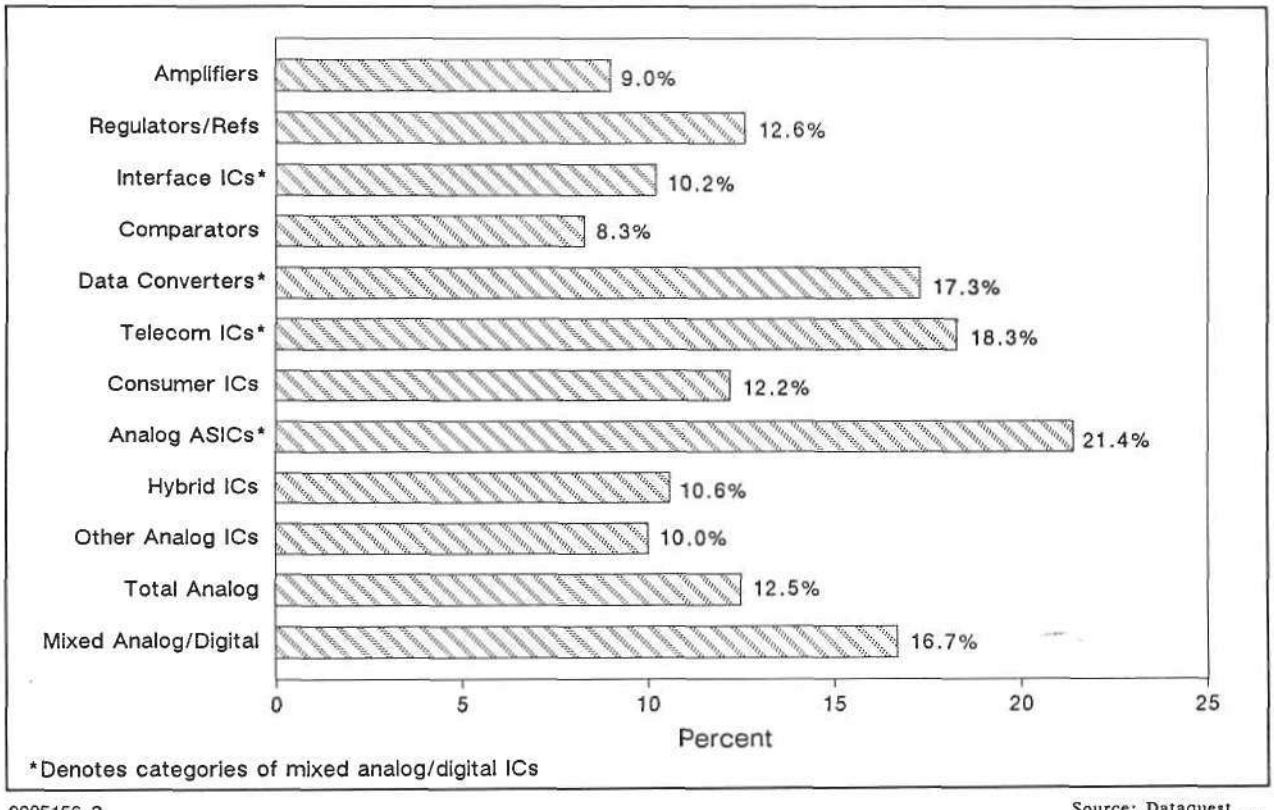
FIGURE 1
Mixed-Mode ICs by Product Category



0005156-1

Source: Dataquest
October 1989

FIGURE 2
Forecast CAGRs by Product Category



0005156-2

Source: Dataquest
October 1989

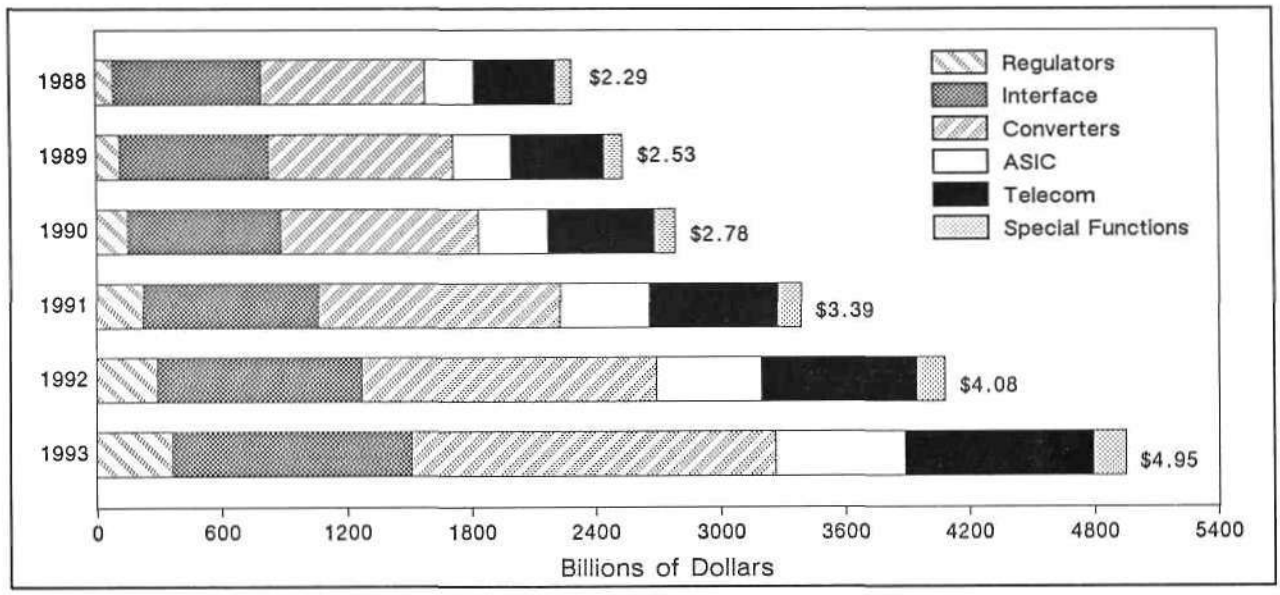
©1989 Dataquest Incorporated October–Reproduction Prohibited
CCIS Electronic Newsletters 1989-6

TABLE 1
Estimated Mixed Analog/Digital Market (1988-1993)

Segment (Billion $)	1988	1989	1990	1991	1992	1993	CAGR 1988-1993
Total Analog Sales	9.00	9.35	9.80	11.50	13.80	16.30	12.5%
Total Mixed IC Sales	2.29	2.53	2.78	3.39	4.08	4.95	16.7%
Mixed ASIC Sales	0.24	0.29	0.35	0.42	0.50	0.62	21.4%

Source: Dataquest
October 1989

FIGURE 3
Mixed-Mode IC Forecast



0005156-3

Source: Dataquest
October 1989

change to mixed-mode ICs as demand increases from the entertainment (HDTV, digital audio) and automotive markets.

Mixed ASIC and Smart Power

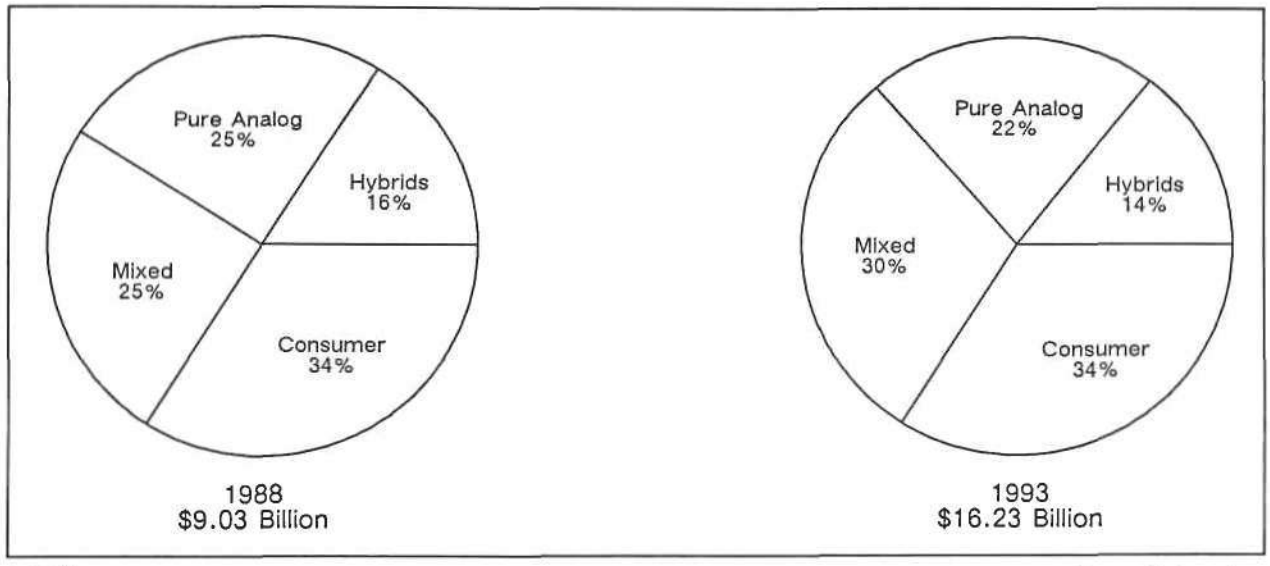
The mixed-mode IC grouping contains ASIC and smart power ICs as well as standard, nonpower ICs. As Figure 5 shows, both ASIC and smart power are relatively minor portions of the mixed-signal grouping. These product types are growing faster than the standard product segments, however, and they present specialized opportunities for growth within the broad mixed-mode product grouping. Mixed ASICs have the potential to replace many of the data converter, interface, and telecom devices now offered as standard mixed-mode products.

Mixed-Mode IC Application Markets

Because the mixed-mode category is a collection of the fastest-growing segments of the analog market, it should not be surprising that these mixed-signal ICs serve the fastest-growing end-application markets. Figure 6 illustrates 1988 mixed-mode IC consumption by application markets. Note that the combination of computer, consumer, and telecom markets consumed 72 percent of the mixed-mode products in 1988.

©1989 Dataquest Incorporated October–Reproduction Prohibited

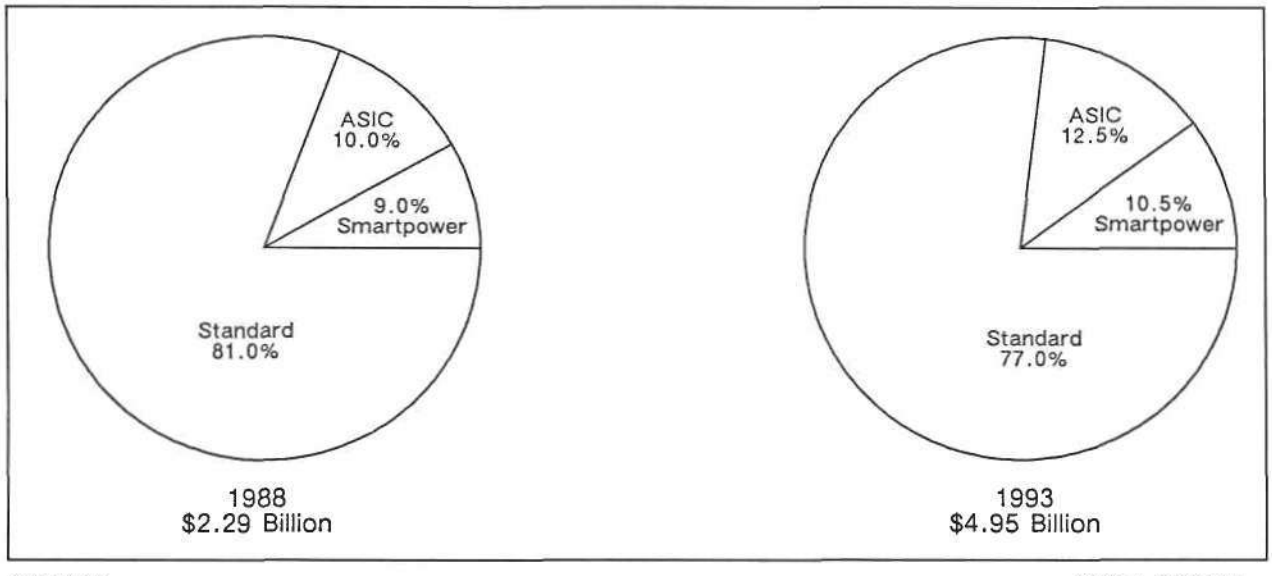
FIGURE 4
Analog IC Forecast by Special Category



0005156-4

Source: Dataquest
October 1989

FIGURE 5
Mixed-Mode IC Forecast by Specialty Products



0005156-5

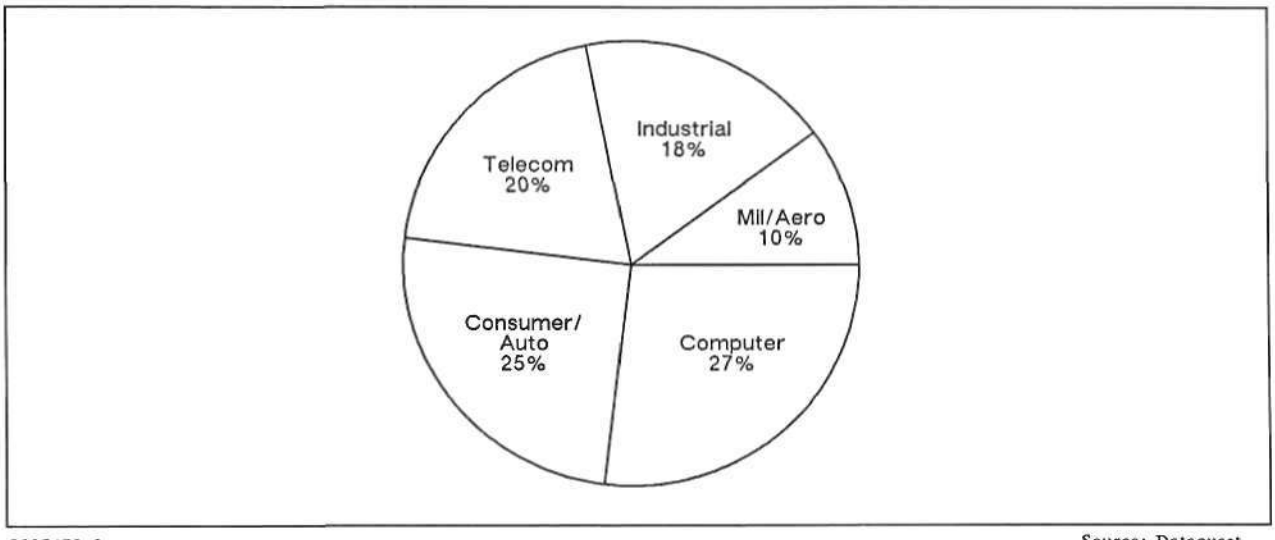
Source: Dataquest
October 1989

Process Technology

Mixed-mode ICs are processed with a wide variety of technologies. Bipolar still dominated in 1988, but we expect it to continue losing ground to CMOS and the various combinations of bipolar, CMOS, and DMOS that we refer to under the BiCMOS designation. BiCMOS is the preferred technology to optimize mixed analog/digital ICs. (See the Dataquest Analog Newsletter entitled, "BiCMOS: A High-Performance Complement to CMOS.") Fewer than 2 percent of analog ICs were processed with this technology in 1988. Dataquest estimates that 7 percent of all IC revenue will come from products utilizing BiCMOS by 1993. The mixed IC forecast by technology is shown in Figure 7.

©1989 Dataquest Incorporated October–Reproduction Prohibited
CCIS Electronic Newsletters 1989-6

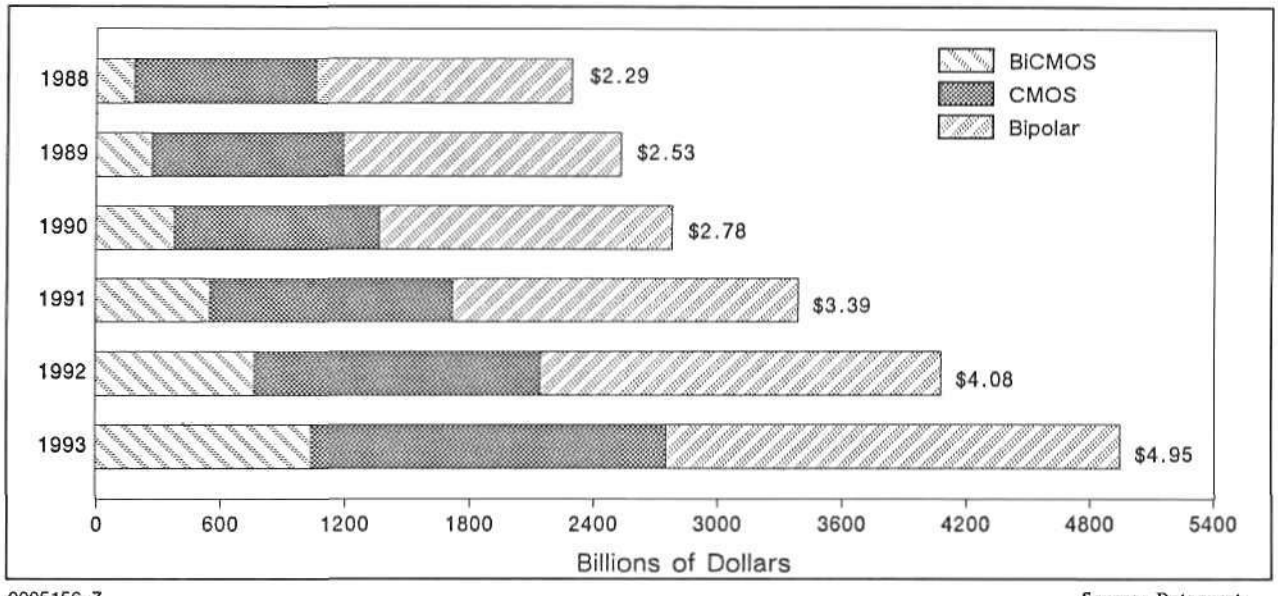
FIGURE 6
Mixed-Mode IC Consumption by Application Markets



0005156-6

Source: Dataquest
October 1989

FIGURE 7
Mixed-Mode IC Forecast by Process Technology



0005156-7

Source: Dataquest
October 1989

Suppliers

Because mixed-mode analog has long been part of the broad analog IC definition, the majority of analog IC suppliers do offer mixed-mode products. Table 2 lists these suppliers in order of market share. The consumer-specific product segment was not included in this review of mixed-mode products; therefore, the top five suppliers are U.S. manufacturers. A review of this chart shows that the mixed-mode IC market is quite fragmented, with a 3 percent market share sufficient for "top 10" status.

©1989 Dataquest Incorporated October–Reproduction Prohibited

TABLE 2
1988 Market Share for Mixed-Signal ICs

Rank	Company	Market Share	Millions of Dollars
1	Analog Devices	8.5%	$ 193.0
2	National Semiconductor	8.1	184.0
3	Texas Instruments	6.9	158.0
4	Motorola	5.8	133.0
5	AMD	4.0	92.0
6	SGS-Thomson	3.8	86.0
7	Ericsson	3.5	80.0
8	Philips	3.4	78.0
9	Sprague	3.3	76.0
10	Matsushita	2.7	61.6
11	Silicon Systems	2.7	61.0
12	Burr-Brown	2.3	53.4
13	Inmos	2.1	47.6
14	Brooktree	2.0	45.0
15	Fujitsu	1.9	44.0
16	GE Solid State	1.9	43.0
17	Toshiba	1.8	42.0
18	Siemens	1.8	40.3
19	NEC	1.8	40.0
20	Harris	1.7	38.2
21	Exar	1.7	37.7
22	Hitachi	1.6	36.1
23	Oki Semiconductor	1.4	31.5
24	Rohm	1.1	24.0
25	Precision Monolithics	1.0	23.8
26	Sierra	1.0	23.0
27	Plessey-Interdesign	1.0	23.0
28	NCR Microelectronics	1.0	23.0
29	Mitel	1.0	22.5
30	Sharp	1.0	22.5
31	Sony	0.9	20.0
32	Telefunken Electronics	0.9	20.0
33	Unitrode	0.9	19.7
34	Silicon General	0.9	19.5
35	International Micro Products	0.8	18.9
36	TRW	0.8	18.0
37	Mitsubishi	0.7	17.0
38	Teledyne Semiconductor	0.7	17.0
39	Maxim	0.7	17.0
40	Linear Technology	0.6	12.7
	Other	10.4	247.0
	Total	100.0%	$2,290.0

Note: Columns may not add to totals shown because of rounding.

Source: Dataquest
October 1989

©1989 Dataquest Incorporated October–Reproduction Prohibited
CCIS Electronic Newsletters 1989-6

DATAQUEST CONCLUSIONS

Mixed analog/digital ICs are not a new phenomenon; analog suppliers have a long history of supplying mixed-signal ICs to the market. Now, however, the trend toward mixed-signal ICs is accelerating, pressed by the continued incursion of both analog and digital ICs into previously "pure" analog or digital applications and by the success of digital ASICs to integrate digital functions. Mixed-mode is not synonymous with ASIC, but mixed-mode ASIC does represent an explosive growth area for mixed-mode ICs if the standard cells, design tools, and design capability can be brought together. Whether in custom, semicustom, or standard ICs, the future of analog ICs is certainly mixed.

(This document is reprinted with the permission of Dataquest's Semiconductor Industry Service.)

Ron Collett
Gary Grandbois

©1989 Dataquest Incorporated October–Reproduction Prohibited
CCIS Electronic Newsletters 1989-6

Dataquest
a company of
The Dun & Bradstreet Corporation

Research Newsletter

THE EDA INDUSTRY'S IMPENDING OPEN SYSTEMS REVOLUTION

SUMMARY

Dataquest believes that this year's Design Automation Conference (DAC) marked the beginning of a new era in the electronic design automation (EDA) industry. The open systems revolution occurring in the workstation industry over the past five years is spilling over into the EDA software industry. We anticipate that this will spark open system, or framework, wars between the major EDA vendors. We also believe that the shift toward open systems will redefine the industry's competitive forces, requiring EDA vendors to compete along new dimensions. This newsletter addresses and analyzes the following issues:

- The impending open systems revolution
- Mentor Graphics' OpenDoor announcement
- The changing competitive forces in the EDA industry
- The positioning strategies for the 1990s

KEY ANNOUNCEMENTS AT DAC 1989

No technology breakthroughs were introduced at this year's Design Automation Conference (DAC), although common elements among industry suppliers included support for the VHSIC Hardware Description Language (VHDL) and the unveiling of several open EDA systems (i.e., open frameworks). Enormous implications stem from these and other recent open systems announcements.

The most significant open systems announcement came from Mentor Graphics, which unveiled its OpenDoor program. Briefly, OpenDoor, which will not be fully available until mid-1990, allows non-Mentor tools to be tightly integrated into the Mentor EDA environment. However, the level of integration—tight or loose coupling—varies according to what the third party desires. What is most surprising is the level of openness Mentor plans to offer. For instance, non-Mentor tools can be integrated at both the user interface and data base levels. A common data base allows a foreign application real-time access to Mentor's data structures and obviates the need for data base translators. This will dramatically improve the performance of heterogeneous EDA systems. Moreover, foreign tools will be permitted to coexist simultaneously on the screen with Mentor's tools.

Tight integration at the user interface and data base levels is a sharp departure from past practice. Until now, Mentor, like other EDA suppliers, permitted only loose coupling to its environment.

THE BEGINNING OF THE OPEN SYSTEMS REVOLUTION

For an EDA system to be truly open, its framework must offer at least the following capabilities:

- An easy, seamless integration of all kinds of third-party and proprietary electronic system design tools
- A user interface that can be customized and that allows all tools to have a common look and feel

Mentor is not the first company to disclose an open systems strategy. Cadence has been following this course for more than two years with its Design Framework product. Valid Logic also has been aggressively promoting itself as a champion of open systems. And recently, other EDA vendors such as Daisy/Cadnetix, Scientific Calculations, Silicon Compiler Systems, Teradyne, and Viewlogic embarked upon similar paths. Likewise, ASIC suppliers, including Fujitsu, Motorola,

©1989 Dataquest Incorporated September–Reproduction Prohibited
0004913
CCIS Electronic Newsletters 1989-5

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

National Semiconductor, and NEC, that rely on EDA software to leverage their chip sales recently introduced open EDA environments for ASIC design.

It is clear that the EDA industry is on the verge of a metamorphosis. The predominantly closed systems of the 1980s will be replaced in the 1990s by open systems based on both industry-endorsed and de facto standards. In support of this conclusion, we point to the following indicators:

- An increasing number of EDA and ASIC vendors, in addition to industry leader Mentor Graphics, are either positioning themselves as advocates of open systems and/or supplying all or part of what we define as an open system. We believe that the aggregate has reached the critical mass necessary to force all vendors to supply open systems.
- It has become apparent that no single vendor can provide all of the different kinds of tools the market wants.
- Market demand for tightly integrated heterogeneous environments is very high.

We anticipate that, in the early 1990s, the EDA market will be evaluating vendors not only on particular application packages but also on the framework that binds these applications together. And just as workstation vendors compete on the number of independent software vendors (ISVs) supporting their machines, EDA vendors will compete on the number of third-party EDA tools tightly integrated into their framework. Similarly, EDA vendors will compete on how easy or difficult it is to tightly integrate the customer's proprietary tools into the framework.

However, we also believe that winning in the market will require more than just a robust framework, because the framework is merely the glue that holds the tools together. A broad set of production-proven design tools must be integrated into the framework and be readily available with the framework. The result of the EDA industry's open systems revolution will be the emergence of an array of proprietary frameworks. This emergence has begun. We believe that over the next three years, the combination of these frameworks will collectively define the industry standard. In the interim, vendors will battle to influence the final direction for the standard. Between 1991 and 1993, we anticipate a battle among framework titans, similar to that now occurring in the operating systems world between Open Software Foundation (OSF) and UNIX International.

MENTOR: ATTEMPTING TO DEFINE THE INDUSTRY'S FRAMEWORK STANDARD?

Open systems in general are not unique to the EDA industry. In other computer-related industries, the evolution of open systems has been characterized by one or more vendors with market power attempting to mold the standard to their advantage, either implicitly or explicitly. For example, in the workstation industry, Sun Microsystems aggressively made its Network File System a de facto standard. Likewise, in the board industry, Intel and Motorola defined open systems standards for bus interfaces (Multibus and VME bus) to leverage their own board and chip businesses. And in the mechanical CAD industry, Autodesk pioneered an open systems strategy that was instrumental in achieving a 64 percent compound annual growth rate (CAGR) over the past five years.

We believe that Mentor Graphics, with its OpenDoor program, will attempt to make its framework (or a close derivative) an EDA industry standard. In support of this, we point to the fact that Mentor announced the OpenDoor program one year before it will be available. Announcing far in advance is often aimed at preempting competitive offerings. We believe that Mentor's goal was targeted, at a minimum, at either preempting or influencing the direction of other emerging framework standards, such as those being generated by the CAD Framework Initiative (CFI). (The CFI is a consortium chartered to define a set of standard framework guidelines.)

Preemption is not a new strategy to Mentor Graphics. Most recently, the company announced a VHDL-based system 9 to 12 months before its delivery date. The goal, it appears, was to slow the penetration rate of other hardware description languages, such as Gateway Design Automation's Verilog HDL.

We believe that announcing a year early was also an attempt by Mentor to muffle the closed system guns continuously fired by its competitors. In our view, if Mentor had not disclosed its open systems strategy, it would have begun to suffer some erosion of its market position.

From a technological perspective, Mentor claims that its framework is not EDA specific. Instead, it was designed to accommodate design tools from all Mentor's design automation

©1989 Dataquest Incorporated September–Reproduction Prohibited
CCIS Electronic Newsletters 1989-5

divisions: CAE, IC, PCB, CASE, electronic system packaging (MCAD), and CAP (documentation). Thus, Mentor has the luxury of receiving continuous internal feedback on a highly diverse, yet related, set of EDA framework requirements. In our view, this may give Mentor's framework a technological edge over frameworks from competitors, because it has the potential to be more accommodating and robust than any which have been, or could be, developed by a single EDA competitor, or perhaps even the CAD Framework Initiative.

On the downside, however, Mentor's first release of its new software will not run under a truly standard UNIX operating system or a standard windowing system. Instead, the UNIX version will be Mentor's own subset of UNIX from AT&T and Berkeley, and the windowing system will remain proprietary. Third parties, however, can use X Window graphics calls, which Mentor's system will translate to the proprietary graphics calls. The user interface will be MOTIF compliant. Later releases of the upcoming software will be based on OSF's AIX and X Window standards. Despite apparent migration toward standards and its open systems announcement, the company still supports only the Apollo platform, which keeps its environment closed to EDA software that does not run on that machine. This restriction has prompted many Mentor competitors to continue labeling Mentor's system as closed. We believe that Mentor will be able to deflect this criticism only when it fully supports OSF AIX and X Window standards. We believe that running on a single platform is Mentor's most formidable nemesis. In fact, much of the business that Mentor is unable to capture is because it does not run on the Sun platform.

THE KEY TO DEFINING THE FRAMEWORK STANDARD: MARKET POWER

Using an open framework as the hook to capture business is not a new concept in the EDA industry. EDA Systems used the same blueprint during its start-up phase several years ago. The company tried to make a business of selling frameworks, hoping that its framework specifications would garner enough support to become an industry standard. This never happened. We believe that there were several reasons for this, the common denominator being that EDA lacked market power. EDA attempted to generate market power by gathering third parties to adopt its framework, but this proved unsuccessful. The risk associated with espousing the start-up company's framework was high, because it was believed that EDA did not have the critical mass necessary to successfully deploy such a strategy. Similarly, EDA did not have any design tools to leverage its framework. Furthermore, framework technology, as well as the concept of a framework, was still in its embryonic stage. The collective result was EDA Systems' inability to provide the requisite incentive for enough EDA tool suppliers to fully endorse its framework to become an industry standard.

In contrast, Mentor Graphics wields market power. Arguably, it has the most market power among all participants in the EDA industry. We believe that Mentor Graphics' present market power can be measured by the following parameters:

- Market Share—Mentor has the largest revenue market share (12.6 percent), which is 4 points higher than its closest competitor (Daisy/Cadnetix Inc.). We expect Mentor's market share to be higher by the end of 1989.
- Installed Base—Mentor's installed base of EDA systems is the largest in the industry (14,000 to 15,000 at the end of 1988). This is 30 percent more than its closest competitor, Daisy/Cadnetix.
- Stability—Virtually all of Mentor's growth has been sustained through internal development, as opposed to mergers and acquisitions, permitting the company to focus on product development. The company's cash and marketable security reserves of $130 million as of the end of the second quarter of 1989 provide even greater stability.
- Broad Product Line—Mentor has a solid market position across all three EDA domains (CAE, PCB, and IC). In addition, Mentor has separate divisions devoted to electronic system packaging and mechanical CAD (MCAD), computer-aided software engineering (CASE), and computer-aided publishing (CAP) for documentation. No other EDA vendor has addressed this much of the design automation problem.

In Dataquest's view, unlike EDA Systems, Mentor Graphics may have both the requisite technology and the market power to attract third parties to develop code around the Mentor framework. This, of course, is a linchpin of the whole strategy. However, if enough third-party support migrates to another framework, that framework will become the industry standard and Mentor will be forced to conform.

©1989 Dataquest Incorporated September–Reproduction Prohibited

Thus, the number of ISVs that tightly integrate their tools into the Mentor environment will be a test of Mentor's market power. It is important to note that third parties may not be in a position to fully support multiple frameworks. Another test will be the amount of influence Mentor can exert over the framework standards being developed by the CAD Framework Initiative.

STRATEGIC POSITIONING FOR THE NEW EDA INDUSTRY

Because the market will begin to shift its focus toward the framework, we anticipate that many EDA companies will be forced to adopt new positioning strategies. In our view, an example of a good strategic positioning model in an impending open systems climate is the strategy used by Sun Microsystems several years ago. Sun defined and aggressively promoted industry standards, simultaneously using those standards as leverage to sell its workstations. A closer look at the execution of Sun's strategy proves helpful in deriving the EDA positioning model.

Between 1985 and 1986, Sun began aggressively challenging Apollo, Digital Equipment, Hewlett-Packard, and IBM. Its workstations consistently offered 1.2 to 2.0 times better price/performance ratios than the competitors, but this alone was not enough to catapult Sun to the top.

The added punch came from Sun's positioning itself as the pioneer in heterogeneous computing, as well as a champion of standards. Here the strategy was to offer a workstation based on a standard backplane, a "standard" UNIX operating system, and a local area network—SunNet—that could tightly link computers from different manufacturers running dissimilar operating systems.

The core of SunNet consisted of Ethernet and TCP/IP, both of which were publicly available, and the Network File System (NFS), which was the upper layer protocol developed by Sun to link dissimilar computers and operating systems. NFS, in essence, was the enabling technology that engendered heterogeneous computing. It was also the critical value-added by Sun. NFS was even more powerful from a marketing standpoint, as Sun used it to position itself as the workstation manufacturer spearheading the march toward heterogeneous computing environments. The market clearly wanted this kind of topology, for, by the end of 1986, Sun licensed NFS to more than 80 computer vendors and universities.

Sun's success can be traced to the company's aggressive positioning along three dimensions: as a champion of standards, as a pioneer in heterogeneous computing, and as the aggressor constantly pushing the price/performance curve. The importance of convincing ISVs to configure their software to its workstations was also critical and cannot be overlooked. These ingredients, combined with a well-orchestrated marketing plan, provided the leverage necessary to wrest market share leadership from Apollo and keep Digital Equipment, Hewlett-Packard, and IBM at bay.

APPLYING THE SUN MODEL TO THE EDA INDUSTRY

Albeit Sun used its positioning formula in the workstation industry, we believe that a derivative can be applied with equal success by EDA vendors over the next five years. In fact, this appears to be Mentor's underlying strategy—to use the openness of its framework as leverage to sell its own design automation tools, simultaneously making large portions, if not all, of its framework an industry standard and using these standards as further leverage to sell its own products. We believe that the three elements of Sun's model that can be applied in the context of the EDA industry are heterogeneity, standards, and the price/performance ratio (see Figure 1).

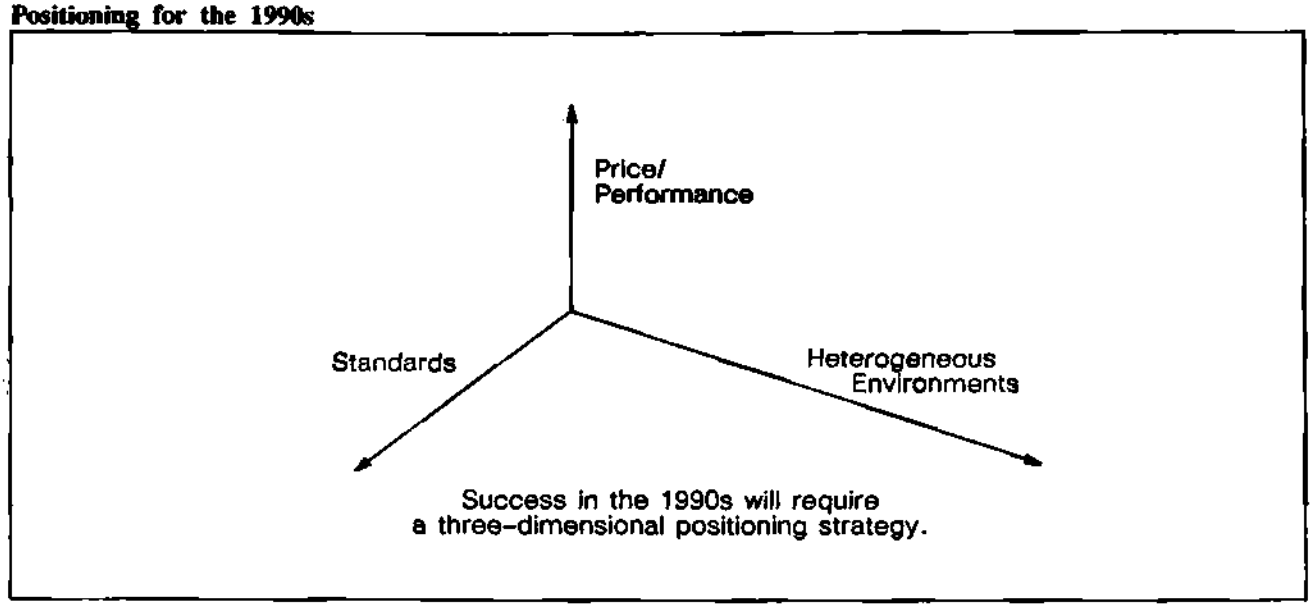
Heterogeneity

Offering a framework that supports tightly integrated third-party and proprietary tools will allow an EDA vendor to position itself aggressively along the heterogeneous vector. Sun, of course, used NFS in a similar manner. Mentor and Cadence, for example, are positioning themselves as the EDA vendors with the requisite enabling technology to support such environments.

Cadence, of course, has been doing this for longer and has a significant lead on Mentor in terms of market perception. However, because Cadence's customers are predominantly IC design groups, this perception barely exists in systems design groups. On the other hand, the fact that Cadence supports seven different workstations will be a significant boost to its open systems marketing strategy.

©1989 Dataquest Incorporated September–Reproduction Prohibited
CCIS Electronic Newsletters 1989-5

FIGURE 1
Positioning for the 1990s



0004913-1

Source: Dataquest
September 1989

Standards

As a first step toward making its framework an industry standard, an EDA vendor will require support from other EDA tool suppliers. The more vendors that adopt its framework, the closer the framework moves to becoming a de facto standard. As an incentive to get third parties to adopt their framework, EDA vendors will offer their distribution channels to the third parties (e.g., OEM and joint marketing agreements).

Mentor, however, appears to be taking an additional step toward making its framework a standard. Just as Sun did with NFS, Mentor plans to license its framework to third parties, including competitors. Toward this end, Mentor already has begun soliciting third parties to espouse its framework. Fifteen software vendors, including VLSI Technology and Gateway Design Automation, announced initial support for the Mentor OpenDoor program at the Design Automation Conference. And, Mentor plans to publish a catalog, similar to Sun's Catalyst catalog, comprising the third-party EDA vendors that support its framework. Widespread adoption of its framework will also give Mentor greater influence over the direction of the CAD Framework Initiative (CFI).

However, a core issue is the price Mentor will charge third parties to integrate into its environment. Mentor plans to announce the pricing plan by the end of 1989. Pricing the OpenDoor program so that it does not alienate third parties, while at the same time charging enough to offset its integration support services, will be a significant challenge for Mentor.

Price/Performance Ratio

Providing an open framework that can be or is stacked with tightly integrated proprietary and third-party tools should enable higher design throughput. We believe that the market will equate this to price/performance leadership.

WHY OPEN UP?

Providing the core framework will give an EDA vendor a great deal of control over the customer account. Account control always has been a key part of EDA vendors' business strategy. In the past, Mentor, like other vendors, gained account control by selling closed turnkey systems. A closed turnkey system forces customers to rely predominantly on a single supplier for hardware, software, and support. However, an increasing portion of the market is now demanding unbundled software. We anticipate that this trend will force traditional turnkey suppliers such as Mentor to sell more unbundled software, which would normally result in the loss of a certain amount of account control. Providing the core framework for EDA will act to preserve control over the account.

©1989 Dataquest Incorporated September–Reproduction Prohibited

Moreover, by allowing third parties to develop applications around its framework, an EDA vendor can offer tightly integrated heterogeneous design automation environments—exactly what the market is demanding.

However, by opening its framework, an EDA vendor makes a new assumption: The company believes that even though it may lose a certain level of business to its third-party partners, this loss will be offset by the additional business captured through its open framework.

OPENDOOR OR TRAP DOOR?

For ISVs, the thought of tightly integrating into the Mentor environment is intriguing. The allure is the opportunity to latch onto Mentor's coattails—that is, leverage Mentor's sales, marketing, and distribution channels to promote and sell its own product. Even more significant, third parties will have access to Mentor's huge installed base of EDA systems. However, there is a potential downside for ISVs. First, there is a serious question as to whether the ISVs' tools will suffer any performance degradation by adopting the Mentor framework. Mentor must demonstrate that this will not occur if it hopes to get third parties to adopt its framework.

Second, ISVs that have products competing directly with products from Mentor must be assured that they will not be put at a disadvantage by adopting the Mentor framework. We believe that this will also be an enormous challenge for Mentor. In essence, Mentor is attempting to be a framework supplier to other EDA companies, which requires assurance of a tight customer-supplier relationship.

Finally, Mentor must convince third parties that its framework will become the template for the industry standard. Initially, this will be a tremendous challenge. Mentor's framework, or portions of it, will become a standard only if endorsed by either a large number of small to medium-size EDA vendors, a few large EDA vendors, or, of course, the CFI. But Mentor is caught in a paradox: Its framework cannot become an industry standard until enough vendors support it, but those vendors will not *fully* support Mentor's framework until it becomes an industry standard.

DATAQUEST CONCLUSIONS

Dataquest believes that until Mentor is able to support operating system and windowing system standards, the company will not make its entire framework a standard. However, we anticipate that Mentor will have the muscle to define some portions of the final standard framework. We believe that, unless Mentor's framework is so technologically superior to the others, the combined market power of other large EDA vendors, such as Cadence, Daisy/Cadnetix, and Valid Logic, will outweigh Mentor's market power and allow the combination of these vendors to define the majority of the standard.

Ron Collett

©1989 Dataquest Incorporated September-Reproduction Prohibited
CCIS Electronic Newsletters 1989-5

Dataquest
a company of The Dun & Bradstreet Corporation

Research Newsletter

CCIS Code: Electronic Newsletters
1989-4
0004619

HIGH-TECH BUSINESS OPPORTUNITIES IN INDIA

INTRODUCTION

Key opportunities exist for high-technology business in India. This newsletter discusses important recommendations by the Joint Scientific Committee, which was appointed by India's Prime Minister Rajiv Gandhi to outline a microelectronics blueprint for the next 10 years. The committee recommends free-market-driven, private-sector development of the electronics components and systems business in India, collaborating with leading foreign companies as needed. The Indian government would play a guiding role in defining technology road maps and coordinating industrial strategies.

The committee has identified several areas for short-term business development. These include design centers for ASICs, microprocessors, and gallium arsenide microwave ICs; semiconductor foundry facilities; and advanced printed circuit board and packaging technology. The markets for these technologies will include low-cost personal computers, office automation products, consumer appliances, telecommunications, and industrial automation. We at Dataquest believe that this information is of particular interest to our clients in the semiconductor design, manufacturing, equipment, and materials industries.

BACKGROUND

The world has seen the meteoric rise of countries such as Japan, Korea, and Taiwan, based on carefully orchestrated industrial strategies for penetrating all segments of the electronics food chain, from discrete devices to complete systems. Top government policy makers in India are increasingly aware of the importance of microelectronics and its value-added leverage in electronic systems. As shown in Table 1, the Department of Electronics has outlined ambitious production levels for India to become a world player in the electronics business.

Table 1

Semiconductor Components and Electronics Production
(Millions of Dollars)

Year	Annual Components Production	Annual Electronics Production
1988	$ 10	$ 4,500
1995	$ 800	$15,000
2001	$1,600	$30,000

Source: Department of Electronics
Government of India

© 1989 Dataquest Incorporated July—Reproduction Prohibited

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

India is the 10th-ranked industrial country in the world, with a population of 800 million and a gross national product of $225 billion. It has the third-largest engineering and scientific human resource base in the world. The English language is used widely for business communication. Recently, India has emerged as a powerhouse in software products and services. To round out its high-technology portfolio, India is currently embarking into VLSI design and manufacturing to meet the needs of advanced electronic systems.

BUSINESS OPPORTUNITIES IN INDIA

The following areas have been identified by the committee as short-term priorities for high-technology business development in India:

- VLSI design centers—The committee proposed that design centers be set in major industrial cities in India to encourage VLSI use in reducing system costs and improving system performance. Dataquest believes that significant opportunities exist for ASIC design, software, and CAD companies in India.

- VLSI fabs for ASICs—World-class semiconductor manufacturing capability is essential to India's electronic systems business success. Collaboration opportunities exist in setting up fabs for IC manufacturing. A high level of compatibility with ASIC design and software tools will be required. Foreign ASIC companies with a full range of CAD, software, and manufacturing capabilities will have an advantage in penetrating the Indian market.

- Microprocessor and digital signal processor design—The Indian government considers the development of microprocessors and digital signal processors essential for advanced system architectures. Companies with expertise in these areas have an opportunity for licensing their technology and developing a low-cost manufacturing source for their products.

- Microwave IC design—Domestic design capability development for GaAs microwave ICs for satellite communications is a priority. Opportunities exist for design and CAD collaboration. The devices will be manufactured by relevant partners at foundries in either Japan or the United States.

- Advanced printed circuit boards and VLSI packaging—The Indian government has emphasized the need for multilayer board technology and high-pin-count VLSI packaging using surface-mount and TAB techniques. Opportunities exist for semiconductor and board-assembly companies to expand in India.

DATAQUEST CONCLUSIONS

Dataquest believes that India offers exciting opportunities for high-technology companies to expand their markets. With its newly liberalized industrial policies, its tremendous technical resources, and its huge domestic markets, India could well be the next Asian economic miracle.

(This document is reprinted with the permission of Dataquest's Semiconductor Equipment and Materials Service.)

Tony Spadarella
Ron Collett
Krishna Shankar

© 1989 Dataquest Incorporated July

Dataquest
a company of
The Dun & Bradstreet Corporation

Research Newsletter

CCIS Code: Electronic Newsletters
1989-3
0004164

RACAL-REDAC SCORES MAJOR WIN, ACQUIRES HHB SYSTEMS

SUMMARY

Daisy/Cadnetix, headquartered in Mountain View, California, last month sold its Mahwah, New Jersey-based wholly owned subsidiary, HHB Systems, to Racal-Redac of Great Britain, for $19 million in cash. The deal closed on May 31, 1989. This newsletter addresses the following issues:

- Motivation behind the purchase and sale
- Strategic significance of the acquisition
- Structure of the deal
- Impact on the HHB Systems' OEMs

BACKGROUND

In the second quarter of 1988, Cadnetix, an independent, publicly traded manufacturer of printed circuit board (PCB) layout systems, acquired HHB Systems, a firm specializing in digital logic simulation and test automation, for 7.2 million shares of Cadnetix stock. When the deal closed November 8, 1988, Cadnetix's stock was trading at approximately $8 per share. This puts the acquisition price at $60 million.

In the fourth quarter of 1988, Daisy Systems acquired Cadnetix to obtain its PCB layout technology, products, distribution, and customer base. Cadnetix's ownership of HHB Systems was incidental to the deal. Daisy had little interest in HHB Systems, which is best known for its CADAT logic simulator. Total revenue for Cadnetix in 1988 was $66.9 million; Daisy recorded revenue of $121.4 million in 1988.

© 1989 Dataquest Incorporated June–Reproduction Prohibited

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

Behind the Deal: Daisy/Cadnetix's Perspective

Daisy/Cadnetix Inc. has been actively looking to divest HHB Systems because there is duplication of products between the two companies (i.e., Daisy/Cadnetix and HHB Systems.) Since the time of Daisy's acquisition of Cadnetix, HHB Systems has been operating as an independent, wholly owned subsidiary of Daisy/Cadnetix Inc. The key overlapping areas are logic simulation, hardware acceleration, and hardware modeling. Daisy's core logic simulation products include the Daisy Logic Simulator (DLS), the GigaLogician/MegaLogician hardware accelerators, and the PMX Hardware Modeler. HHB's CADAT logic simulator, CATS hardware accelerator, and CATS Hardware Modeler compete directly with the three Daisy/Cadnetix products.

HHB Systems' revenue in 1988 was $17 million (not including the SimuCAD division), 40 percent of which was derived from OEM sales. OEMs include Racal-Redac, Zuken, ComputerVision, Data I/O, Calay, Silvar-Lisco, Harris Semiconductor, Schlumberger Technologies, Fujitsu (Japan), NCR Microelectronics, and Scientific Calculations.

Behind the Deal: Racal-Redac's Perspective

Dataquest believes that the following are prerequisites to continued growth in the electronic design automation (EDA) market:

- Providing customers with front-end design capabilities (i.e., design entry, simulation, test automation) and back-end design automation tools (e.g., PCB layout, tight links to manufacturing) for both chip- and PC board-level design.

- Tight coupling between the front-end and back-end design tools.

Racal-Redac, which recorded revenue of $75 million in 1988, had been addressing the first issue by signing on as an OEM of HHB Systems' simulation products. (Seventeen percent of HHB's revenue came from Racal-Redac in 1988.) But an OEM agreement in the electronic design automation industry is often a double-edged sword. On the one hand, it allows the OEM to immediately fill a product void. But, on the other hand, it typically does not permit the tightest possible integration between products, because such integration requires extensive modifications to each of the products. Thus, Racal-Redac was unable to seamlessly integrate its PCB layout tools with HHB Systems' simulation products, although a certain level of integration was obtained as a result of both companies' products running on the same computer platforms.

Cadnetix's acquisition of HHB Systems dramatically affected Racal-Redac's position with respect to its front-end strategy. Cadnetix, a direct competitor, gained control of Racal-Redac's simulation offerings. This left Racal-Redac with an uncertain position in the simulation market, an area of strategic importance to the company.

Daisy's subsequent acquisition of Cadnetix flipped the situation 180 degrees, because duplication of products between Daisy and HHB Systems forced Daisy to find a buyer for HHB Systems. Thus, Racal-Redac was presented with an opportunity to permanently solve its simulation dilemma.

RACAL-REDAC SCORES A MAJOR WIN

Dataquest believes that Racal-Redac has scored a major victory in the chain of events leading to its acquisition of HHB Systems. Positives for Racal-Redac include the following:

- Racal-Redac paid $19 million for HHB Systems, which is three to four times less than Cadnetix paid for HHB Systems just one year earlier.
- Its tenuous position in the CAE market has been strengthened considerably now that it owns a solid simulation and test automation company.
- The company is now in a position to compete more effectively against such heavyweights as Mentor Graphics, Daisy/Cadnetix, and Valid Logic Systems.
- It can now begin to tightly integrate its PCB layout products with the HHB simulation tools.
- The newly acquired simulation and test products will provide significant market leverage for Racal-Redac's PCB layout products, allowing the company to more aggressively expand its position in the electronic design automation field.

STRUCTURE OF THE DEAL

Details on the structure of the deal between Daisy/Cadnetix Inc. and Racal-Redac are as follows:

- Daisy/Cadnetix Inc. received $19 million in cash from Racal-Redac.
- All assets and business of SimuCAD, a division of HHB Systems, will remain with Daisy/Cadnetix.
- Daisy/Cadnetix retains OEM rights to all of HHB Systems' products.
- HHB Systems will operate as a wholly owned subsidiary of Racal-Redac (e.g., the two companies will maintain independent sales forces).

© 1989 Dataquest Incorporated June

IMPACT ON HHB'S OEMS

The sale of HHB Systems to Racal-Redac will have minimal impact on HHB Systems' OEMs because most of them began rethinking their simulation strategies after Cadnetix acquired HHB Systems.

However, logic simulators are becoming increasingly important to electronic engineers, and supplying proven simulation capabilities to customers is a must for EDA vendors. But logic simulators are complex and difficult to design. HHB Systems is one of the few EDA suppliers to offer a proven logic simulator for OEM resale, which is why so many third-party EDA companies are OEMs of HHB's product.

According to Racal-Redac, it plans to maintain all of HHB Systems' OEM relationships. However, Dataquest believes that OEMs such as ComputerVision, Scientific Calculations, and Zuken, which compete directly against Racal-Redac in the PCB layout market, eventually may phase out their OEM agreements with HHB Systems. We expect that a major challenge for Racal-Redac will be to keep its competitive OEMs from migrating away from the HHB Systems products.

Dataquest also believes that competitive OEMs must restructure their relationship with HHB Systems to ensure that they will not suffer any major disadvantages (e.g., price). Nonetheless, because of the inherent disadvantage of having a direct competitor supplying a critical piece of a company's product line, we anticipate that several of HHB's OEMs may attempt to offer alternate simulation products. Examples include the Verilog simulator from Gateway Design Automation, the Vantage Spreadsheet from Vantage Analysis Systems, and the HILO simulator from GenRad.

DATAQUEST CONCLUSIONS

Dataquest views the acquisition of HHB Systems by Racal-Redac as a significant boost for both companies. HHB Systems has been operating in a state of uncertainty since late 1988, when it became clear that it did not fit into the Daisy/Cadnetix Inc. picture. HHB Systems is now in a position to focus more effectively its efforts on product development.

Also, with the strong financial backing of the Racal Electronics Group, HHB Systems will be able to focus more extensively on the development of new products.

HHB Systems also will benefit significantly from Racal-Redac's solid presence in the European (55 percent of Racal-Redac's revenue) and Asian (34 percent of Racal-Redac's revenue) markets, regions that Dataquest believes will grow at compound annual growth rates (CAGRs) during the next five years of 15.2 percent and 17 percent, respectively.

© 1989 Dataquest Incorporated June

We believe that Racal-Redac has several challenges ahead. The company must tightly integrate HHB Systems' products into its electronic design automation environment. Racal-Redac also must piece together an infrastructure that allows for effective management of HHB Systems, establish a strong presence in the ASIC design market, and, finally, Racal-Redac must position itself as a full-line EDA tool supplier and convince the market that its solutions are superior to market leaders such as Daisy/Cadnetix, Mentor Graphics, and Valid Logic Systems.

Ron Collett

NEW DIRECTORY OF DATAQUEST PUBLICATIONS?

A new directory describing 30 Dataquest Research Publications is now available from Dataquest's Direct Marketing Group. The directory includes information on:

- Monthly newsletters on global semiconductor, information systems, and office equipment markets
- SpecCheck specification guides for hundreds of facsimile machines, copiers, personal computers, and printers
- In-depth reports on current high-technology topics, from intellectual property issues to high-definition video technology

For a free copy of the directory, call the Direct Marketing Group toll-free at 1-800-624-3282 or write:

Direct Marketing Group
Dataquest Incorporated
1290 Ridder Park Drive
San Jose, CA 95131

Source Code: K4

© 1989 Dataquest Incorporated June

Dataquest
a company of The Dun & Bradstreet Corporation

Research Newsletter

CCIS Code: Electronic Newsletters
1989-2
0003884

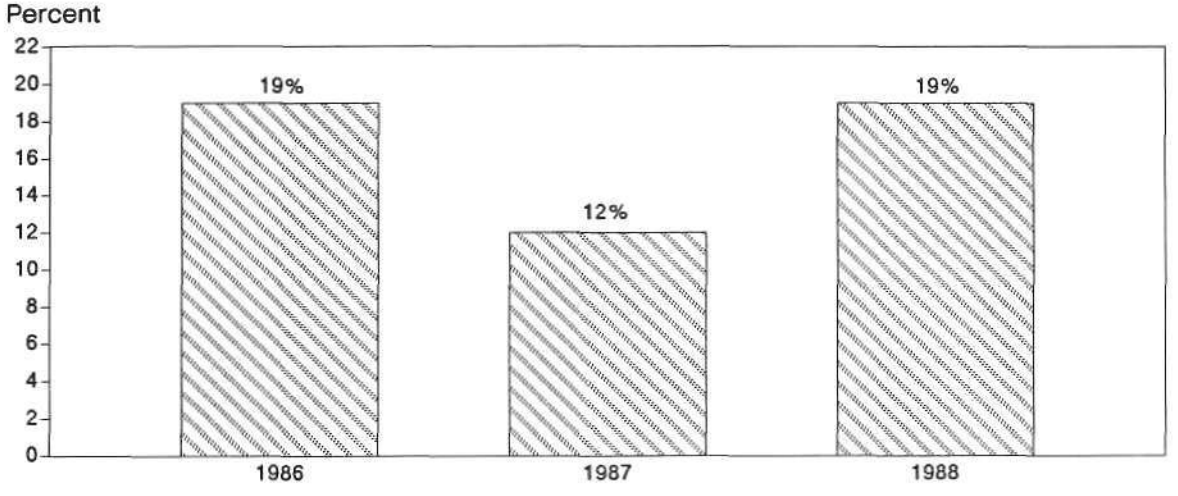
ELECTRONIC DESIGN AUTOMATION MARKET REBOUNDS

SUMMARY

Rebounding from its modest 12.1 percent growth in 1987, the electronic design automation (EDA) market forged ahead at 18.6 percent growth in 1988. Spearheading this expansion was the computer-aided engineering (CAE) sector, which grew by 20.8 percent, with revenue reaching $1.12 billion. The PCB layout market exhibited equally strong growth, jumping 20.3 percent to $884.0 million. The IC layout market showed only a moderate increase of 8.7 percent, however, advancing to $333.6 million. Figure 1 illustrates the growth trend over the past four years.

Figure 1

Worldwide EDA Market Percentage Growth Rates



0003884-1

Source: Dataquest
May 1989

© 1989 Dataquest Incorporated May–Reproduction Prohibited

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

This newsletter discusses our new worldwide EDA market review and forecast (see Tables 1 through 7 at the end of this document) and addresses the following issues:

- Signs of maturity in the EDA market
- The forces behind consolidation in the EDA arena
- What the mergers and acquisitions did for the players
- Analysis of 1988 market growth
- Regional analysis of the EDA market (North America, Asia, Europe)
- Changing EDA business models
- 1988 events impacting EDA's future
- Future opportunities in EDA

EDA INDUSTRY MOVES TOWARD MATURITY

What makes 1988's robust expansion most significant is that it occurred while the industry averaged more than one merger or acquisition per month. Clearly, consolidation and the volatility of the EDA industry failed to shake the market's confidence in either suppliers or technology. Yet market confidence will be short-lived for those merged vendors that fail to demonstrate positive short-term gains; customers will perceive lackluster growth as a sign of vendor instability and will turn quickly to suppliers demonstrating strength and longevity. It is important to note that many of the mergers and acquisitions occurred late in the year and had little impact on the 1988 growth. Market reaction to those mergers will become apparent in 1989 and 1990.

Dataquest believes that this level of consolidation demonstrates that the industry has begun moving into its adolescence. Yet consolidation has had a negligible effect on concentration: the top ten vendors captured 53.2 percent of revenue in 1988, compared with 50.9 percent in 1987. Similarly, the top 20 held 71.8 percent of revenue in 1988, up slightly from 68.7 percent in 1987. Insignificant changes in concentration indicate that more consolidation can be expected.

Moreover, the leading EDA vendor, Mentor Graphics, commands only a 12.6 percent market share, which is a far cry from market dominance. Daisy, with its acquisition of Cadnetix, now holds an 8.8 percent market share, pulling to within striking distance of Mentor. And Valid's string of acquisitions has brought the company 6.0 percent of the EDA pie. In sum, 1988 was the year that market leaders were forced to become stronger, either by acquisitions, mergers, or internal expansion; despite the consolidation, the industry remains highly fragmented.

THE FORCE BEHIND CONSOLIDATION

Several reasons for the high rate of consolidation stand out. Discussion of the more important reasons follow.

Critical Mass

In some instances, vendors recognized that competing with Mentor Graphics would first require reaching "critical mass." Other vendors concluded that simply keeping pace with Mentor's EDA growth (35.6 percent in 1988), or narrowing its market share lead, could be accomplished only through mergers or acquisitions.

Filling Product Voids

Competitors also acknowledged that unsuccessful and undeveloped product voids had to be filled immediately, thus precluding in-house product development. Ostensibly, the urgency was in response to the market's demand for integrated, end-to-end EDA solutions. But merging products from different companies does not necessarily result in a tightly integrated EDA product line. In fact, it usually does not. Dissimilar data bases and user interfaces, for example, present a roadblock to seamless integration. Over the long term, there is little doubt that vendors that acquire products through acquisitions will tightly integrate these tools into their environments, but this is by no means an overnight process.

Product Line Differentiation

With compute environments becoming more standardized across the EDA industry (e.g., platform, operating system, networking, graphics), vendors can no longer differentiate themselves along the "compute dimension." In essence, the workstation is becoming somewhat of a commodity. So the more application software an EDA vendor acquires or develops, the more the vendor distinguishes itself from its competitors.

End-to-End Solution

Expanding product line breadth instantaneously via acquisitions is advantageous from a market positioning standpoint. It provides a tactical edge for competing against focused niche players that are selling tools accredited with either functionality or performance superiority. Here, the goal is to offset that superiority by providing the market with an "integrated" product line together with one-stop shopping. One-stop shopping simplifies service and support, which is extremely important to schedule-conscious EDA managers, many of whom do not relish the idea of dealing with a myriad of suppliers.

© 1989 Dataquest Incorporated May

Although a full-line, integrated product suite is beneficial, Dataquest believes that the EDA market will not adopt tools from a full-line supplier if these products exhibit any substantial disparities in either performance or functionality when compared with competitive offerings. Gateway Design Automation, with its Verilog simulator, is a prime example of a niche player that continued to haunt the full-line suppliers in 1988. Companies are buying EDA tools primarily to increase productivity and slash time to market. EDA packages unable to deliver a noticeable edge in these areas will be unsuccessful in the market, even if they come from a vendor offering a plethora of "integrated" EDA products. As a result, "integration" frequently will take a back seat to performance and functionality. However, this will not always be the case. Dataquest believes that use of a truly integrated EDA intertool system (i.e., common data base, common user interface, intertool communication) will slash more time off the design cycle than a set of loosely coupled, high-performance tools. As a result, individual tool capabilities will become secondary to integration, as vendors begin delivering truly integrated systems. Of course, the optimal situation is to provide the market with tightly integrated, full-featured, high-performance tools—a goal that EDA vendors continue to strive toward.

WHAT THE MERGERS AND ACQUISITIONS DID FOR THE PLAYERS

The slew of mergers and acquisitions in 1988 changed the competitive forces within the EDA industry significantly. In almost every case, the combination yielded a more competitive company in one area or another. These mergers and their effects include the following:

- Daisy's acquisition of Cadnetix thrusted Daisy into the top slot in the PCB layout arena, a significant accomplishment given that Daisy was at the bottom in 1987.

- Cadnetix's purchase of HHB Systems gave the company a solid base of simulation and automatic test generation technology in which to complement the firm's increasing strength in PCB layout. However, Cadnetix did not anticipate the initially hostile takeover orchestrated by Daisy Systems. (The Daisy/Cadnetix/HHB Systems merger resulted in duplication of products in several key areas, including simulation, leaving Daisy with little choice but to either sell part or all of HHB Systems.)

- SDA's merger with ECAD, which resulted in a renaming of the combination to Cadence Design Systems, provided the firms with the critical mass and product-line depth needed to accelerate them into a leadership position in IC design tools.

- Cadence's acquisition of Tangent Systems from Intergraph further strengthened Cadence's product line (with Tangent's auto place-and-route software for sea-of-gates gate arrays) and customer base.

- Silicon Compiler Systems' acquisition of Caeco helped reposition it from a silicon compiler company to a full-line supplier of IC design tools, which was necessary in order to compete with Cadence, Mentor, Valid, Silvar-Lisco and Seiko.

- Valid Logic's purchase of Analog Design Tools catapulted the firm into leadership position in the analog design automation market.

- Valid's acquisition of Calma (IC division) gave Valid an installed base of 3,000 seats and the opportunity to significantly grow its fledgling IC layout business.

- Valid's purchase of Integrated Measurement Systems yielded a presence in the prototype ASIC verification market, which sets the stage for the company's foray into the automatic test equipment (ATE) market.

- Mentor Graphics' purchase of Trimeter Technologies in 1989 was initiated to bring logic synthesis technology into the Mentor product fold.

- Mentor's acquisition of Tektronix's CAE Systems Division increased the Mentor installed base and gave Mentor computer-aided software engineering (CASE) technology.

- Mentor's purchase of Contour Design Systems bolstered Mentor's analog design automation technology.

- Cadam's purchase of PCAD gave the former a low-end PCB layout product to complement its high-end Prance offering.

- Prime Computer's merger with ComputerVision moved Prime into the EDA field, while ComputerVision received an infusion of marketing and sales support from Prime.

Can The Niche Player Survive?

Dataquest expects 1988's market forces to remain in place throughout 1989 and into 1990, resulting in further consolidation. Can the niche player remain viable? Surviving as a niche player will require three elements, as follows:

- Significant product differentiation

- Integration of the tool into an existing design environment must be a straightforward task.

- Diversified distribution channels and strategic alliances must be established (e.g., direct sales, a few strategic OEMs, reference selling, joint marketing).

© 1989 Dataquest Incorporated May

ANALYSIS OF 1988'S MARKET GROWTH

Standards

Further proliferation of standards (e.g., platform, operating system, networking, graphics, EDIF) was a significant factor driving 1988's expansion. The market has been far more receptive toward EDA solutions configured around nonproprietary compute environments. Dataquest believes that the continuing push toward standards will play a major role in fueling continued growth (e.g., VHDL, UNIX, X-Windows, FDDI, CAD Framework Initiative).

Renewed Confidence

Also contributing to the growth was renewed confidence in the technology and suppliers. For example, the number of $1 million-dollar orders jumped significantly in 1988. However, the market remains very sensitive to delivery delays. Addressing this issue will be critical for recently merged or acquired vendors.

Similarly, because nearly all EDA systems are unavoidably shipped with software bugs, among the most important deliverables to today's EDA market is customer service and support (e.g., helping customers to work around inherent system deficiencies). This fact was confirmed in Dataquest's 1988 end-user survey, in which the single most common reason cited for not repurchasing from a vendor was poor support and service. Moreover, consolidation and instability of the EDA industry makes rapid, uninterrupted, quality service even more important—especially in the Far East, where mergers and acquisitions are an unfamiliar phenomenon.

Workstation Performance

The dramatic increases in workstation performance was also a major factor behind 1988's growth. EDA managers saw productivity gains reaped from workstations churning away at 4 to 10 mips. Time to market is the primary litmus test used by EDA managers in evaluating the tools—whether the tools will help shrink product development cycles—and today's systems are yielding noticeable return on investment (ROI) in this domain. The competitive pressure on workstation manufacturers to double performance every two years will undoubtedly provide further leverage for EDA market expansion.

Tumbling ASPs

In an effort to grab market share (installed base), both workstation vendors and EDA suppliers continued slashing prices in 1988. EDA suppliers and workstation vendors recognize that increasing market share now, while their respective markets are riding high-growth curves, is imperative. Capturing market share when the industry reaches its maturing, slower growth stage will be far more difficult.

© 1989 Dataquest Incorporated May

More Expensive Systems

Much of the industry's revenue growth resulted from vendors shipping systems that have high software value (e.g., PCB layout). Vendors have a greater incentive to ship these kinds of systems because margins are so much higher in comparison with front-end products (e.g., design entry).

EDA MARKET REGIONAL ANALYSIS

North America

In 1988, the North American market for EDA tools grew 12.2 percent over 1987. Much of this growth stems from sales related to spending by the military and aerospace industries, which were preparing for possible cuts in defense projects due to the uncertainties of a new administration.

Similarly, EDA companies received an increased number of $1-million-to-$2-million orders from U.S. customers, especially in the military and aerospace industries. The U.S. semiconductor and computer industries also consumed large quantities of EDA tools.

Market Leadership

Mentor continued to dominate North America, outpacing its nearest competitor, Daisy, by nearly a 2:1 margin. Mentor's $143.6 million revenue translated to a 14.8 percent market share, up from $112.6 million and a 12.9 percent market share in 1987.

However, both Daisy and Valid gave Mentor reason to start looking over its shoulder, as each firm's North American EDA revenue doubled from the previous year. Daisy recorded revenue of $87.3 million, equivalent to a 9.0 percent market share, and Valid weighed in at $74.8 million, giving the company a 7.7 percent slice of the pie.

Daisy's North American growth was due primarily to its acquisition of Cadnetix, and much of Valid's increase came from its acquisition of Analog Design Tools and Integrated Measurement Systems. It is highly doubtful that the firms can repeat 1988's growth without additional acquisitions or mergers.

Although Mentor enjoyed considerable success in 1988, Apollo's eroding position in the marketplace made it difficult or impossible for Mentor to penetrate some accounts. This fueled speculation that Mentor would complement its Apollo-based offering with a second platform. Dataquest believes that the platform issue may have been solved with Hewlett-Packard's acquisition of Apollo, which resulted in workstation market-share leadership for HP/Apollo, as of the end of 1988 (30.4 percent).

But the acquisition also creates a conflict between HP/Apollo and Mentor, because HP sells not only workstations, but EDA software that competes with Mentor's product line. With the acquisition, HP controls the workstations that Mentor purchases from Apollo. Dataquest believes that HP may address the problem by selling its EDA business

 © 1989 Dataquest Incorporated May

to Mentor in exchange for Mentor's commitment to port to the HP platforms, since HP has not been a major player in EDA software. In fact, of HP's $70.4 million in 1988 EDA sales, only $14.0 million was in software. The revenue HP would derive from Mentor selling HP workstations would substantially outweigh its loss of EDA software business.

Asia

The Asian EDA market grew by 27.3 percent in 1988, from $524.0 million in 1987 to $667.0 in 1988. Dataquest believes that several factors explain the Asian market's growth in 1988, as follows:

- Rebound from market sluggishness in 1987 resulted from the yen's appreciation.
- After factoring the yen's appreciation into 1988's market growth, actual growth was approximately 16.0 percent.
- Profitability for Japanese semiconductor manufacturers over the past two years was very high, allowing for increased investment in EDA tools.

Market Leadership

What is most significant about the Asian market is the marginal penetration by U.S. vendors: Four of the top five market-share slots are held by Japanese suppliers, although Mentor Graphics remains the leader with revenue of $74.0 million and an 11.1 percent market share. Mentor's strength was primarily due to its CAE business, which accounted for more than 70 percent of its Asian revenue.

Following Mentor are Zuken ($57.9 million), Fujitsu ($53.8 million), NEC ($53.4 million), and Seiko ($42.2 million). Despite the lack of U.S. penetration, Dataquest anticipates that U.S. EDA vendors will begin making significant inroads into the Asian market in 1989, as U.S. firms turn their sights from North America to the Far East. Vendors making successful penetration in 1989 will derive 20 percent to 35 percent of their worldwide revenue from Asian campaigns.

Unlike the CAE sector, the PCB layout market, which expanded by 26 percent to $293.9 million in 1988, was completely dominated by Japanese suppliers: Zuken (15.1 percent), Fujitsu (11.5 percent), NEC (9.7 percent), and Sharp (5.1 percent). Zuken's success is tied to its stable position in the marketplace—it is one of the oldest PCB layout companies in the industry and has been the revenue leader for many years. However, in 1988, with an increasing number of vendors competing for the Asian PCB market, the firm expanded into CAE, unveiling schematic capture and simulation tools for both analog and digital design. This was a positive move for Zuken, as its CAE offerings accounted for more than 15 percent of the firm's 1988 revenue.

A big surprise in Japan came from Seiko, which continued to hold onto its leadership position in IC layout, despite the increasing competition from Cadence and Mentor. Seiko captured a 29.7 percent market share in Asia in 1988, down slightly from its 30.1 percent share in 1987; Cadence is the next closest competitor, with 12.0 percent.

© 1989 Dataquest Incorporated May

And worldwide, Seiko ranks second (11.5 percent) behind Cadence (15.4 percent). Seiko's recent success stems from its SX-8000 IC layout system, which the company has been actively marketing since Daisy's commitment in the IC layout market became questionable. (Seiko is a distributor for Daisy.) Daisy is still selling its ChipMaster IC design system, but no further development of the product is planned.

Europe

The European market grew 20.9 percent in 1988, from $561.0 million to $678.1 million. CAE experienced the largest growth, with revenue climbing 23.7 percent, from $270 million in 1987 to $333.9 million in 1988. Also exhibiting robust expansion was the PCB arena, where revenue grew to $272.5 million, up from $229.0 million in 1987. (After factoring in appreciation of European currencies, 1988 EDA growth was approximately 17.7 percent.)

Presently, Europe is in a transition period and is attempting to enhance its competitive position against Japan and the United States. Examples of the European commitment include the following:

- Europe's goal of tearing down internal trade barriers by 1992 is well underway.
- Many of Europe's large system manufacturers are striking alliances with foreign companies (e.g., VLSI Technology and Philips) to gain access to strategic areas of technology.
- European electronics manufacturers also have been upgrading their EDA capabilities significantly, as witnessed by the steady growth over the past two years.

Dataquest anticipates that many U.S. and Asian electronics firms will establish manufacturing and design sites in Europe during the next two to three years to avoid the tariff that will be imposed in 1992. And large European systems manufacturers will continue upgrading EDA capabilities during the next few years as they strive to reduce development costs and increase product offerings. This upgrading, together with the increased effort EDA vendors are putting on European sales and marketing, will provide healthy expansion of the European EDA market during the next few years.

Market Leadership

In 1988, Mentor and Daisy were locked in a heated race for EDA market-share leadership, finishing up the year with 11.6 percent and 11.4 percent, respectively. Daisy held a slight edge over Mentor in PCB layout (9.7 percent to 7.2 percent), whereas Mentor was just ahead of Daisy in CAE sales (15.7 percent to 14.5 percent). This is in sharp contrast to the North American CAE sector, where Mentor outpaced Daisy by a 2:1 margin.

© 1989 Dataquest Incorporated May

Racal-Redac was third in the European market, with revenue of $53.9 million. Racal-Redac, whose primary business is PCB layout, maintained its leadership position in this area with a 16.1 percent market share. However, the firm also had a presence in CAE, deriving more than 13 percent of its revenue from front-end design tools (e.g., Racal is an OEM of HHB Systems' CADAT simulator).

In 1988, Racal-Redac, like Zuken in Asia, began feeling the competitive pressures from U.S. PCB layout vendors (e.g., Mentor, Valid, Daisy,) and, as such, put more emphasis on its CAE business. But the company is an OEM of the CADAT simulator and, thus, is unable to enjoy high margins on the product. Dataquest believes that an acquisition of HHB Systems by Racal-Redac would provide Racal-Redac with the margin incentives to expand into the CAE arena aggressively into the CAE arena. The combination also would provide Racal-Redac with a much stronger position against Mentor, Daisy, and Valid.

CHANGING BUSINESS MODELS

The EDA industry is undergoing a major change, moving from a predominantly turnkey business (Daisy Systems, Mentor Graphics, Valid Logic) to one that now includes a healthy mix of software-only vendors (e.g., Cadence, Silicon Compiler Systems) and workstation suppliers (Sun, Digital Equipment, IBM, HP/Apollo, Intergraph, Solbourne, Sony) selling directly to EDA end-users.

Dataquest believes that this trend toward unbundling is driven by the following factors:

- A better deal. Large-volume workstation customers often believe they can extract higher discounts for the hardware if they buy it separately through an alternate distribution channel (i.e., a non-EDA workstation OEM such as a workstation clone manufacturer).

- Network licenses. The market is beginning to demand network licenses for EDA software instead of site-and-node licenses. With network licensing, the customer purchases the software either separately or bundled on a file server. The license allows a fixed number of nodes to use the software concurrently, and the customer is free to load the software onto any node on the network. Thus, the customer is not purchasing a turnkey workstation for each license. Valid's Access system, for example, is among the first to meet this new market demand. Several other vendors, including Cadence, also have begun offering network licensing.

- Market expectancy. With an increasing number of vendors unbundling their software, the market is expecting other vendors to do the same.

- Porting gets easier. With standards such as the C language and the UNIX operating system becoming more pervasive, porting to additional platforms is becoming less burdensome. Yet, the costs and complexities (e.g., inventory, quality control, service) of selling multiple-platform turnkey systems can become prohibitive. Shipping only software simplifies and expedites porting to new platforms.

- Shrinking hardware margins. Vendors supporting even one turnkey platform are finding it increasingly difficult to sustain turnkey profit margins because hardware margins are slipping, a result of the tumbling workstation prices.

Dataquest believes that the combination of these factors will continue chipping away at the once healthy turnkey profit margins, thereby slowing the growth of turnkey systems. However, many EDA vendors remain committed to selling turnkey systems, and large segments of the EDA market still wish to buy both hardware and software from a single supplier.

Extending the Life of Turnkey Systems

Dataquest believes that vendors can forestall the market's demand for unbundling by leveraging the turnkey solution with attractive service contracts, which include both hardware and software maintenance. Because EDA managers are looking for complete design automation solutions, and not simply a list of separate technical requirements (e.g., the application software, workstations, operating systems, networking, graphics), large segments of the market will be inclined to buy turnkey systems if the unified service contract makes buying the hardware separately less palatable.

Solutions to Falling Margins

Dataquest believes that EDA suppliers will combat slipping hardware margins by attempting to ship more turnkey systems that have a higher software value content. This strategy preserves system margins due to the dramatically wider margins reaped from software.

Vendors also will attack the problem by improving inventory management. For Mentor Graphics, employing this strategy in 1988 yielded positive results: Sales volumes increased, yet inventory levels as of December 31, 1988, were $20.6 million, down from $23.3 million in 1987. However, this reduction in inventory could also be indicative of the close relationship between Apollo Computer and Mentor.

Similarly, some vendors have resorted to just-in-time (JIT) inventory management. This, of course, is risky business, but an increasing number of companies across a range of different industries have resorted to it.

© 1989 Dataquest Incorporated May

The Achilles Heel: Software Pricing

Falling average selling prices (ASPs) of hardware will present another problem for EDA suppliers: Customers will expect a corresponding erosion of software prices. This puts EDA vendors in a difficult position, because software development costs are rising. The problem is less acute for vendors selling turnkey systems, because software pricing can be buried in the bundled system price. Nonetheless, the huge margins on software are in jeopardy, as more and more software is sold unbundled.

To solve the problem and reduce the cost of development, some vendors are turning to object-oriented programming languages such as C++, which appears to be an emerging standard in the EDA industry. Several EDA vendors, including Mentor, Valid, and Cadence, have been using C++ extensively. In fact, Mentor's Package Station is based exclusively on C++. The C++ language is an extension of C that adds the concept of class, a mechanism for creating user-defined data types. The language was developed at the Computer Science Research Center at AT&T Bell Laboratories (Murray Hill, New Jersey).

Object-oriented programming is a relatively new style of programming that seems to be yielding significant increases in programmer productivity. Much of the assets of today's EDA vendors is measured by the productivity of the firms' software engineers, so a boost in productivity will produce a more favorable asset turnover (sales/total assets). Even more important, object-oriented programming enables code reuse and better maintainability, which can dramatically increase the code's life span.

On the down side, because object-oriented software construction is a new style of programming, there are relatively few experts in the field. Recognizing the importance of using C++, however, both Mentor and Valid established in-house training projects to get developers up to speed.

Dataquest believes that EDA vendors that are able to significantly reduce the cost of software development and maintenance will be among the most competitive in the 1990s.

1988 EVENTS IMPACTING 1989 AND BEYOND

VHDL Comes of Age

The VHSIC Hardware Description Language (IEEE-1076) leaped to center stage in 1988. Most of the major EDA vendors have announced that they will support it. However, the vast majority of the market is unfamiliar with VHDL, and several issues have yet to be resolved (e.g., whether existing simulators will be afforded the luxury of accepting only a particular "standard" subset of VHDL constructs). As a result, VHDL will not immediately impact the market. In fact, the VHDL test validation suite, which will enable the Department of Defense (DOD) to verify the capabilities of each vendor's VHDL simulator, will not be available until early 1990. The suite of software test programs is being developed by Intermetrics and Vantage Analysis Systems, both of which provide VHDL simulators.

Presently, the market is curious about VHDL, as much has been written about it in the press over the last year. However, Dataquest believes that VHDL's rate of market penetration in the commercial sector will depend on how well it performs against competitive hardware description languages (HDLs).

Logic Synthesis

Logic synthesis made its debut in 1988, with three start-up companies capturing most of the attention: Synopsys, Silc Technologies, and Trimeter Technologies. Briefly, logic synthesis allows engineers to describe the behavior of a design in a hardware description language; from this description, a circuit is automatically synthesized by the logic synthesis system. The circuit is then optimized to minimize the number of gates necessary to implement the design.

Logic synthesis' primary advantage is twofold: First, the optimization ensures that the least amount of real estate will be consumed by the design; and second, working with a high-level language instead of gates simplifies and speeds the design process dramatically, since the designer is not bogged down with the intricacies of gates and primitive macrocells.

Logic synthesis is a step higher than silicon and cell compilation, both of which require the designer to work at the structural level of design (e.g., block- and register-level). Silicon and cell compilation can be thought of as a subset of logic synthesis, since the high-level descriptions used in logic synthesis are transformed into structural representations, which are then compiled into a physical representation and mapped onto a selected physical structure (e.g., a full-custom, gate array, cell-based, programmable logic device).

The total market for logic synthesis tools in 1988 is estimated at $8.0 million (including logic synthesis tools for PLD design—Boolean equations, state machines, etc.). Dataquest expects this figure to jump to $13.0 million in 1989. Most of the large EDA vendors, as well as the ASIC vendors, are currently formulating a strategy to meet the market's demand for logic synthesis tools. Mentor took the first step by announcing its intent to acquire Trimeter Technologies in early 1989. Others, such as Cadence and LSI Logic, have become OEMs of the Synopsys product.

The central issue surrounding logic synthesis is which hardware description language will become the de facto standard for describing circuit behavior. Silc Technologies provides its own language, Synopsys offers Gateway Design Automation's Verilog language, and Trimeter supports VHDL. However, because VHDL is becoming a broadly supported standard, both Silc and Synopsys have committed to developing VHDL-based logic synthesis tools. The problem with VHDL is its all-encompassing nature, which makes synthesis of the entire language impossible. So again, the issue will be which VHDL constructs the logic synthesis vendors will support.

© 1989 Dataquest Incorporated May

New Muscle behind Analog Design Automation

Dataquest estimates that the analog design automation market in 1988 was between $50 million and $60 million. Until now, most EDA vendors have given little attention to the analog design automation market due to its limited size. However, because almost all of the analog design automation environments are a composite of very loosely integrated tools from universities, in-house development projects, and commercial vendors, a substantial need for sophisticated, high-performance tools existed. In 1988, EDA vendors took aim at this market. The results were as follows:

- Valid acquired Analog Design Tools, the leader in the analog design automation market with 1988 revenue of $15.4 million.

- Daisy acquired SimuCAD, a niche company focusing on analog simulation, as part of its Cadnetix/HHB Systems acquisition. Daisy's analog design automation groups have consolidated and now exist as separate divisions.

- Mentor Graphics increased the depth of its analog offering by purchasing Contour Design Systems, a supplier of analog component libraries and modeling technology.

- Cadence is establishing its place in the analog design automation field by adopting a series of technology partners. This is the same strategy used by the firm (formerly SDA) during its start-up period several years ago. Under the agreements, Cadence receives an infusion of capital and feedback for improvements on Cadence's products from each of its partners. In return, the partner receives access to the technology born from the development.

Dataquest believes the significant muscle now behind the development of analog design automation tools will translate to high growth. In addition, analog design automation technology will benefit from major research efforts currently underway at universities throughout the United States, where areas of focus include analog synthesis, simulation, modeling, and physical design.

Mixed-Signal Simulation Gains Momentum

Mixed-signal simulation (i.e., analog/digital) took a leap forward as HHB Systems, GenRad, and Gateway Design Automation each teamed independently with Analogy to link their logic simulators with Saber, Analogy's behavioral-level analog simulator. These Saber-based products join several other mixed-signal simulators already on the market, including those from ViewLogic/MicroSim, Silicon Compiler Systems, Silvar-Lisco, and Sierra Semiconductor.

Dataquest believes that development and proliferation of board-level, mixed-signal simulators will significantly boost the penetration of simulation technology into the mainstream systems design houses. However, for these products to be successful, they must possess robust component model libraries and exhibit high execution speeds.

A New Push Toward Standardization: CAD Framework Initiative

With 1988 came the birth of the CAD Framework Initiative (CFI). The CFI comprises a body of EDA vendors and users whose charter is to develop guidelines for standard EDA framework implementation. A framework is a software infrastructure providing a common operating environment for EDA tools. The CFI is currently addressing six elements: system environments (e.g., operating systems), design methodology management, design data management, design representation, user interfaces, and intertool communications.

The CFI group is attempting to solve the problems of heterogeneous design environments, since most current EDA environments consist of a mixture of software and hardware from an array of vendors. Heterogeneous environments are what the market is demanding—users want the freedom to buy design tools from different suppliers and to easily integrate them into a standard EDA environment.

Some vendors have responded by offering software utilities that allow users to more easily integrate tools into that vendor's proprietary framework. This is a good first step, but the market still remains fearful of relying on any particular vendor's framework, for even with such an "open" system, users must base their design environment on a nonstandard framework from a single vendor.

Dataquest views formation of the CFI as very positive. Most of the market is unaware of the group, but those that are—mostly EDA managers—are hopeful, although somewhat skeptical, that the CFI will bear fruit. Skepticism stems from the fact that a large amount of plurality and bias exists among the CFI vendor membership, which may slow development of a standard framework.

Despite the CFI's aggressive development schedule to generate a preliminary standard by late 1990, Dataquest believes that it may be well into 1991 or early 1992 before an industry-endorsed standard set of guidelines emerges from the group. However, development and acceptance will accelerate as more large EDA users pressure the group to come to a consensus. Currently, CFI has approximately 40 members, including Mentor Graphics, Valid Logic Systems, Cadence Design Systems, EDA Systems, Digital Equipment Corporation, Hewlett-Packard, Motorola, MCC, VLSI Technology, Sony, Philips, Siemens, and Nixdorf.

Silicon Vendors Aim at Software Market

Several chip manufacturers, most notably LSI Logic and VLSI Technology, launched major EDA software campaigns to leverage their silicon offerings in 1988. Both firms surpassed the $20 million barrier and will continue developing and marketing EDA software that facilitates silicon sales. As ASIC manufacturing becomes more of a commodity, ASIC vendors will attempt to differentiate themselves not only on fabrication capabilities, but design tools as well.

© 1989 Dataquest Incorporated May

But the high cost of developing tools, as well as the difficulty of keeping pace with the technology advances from commercial EDA vendor offerings, is increasingly prohibiting in-house development. To solve the problem, several ASIC vendors are opting to serve as OEMs for commercial EDA suppliers. ASIC vendors are offering customers with "open" EDA systems that combine the ASIC vendor's proprietary tools with third-party packages. Among the first to espouse this strategy are Motorola, LSI Logic, and NEC.

EDA vendors also are doing their part to open the newly discovered ASIC-vendor distribution channel. For instance, Cadence recently established its Silicon Access Alliance (SAA) OEM program, whereby Cadence helps the ASIC vendor integrate proprietary, third-party, and Cadence software into a common design environment. All or part of the resulting design automation system is then remarketed to the ASIC supplier's customers, which are predominantly systems houses. Initial members of the SAA program include National Semiconductor, Harris Semiconductor, and European Silicon Structures.

Cadence's strategy thus provides the firm with a second distribution channel into the systems market that complements its direct channel. This channel will "prime the pump" for Cadence to more effectively penetrate electronic systems manufacturers.

Cadence: A New Member of the Daisy-Mentor-Valid Triumvirate?

Cadence, which traditionally has been attacking the back end of the IC design process, has clearly begun targeting the systems market with not only back-end IC design tools, but front-end system design products. Cadence is using the following strategies to penetrate this territory:

- Establishing a separate division whose charter is to thrust the company into the systems domain
- The SAA OEM program
- Signing of several technology partner agreements with systems houses
- Striking an agreement with Gateway Design Automation to integrate and reference sell the Verilog simulator, a tool used for front-end design
- Signing an agreement with Synopsys to be an OEM of the Design Compiler logic synthesis system, which is used by systems engineers for front-end ASIC design

Dataquest anticipates that Cadence will pose a significant threat to the market shares of Mentor, Daisy, and Valid. In fact, in 1988, Cadence surpassed Valid in software revenue.

FUTURE OPPORTUNITIES

Dataquest believes the EDA market will adopt tools that deliver verifiable productivity increases to engineers. The kinds of products that are needed, and that will be successful over the next few years are as follows:

- VHDL-based products
- Logic synthesis tools
- Automatic/interactive partitioning tools
- Analog design automation (e.g., modeling, simulation, layout, synthesis)
- Test synthesis tools (e.g., scan, ATPG)
- Advanced PC board layout systems (e.g., automatic timing-driven layout—crosstalk, impedance matching)
- Mixed-signal simulators
- Design management systems
- Hybrid IC layout tools
- System simulation packages
- IC layout tools geared toward the system designer (e.g., floor planning)

DATAQUEST CONCLUSIONS

Dataquest believes that the hardy growth witnessed in 1988 will continue over the next five years. Electronic design automation, previously viewed as a luxury by most companies, is now clearly recognized as a necessity for remaining competitive. We expect this to be the underlying force driving our forecast 15 percent compound annual growth rate (CAGR) through 1993.

Ron Collett

© 1989 Dataquest Incorporated May

Table 1

1988 EDA Worldwide Market Share

	Revenue	Units	Revenue Share	Units Share
Mentor Graphics	295.9	4,083	12.6%	6.8%
Daisy Systems	205.2	2,005	8.8%	3.3%
Digital	156.0	1,967	6.7%	3.3%
Valid	141.0	1,277	6.0%	2.1%
Sun	124.9	5,942	5.3%	9.8%
Apollo	96.6	5,010	4.1%	8.3%
Racal-Redac	77.0	149	3.3%	.2%
Hewlett-Packard	70.4	4,040	3.0%	6.7%
Cadence	61.7	0	2.6%	.0%
Intergraph	60.4	662	2.6%	1.1%
Zuken	58.0	347	2.5%	.6%
Fujitsu	53.8	382	2.3%	.6%
NEC	53.4	2,815	2.3%	4.7%
Prime Computer	51.7	403	2.2%	.7%
Compaq	50.0	9,600	2.1%	15.9%
IBM	48.3	1,760	2.1%	2.9%
Seiko - No OEM	42.2	200	1.8%	.3%
Zycad	35.4	51	1.5%	.1%
Silicon Compiler Systems	30.4	0	1.3%	.0%
Scientific Calc.	29.0	101	1.2%	.2%
Other	603.1	19,531	25.7%	32.4%
All Companies	2,344.4	60,324	100.0%	100.0%
All U.S.-Based Companies	1,854.1	53,114	79.1%	88.0%
All Asian-Based Companies	317.0	5,410	13.5%	9.0%
All European-Based Companies	173.4	1,799	7.4%	3.0%
All Hardware Companies	566.9	44,204	24.2%	73.3%
All Turnkey & SW Companies	1,777.6	16,119	75.8%	26.7%

Source: Dataquest
May 1989

© 1989 Dataquest Incorporated May

Table 2

EDA Worldwide Forecast by Application

	1988	1989	1990	1991	1992	1993	CAGR
All EDA Applicat.							
Revenue	2,344	2,732	3,174	3,662	4,126	4,645	14.7%
Systems	58,599	69,800	83,400	95,580	110,750	125,150	16.4%
Workstations	60,324	71,140	84,360	96,230	111,160	125,440	15.8%
Electronic CAE							
Revenue	1,127	1,307	1,525	1,760	1,959	2,169	14.0%
Systems	31,590	37,120	45,570	53,140	62,210	69,920	17.2%
Workstations	31,851	37,290	45,690	53,230	62,290	70,020	17.1%
IC Layout							
Revenue	334	420	505	581	652	740	17.3%
Systems	4,152	5,670	7,240	8,510	9,800	11,460	22.5%
Workstations	4,314	5,790	7,320	8,560	9,830	11,480	21.6%
PCB Layout							
Revenue	884	1,004	1,144	1,321	1,515	1,736	14.4%
Systems	22,856	27,010	30,580	33,940	38,740	43,770	13.9%
Workstations	24,158	28,060	31,350	34,440	39,040	43,950	12.7%

Source: Dataquest
May 1989

© 1989 Dataquest Incorporated May

Table 3

EDA Worldwide Forecast by Region

	1988	1989	1990	1991	1992	1993	CAGR
Worldwide							
Revenue	2,344	2,732	3,174	3,662	4,126	4,645	14.7%
Systems	58,599	69,800	83,400	95,580	110,750	125,150	16.4%
Workstations	60,324	71,140	84,360	96,230	111,160	125,440	15.8%
North America							
Revenue	971	1,075	1,195	1,342	1,504	1,680	11.6%
Systems	29,952	34,420	38,420	41,370	45,970	49,510	10.6%
Workstations	30,491	34,760	38,590	41,440	45,990	49,520	10.2%
Europe							
Revenue	678	797	932	1,107	1,234	1,378	15.2%
Systems	15,796	18,270	22,800	27,210	32,630	38,210	19.3%
Workstations	16,264	18,700	23,150	27,460	32,760	38,270	18.7%
Far East							
Revenue	667	821	993	1,142	1,296	1,465	17.0%
Systems	12,114	16,100	20,690	24,860	29,060	33,070	22.2%
Workstations	12,790	16,610	21,070	25,110	29,220	33,190	21.0%
Rest of World							
Revenue	29	39	53	71	92	122	33.6%
Systems	737	1,010	1,480	2,140	3,090	4,350	42.6%
Workstations	779	1,060	1,550	2,220	3,190	4,470	41.8%

Source: Dataquest
May 1989

© 1989 Dataquest Incorporated May

Table 4

EDA Worldwide Forecast by Platform

	1988	1989	1990	1991	1992	1993	CAGR
All Platforms							
Revenue	2,344	2,732	3,174	3,662	4,126	4,645	14.7%
Systems	58,599	69,800	83,400	95,580	110,750	125,150	16.4%
Workstations	60,324	71,140	84,360	96,230	111,160	125,440	15.8%
Technical Workstation							
Revenue	1,536	1,945	2,480	3,118	3,699	4,314	22.9%
Systems	24,582	33,610	47,220	65,550	85,910	106,800	34.1%
Workstations	24,583	33,610	47,220	65,550	85,910	106,800	34.1%
Host-Dependent/Server							
Revenue	459	426	354	271	214	175	-17.5%
Systems	2,179	2,370	2,200	1,860	1,600	1,390	-8.6%
Workstations	3,902	3,710	3,170	2,510	2,020	1,690	-15.4%
Personal Computer							
Revenue	349	361	340	274	213	155	-14.9%
Systems	31,838	33,820	33,980	28,170	23,240	16,960	-11.8%
Workstations	31,838	33,820	33,980	28,170	23,240	16,960	-11.8%

Source: Dataquest
May 1989

© 1989 Dataquest Incorporated May

Table 5

EDA Worldwide Average Price per Seat Forecast by Platform

	1988	1989	1990	1991	1992	1993	CAGR
Turnkey & Hardware-Only							
Technical Workstation	39.6	35.3	30.8	26.7	22.9	20.5	-12.3%
Host-Dependent/Server	152.1	128.6	112.1	98.6	86.9	77.9	-12.5%
Personal Computer	5.4	5.4	5.1	4.8	4.5	4.3	-4.5%
All Platforms	25.2	23.9	22.5	21.6	19.9	19.0	-5.5%
Turnkey							
Technical Workstation	62.0	58.2	54.3	50.4	48.4	48.2	-4.9%
Host-Dependent/Server	376.8	361.4	341.6	315.9	317.4	321.0	-3.2%
Personal Computer	15.1	16.9	14.4	13.0	13.1	9.6	-8.7%
All Platforms	64.9	61.3	56.4	51.9	49.4	49.0	-5.5%
Hardware-Only							
Technical Workstation	18.1	16.4	14.9	13.5	12.4	11.9	-8.0%
Host-Dependent/Server	88.1	79.5	72.9	68.6	62.6	57.1	-8.3%
Personal Computer	4.6	4.7	4.7	4.6	4.3	4.3	-1.3%
All Platforms	11.7	11.6	11.3	11.4	11.1	11.2	-.9%

Source: Dataquest May 1989

© 1989 Dataquest Incorporated May

Table 6

EDA Worldwide Revenue Sources Forecast by Platform

	1988	1989	1990	1991	1992	1993	CAGR
All Platforms							
Hardware	1,154	1,236	1,385	1,524	1,639	1,779	9.0%
Software	866	1,114	1,338	1,606	1,879	2,175	20.2%
Service	325	382	451	532	607	690	16.3%
Total	2,344	2,732	3,174	3,662	4,126	4,645	14.7%
Technical Workstation							
Hardware	703	835	1,032	1,252	1,430	1,623	18.2%
Software	587	806	1,062	1,383	1,700	2,031	28.2%
Service	241	304	385	482	569	659	22.3%
Total	1,536	1,945	2,480	3,118	3,699	4,314	22.9%
Host-Dependent/Server							
Hardware	282	235	193	147	114	91	-20.3%
Software	110	131	111	87	71	61	-11.1%
Service	65	60	49	37	29	24	-18.3%
Total	459	426	354	271	214	175	-17.5%
Personal Computer							
Hardware	169	166	159	124	95	66	-17.2%
Software	169	177	165	137	108	82	-13.4%
Service	18	18	16	13	10	7	-17.1%
Total	349	361	340	274	213	155	-14.9%

Source: Dataquest
May 1989

© 1989 Dataquest Incorporated May

Table 7

EDA Worldwide Forecast by Distribution Class

	1988	1989	1990	1991	1992	1993	CAGR
Total Hardware and Software Revenue							
Turnkey	960	1,106	1,222	1,327	1,345	1,371	7.4%
Unbundled	1,061	1,243	1,501	1,803	2,173	2,583	19.5%
Total	2,021	2,350	2,723	3,130	3,518	3,954	14.4%
Hardware Revenue							
Turnkey	637	671	731	783	777	774	4.0%
Unbundled	518	565	654	741	862	1,005	14.2%
Total	1,154	1,236	1,385	1,524	1,639	1,779	9.0%
Software Revenue							
Turnkey	323	436	491	544	568	597	13.1%
Unbundled	543	678	847	1,063	1,311	1,578	23.8%
Total	866	1,114	1,338	1,606	1,879	2,175	20.2%
Workstation Shipments							
Turnkey	16,119	18,360	21,420	24,720	25,830	26,130	10.1%
Unbundled	44,204	52,780	62,940	71,510	85,330	99,310	17.6%
Total	60,324	71,140	84,360	96,230	111,160	125,440	15.8%

Source: Dataquest May 1989

Dataquest
a company of The Dun & Bradstreet Corporation

Research Newsletter

CCIS Code: Electronic Newsletters
1989–1
0003280

ASICs SURPASS $7.4 BILLION IN 1988

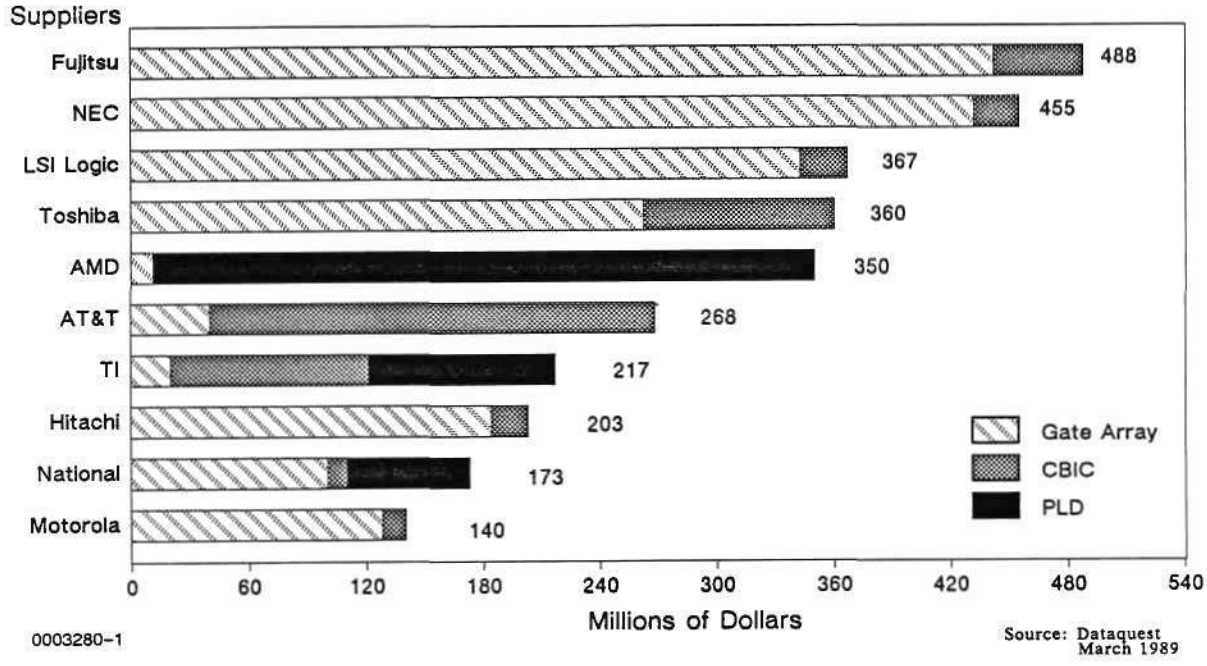
SUMMARY

Application-specific integrated circuits (ASICs) now account for more than 20 percent of worldwide IC consumption, and Dataquest believes that ASICs will be an astounding $17.4 billion market by 1994. Worldwide ASIC consumption grew from $2.3 billion in 1983 to $7.4 billion in 1988. ASICs can incorporate the microprocessor, memory, and logic on a single chip, thus reducing the size and cost of a system while improving the performance and reliability. ASICs are transforming the IC industry.

Gate arrays are the largest ASIC market, followed by full-custom ICs, cell-based ICs (CBICs), and programmable logic devices (PLDs). During 1988, gate array consumption rose 27.6 percent, CBIC consumption grew 33.4 percent, and PLD consumption grew 39.9 percent. Figure 1 illustrates the top ten 1988 worldwide ASIC suppliers and their respective product mixes.

Figure 1

Estimated 1988 Worldwide ASIC Ranking



Source: Dataquest March 1989

© 1989 Dataquest Incorporated March—Reproduction Prohibited

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

THE 1988 ASIC MARKET

Table 1 lists the estimated 1988 worldwide ASIC shipments for the top ten suppliers shown in Figure 1.

Table 1

Estimated 1988 Worldwide ASIC Shipments
(Millions of Dollars)

1988 Ranking	Companies	Gate Array	CBIC	PLD	Total
1	Fujitsu	$ 442.0	$ 46.0	0	$ 488.0
2	NEC	432.0	23.0	0	455.0
3	LSI Logic	343.0	24.0	0	367.0
4	Toshiba	262.0	98.0	0	360.0
5	Advanced Micro Devices	11.0	0	$338.8	349.8
6	AT&T Technologies	40.0	228.0	0	268.0
7	Texas Instruments	20.0	101.0	96.3	217.3
8	Hitachi	184.0	19.0	0	203.0
9	National Semiconductor	100.0	10.0	63.0	173.0
10	Motorola	128.0	12.0	0	140.0
	Total	$1,962.0	$561.0	$498.1	$3,021.1

Source: Dataquest
March 1989

Fujitsu was the number one ASIC supplier for the fifth year in a row. Second-place NEC stated three years ago that it would become the number one ASIC supplier, and it seems to be right on schedule. NEC grew 35.4 percent from 1987 to 1988, while Fujitsu grew just 24.7 percent. NEC was only $33 million behind Fujitsu in total 1988 ASIC revenue, and we believe that 1989 may well be the year that NEC becomes the number one ASIC supplier. LSI Logic and Toshiba are formidable competitors also and experienced growth surpassing both Fujitsu and NEC with 40.7 percent and 54.4 percent, respectively.

Seven of the top ten ASIC suppliers generated the majority of their revenue from gate arrays. AMD is unique in that it was the only supplier to make the top ten ranking with the majority of its revenue in PLDs, having little or no revenue in gate arrays and CBICs. During 1988, there were no major Japanese suppliers in the PLD market; however, Fujitsu just announced a PLD product that it will begin shipping in 1989. Samsung also has entered the PLD market and currently is involved in a lawsuit with AMD on PLD patents. We expect to see fierce competition in the PLD market during 1989 and 1990.

© 1989 Dataquest Incorporated March

AT&T Technologies and Texas Instruments (TI) both derived the majority of their ASIC revenue from CBICs. Both companies had healthy years in ASICs, growing 64.4 percent and 53.4 percent, respectively. Although Hitachi, National, and Motorola had 1987 to 1988 ASIC growth rates that were only in the high teens to mid-twenties, each has made a major commitment to the ASIC market.

Gate Arrays

As mentioned earlier, seven of the top ten ASIC suppliers generated the majority of their revenue from gate arrays. Furthermore, Table 2 shows that the top four ASIC suppliers are the same as the top four gate array suppliers.

Table 2

Top Five 1988 Worldwide Gate Array Suppliers
(Millions of Dollars)

1988 Ranking	Companies	1987	1988	1987-1988 Growth	Market Share
1	Fujitsu	$ 357.0	$ 442.0	23.8%	15.0%
2	NEC	318.0	432.0	35.8%	14.7%
3	LSI Logic	251.0	343.0	36.7%	11.7%
4	Toshiba	174.0	262.0	50.6%	8.9%
5	Hitachi	149.0	184.0	23.5%	6.3%
	Total	$1,249.0	$1,663.0	33.1%	56.5%

Source: Dataquest
March 1989

Four of the top five gate array suppliers are Japanese companies. Fujitsu is still the number one supplier, although NEC is narrowing the gap. LSI Logic is holding its own against the Japanese giants and maintained the number three position in total worldwide gate arrays and the number one position in worldwide MOS gate arrays. All four Japanese suppliers are not only leaders in the gate array market, but also leading computer suppliers. This gives them an advantage in two ways. First, they use their internal computer needs to help define future merchant gate array products. And second, they achieve increased economies of scale in manufacturing.

Fujitsu, NEC, and Hitachi all had significant revenue generated from bipolar (ECL) gate arrays, of which a large portion was consumed internally by their computer divisions. Fujitsu was the number one 1988 worldwide bipolar gate array supplier with $220 million; it was followed by NEC, Motorola, and Hitachi with $141 million, $103 million, and $85 million, respectively. Although Motorola was the number three total worldwide bipolar gate array supplier, it was the number one supplier to the merchant market.

© 1989 Dataquest Incorporated March

LSI Logic captured the number one position in the 1988 worldwide MOS gate array market, with $343 million. NEC was the number two supplier, with $291 million. Toshiba, Fujitsu, and Hitachi followed with $262 million, $222 million, and $99 million, respectively. It is interesting to note that four of the top five MOS gate array suppliers are Japanese companies.

It comes as no great surprise that Japanese companies are leaders in the gate array market. Over the last 10 years, Japanese companies have made major investments in gate array manufacturing, technology, software, and marketing. Moreover, Fujitsu was a pioneer in the gate array market and marketed its first gate array product in the mid-1960s.

Cell-Based ICs

Table 3 shows the top five 1988 worldwide cell-based IC (CBIC) suppliers.

Table 3

Top Five 1988 Worldwide CBIC Suppliers
(Millions of Dollars)

1988 Ranking	Companies	1987	1988	1987-1988 Growth	Market Share
1	AT&T	$155.0	$228.0	47.1%	18.0%
2	Texas Instruments	63.0	101.0	60.3%	8.0%
3	Toshiba	59.1	98.0	65.8%	7.7%
4	NCR	71.4	89.0	24.6%	7.0%
5	VLSI Technology	71.4	85.0	19.0%	6.7%
	Total	$419.9	$601.0	43.1%	47.5%

Source: Dataquest
March 1989

AT&T is by far the largest worldwide CBIC supplier; however, a large portion of its revenue is generated from sales to internal divisions. The race is close among the next four suppliers. TI jumped from the number four position in 1987 to the number two position in 1988. Toshiba also moved up in the ranking from number five in 1987 to number three in 1988.

Dataquest believes that a large portion of Toshiba's 1988 sales were derived from what we call optimized gate arrays. Toshiba converted some of its gate arrays that were running in high volume by removing the unused gates and routing channels; the company retooled the device using a full set of masks. This device fits the CBIC definition because it is customized with a full set of masks but is not a traditional CBIC.

© 1989 Dataquest Incorporated March

NCR broke the 1987 tie with VLSI Technology and captured the number four position. NCR experienced healthy growth in 1988 by focusing on mixed analog/digital CBICs. VLSI Technology is focusing on gate arrays now as well as CBICs, thus affecting its CBIC growth. Although the company's CBIC growth was only 19 percent, its gate array growth was a healthy 60 percent, growing from $25 million in 1987 to $40 million in 1988.

It is interesting to note that only one Japanese company made the top five CBIC suppliers in 1988. We believe that the Japanese suppliers will continue to focus on gate arrays as well as structured arrays (megacells embedded in gate array base wafers) and that CBICs will be of secondary importance to them.

Programmable Logic Devices

Table 4 shows the top five worldwide programmable logic device (PLD) suppliers in 1988.

Table 4

Top Five 1988 Worldwide PLD Suppliers
(Millions of Dollars)

1988 Ranking	Companies	1987	1988	1987-1988 Growth	Market Share
1	Advanced Micro Devices	$274.0	$338.8	23.6%	48.0%
2	Texas Instruments	61.0	96.3	57.9%	13.7%
3	National Semiconductor	45.0	63.0	40.0%	8.9%
4	Philips/Signetics	45.9	53.6	16.8%	7.6%
5	Altera	20.7	37.0	78.7%	5.2%
	Total	$446.6	$588.7	31.8%	83.5%

Source: Dataquest
March 1989

Advanced Micro Devices (AMD) tops the chart in 1988 PLD shipments with a clear lead over its competitors. AMD became the largest PLD supplier when it acquired Monolithic Memories in 1987. Texas Instruments experienced growth surpassing AMD and is expected to do well in 1989. The top four suppliers shown in Table 4 derived the vast majority of their revenue from bipolar PLDs. The bipolar PLD market is mature, and the MOS PLD market is in the early growth phase of its product life cycle. The compound annual growth rate (CAGR) from 1989 to 1994 for MOS PLDs is estimated to be 31.3 percent, compared with a negative 3.3 percent CAGR for bipolar PLDs.

In excess of 20 MOS PLD suppliers are active in the market, compared with only 4 bipolar PLD suppliers. Altera leads the pack of MOS PLD suppliers, capturing the number five position in total PLDs with an exclusive MOS product line. Cypress, Xilinx, Lattice, and Intel follow with 1988 MOS PLD revenue of $34 million, $27 million, $21 million, and $16 million, respectively.

 © 1989 Dataquest Incorporated March

Full-Custom ICs

Full-custom ICs are being phased out and replaced by other ASIC technologies; therefore, Dataquest research has been focused on the growing ASIC markets. The vast majority of full-custom ICs are watch and calculator chips, and most of the production is offshore. Leading full-custom IC suppliers include NEC, Matsushita, Sharp, Toshiba, and Oki.

1989 AND BEYOND

Dataquest believes that the ASIC market will start to slow during the second half of 1989 and that 1990 will be the lowest growth year. We expect the ASIC market to grow 15.7 percent in 1989 and 5.8 percent in 1990. We then foresee 1991 through 1993 to be prosperous years, with annual growth rates in the 20 to 25 percent range, followed by the next slowdown in 1994.

Table 5 shows estimated worldwide ASIC consumption by technology from 1987 through 1994. Dataquest forecasts include NRE revenue, CAD software revenue, intracompany revenue (internal sales), and device production revenue. Dataquest forecasts do not include captive manufacturing of companies that do not sell to the merchant market such as IBM, Digital Equipment, and Unisys.

Table 5

Estimated Worldwide ASIC Consumption by Technology
(Millions of Dollars)

	1987	1988	1989	1990	1991
Total ASIC	6,225.1	7,437.9	8,605.8	9,104.8	11,021.5
MOS	4,403.7	5,374.8	6,351.9	6,743.2	8,253.7
Bipolar	1,790.4	2,003.3	2,145.8	2,141.6	2,365.0
BICMOS	31.0	59.8	108.1	220.0	402.8
Gate Arrays	2,305.4	2,941.3	3,552.8	3,958.1	5,026.7
MOS	1,446.5	1,933.5	2,382.1	2,617.9	3,353.5
Bipolar	827.9	949.0	1,067.6	1,139.2	1,321.4
BICMOS	31.0	58.8	103.1	201.0	351.8
Programmable Logic	504.2	705.4	898.2	950.6	1,236.9
MOS	82.3	176.9	335.7	442.6	702.7
Bipolar	421.9	528.5	562.5	508.0	534.2
Cell-Based ICs	949.5	1,266.2	1,551.0	1,753.1	2,298.9
MOS	912.9	1,214.4	1,481.5	1,659.4	2,153.9
Bipolar	36.6	50.8	64.5	74.7	94.0
BICMOS	0	1.0	5.0	19.0	51.0
Full-Custom ICs	2,466.0	2,525.0	2,603.8	2,443.0	2,459.0

(Continued)

Table 5 (Continued)

Estimated Worldwide ASIC Consumption by Technology
(Millions of Dollars)

	1992	1993	1994	CAGR 1989-1994
Total ASIC	13,355.8	15,888.2	17,814.4	15.7%
MOS	10,065.3	11,857.5	12,962.5	15.3%
Bipolar	2,567.5	2,762.7	2,886.7	6.1%
BICMOS	723.0	1,268.0	1,965.2	78.6%
Gate Arrays	6,380.1	7,962.5	9,122.1	20.8%
MOS	4,269.0	5,250.9	5,828.5	19.6%
Bipolar	1,513.1	1,724.8	1,862.8	11.8%
BICMOS	598.0	986.8	1,430.8	69.2%
Programmable Logic	1,496.0	1,641.5	1,785.2	14.7%
MOS	970.9	1,149.7	1,310.3	31.3%
Bipolar	525.1	491.8	474.9	(3.3%)
Cell-Based ICs	3,094.4	3,994.3	4,731.7	25.0%
MOS	2,843.1	3,553.8	4,015.8	22.1%
Bipolar	126.3	159.2	181.5	23.0%
BICMOS	125.0	281.3	534.4	154.6%
Full-Custom ICs	2,385.3	2,289.9	2,175.4	(3.5%)

Source: Dataquest
March 1989

As the ASIC market slows in the second half of 1989 and in 1990, we believe that suppliers will shift their focus from increasing market share to increasing profit margins. Some suppliers will elect to withdraw from the market because their margins will be so low and they will not have the capital or alliances required to develop leading-edge submicron products. We believe that gate arrays will be the dominant ASIC market through 1994. Major product trends to watch over the next five years include: field programmable gate arrays (FPGAs), BICMOS ASICs, RISC microprocessor ASIC cores, and the emergence of high-functionality structured arrays (megacells embedded in gate array base wafers).

ASICs have come a long way in the last five years. We believe, however, that the ASIC revolution has just begun.

(This document is reprinted with the permission of Dataquest's Semiconductor Industry Service.)

Tony Spadarella
Bryan Lewis

© 1989 Dataquest Incorporated March

Dataquest
a company of The Dun & Bradstreet Corporation

Research Newsletter

CCIS Code: Electronic Newsletters
1988-2

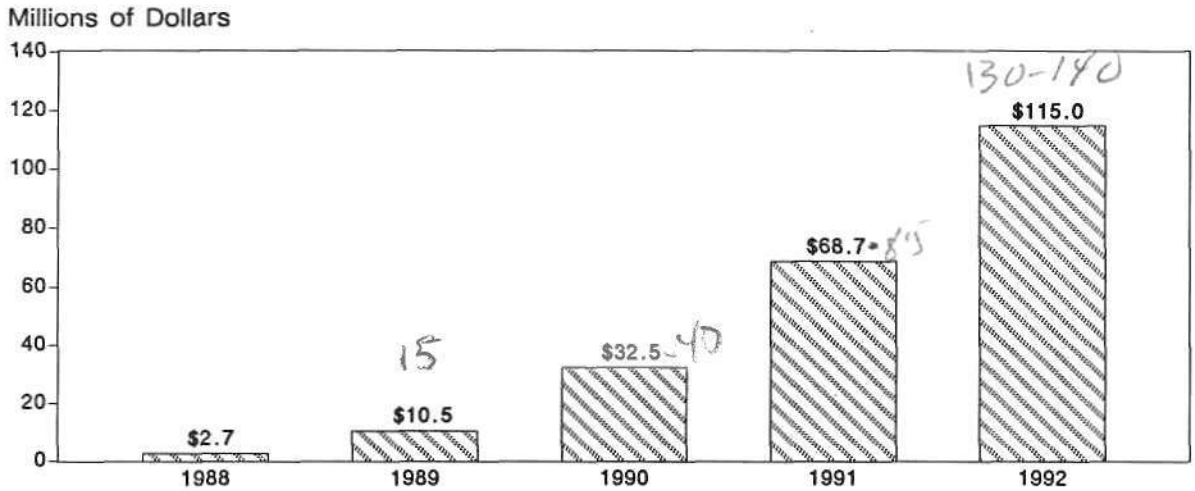
LOGIC DESIGN AUTOMATION: THE NEXT GENERATION

SUMMARY

Even as basic computer-aided engineering products such as schematic capture are starting to make their appearance on the average engineer's desk, a new generation of tools, which we call logic design automation (LDA), is emerging that promises to revolutionize hardware design completely. Dataquest believes that LDA will be one of the most dynamic new markets since electronic computer-aided engineering (ECAE) began. Although LDA revenue is less than a $5 million niche today, Dataquest believes that it could grow to $115 million by 1992. This is shown below in Figure 1.

Figure 1

Logic Design Automation
Worldwide Software Revenue Forecast



Source: Dataquest
June 1988

© 1988 Dataquest Incorporated June---Reproduction Prohibited

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

This newsletter examines LDA and answers questions such as:

- What is LDA and what are its benefits?
- Who are, and who may be, the participants in this market?
- What will be the major forces in technology adoption and market growth?

LDA TOOLS AND TECHNOLOGIES

LDA is exactly what it sounds like: the portion of the CAE market that focuses on automating the creation and generation of logic. LDA tools help engineers specify, create, and optimize designs to achieve significant improvements in productivity, system performance, and cost. Examples of LDA products are tools that generate schematics from textual input, systems that minimize a logic design given specific performance constraints, or assistant/consultant rule systems that aid the engineer in making design trade–offs or technology selection.

Furthermore, LDA tools complement, rather than replace, today's CAE systems. The new LDA tools not only offer a new solution to up–front design tasks, but also are meant to be integrated so that they directly feed existing CAE tools for schematic/document generation and detailed simulation and test.

Up until now, these tasks have been performed by hand or by using tools that were isolated from the rest of the design process. A design might be specified using an architectural simulator, but then it was up to the engineer to convert the design manually into a schematic. Using today's tools, getting a critical path to work correctly requires days or weeks for an engineer to modify a schematic, resimulate, and make further changes. Design efficiency is often sacrificed for expediency. LDA tools can perform these tasks for the engineer in a few hours.

The initial round of LDA tools is targeted at the ASIC design community. This makes sense. ASIC designers already understand the benefits and the process of computer–aided engineering and should rapidly adopt this technology. LDA tools provide immediate cost savings in ASIC applications, but without requiring significant methodology changes, reeducation, or the sacrifice of existing investment in ECAE tools.

Once LDA tools have established themselves in the ASIC design process, they can begin the migration to system–level problems. As this occurs, LDA tools will have to interface to the new generation of system design tools such as behavioral simulators that are now coming to the fore, as well as addressing the skill sets of a less automation–literate audience. However, we believe that the power of LDA tools will pull them into the system design marketplace within a few years of their introduction.

LDA DEFINED

Dataquest defines logic design automation as CAE tools that begin with a circuit description, textual or schematic, and user–supplied objectives such as path delays, and generate without further manual intervention either a netlist, a schematic, or recommendations that can be used to modify a schematic. This definition is meant to encompass both sophisticated tools that create schematics from behavioral languages

and simplistic tools that convert truth tables into PLA formats. The stress is on design rather than drafting, or "inspiration versus perspiration," to paraphrase Dr. Richard Newton of Berkeley.

LDA is distinct from schematic capture, architectural simulation, and silicon compilation. Schematic capture refers exclusively to the drafting tools creating logic diagrams. Architectural tools provide high-level simulation and analysis but do not generate designs. Silicon compilation implies a direct linkage with physical layout, whereas LDA is explicitly layout independent.

In academic circles, the term logic synthesis has been applied to some of the tools that are encompassed by our definition of LDA, though the term synthesis is also applied to tools that automate the physical layout of integrated circuits. Dataquest suggests that the term logic design automation is more appropriate for three reasons:

- First, LDA is a broader term. There are a variety of innovative products that are not synthesis tools, but which can truly be said to help automate logic creation.
- Second, the term logic design automation is meant to describe a market niche, whereas synthesis refers to a technology.
- Third, by using a broad, market definition, rather than a technology definition, we hopefully can avoid a lot of meaningless debates as to which firm truly sells logic synthesis.

In the case of silicon compilation, endless debates occurred on technology, and it is arguable that the ensuing confusion among customers slowed the adoption of these tools. We believe that using the term LDA to describe the market may, in some small way, enable suppliers and customers to focus on products and their benefits rather than on bragging rights to technology definitions.

LDA TECHNOLOGIES AND TOOLS

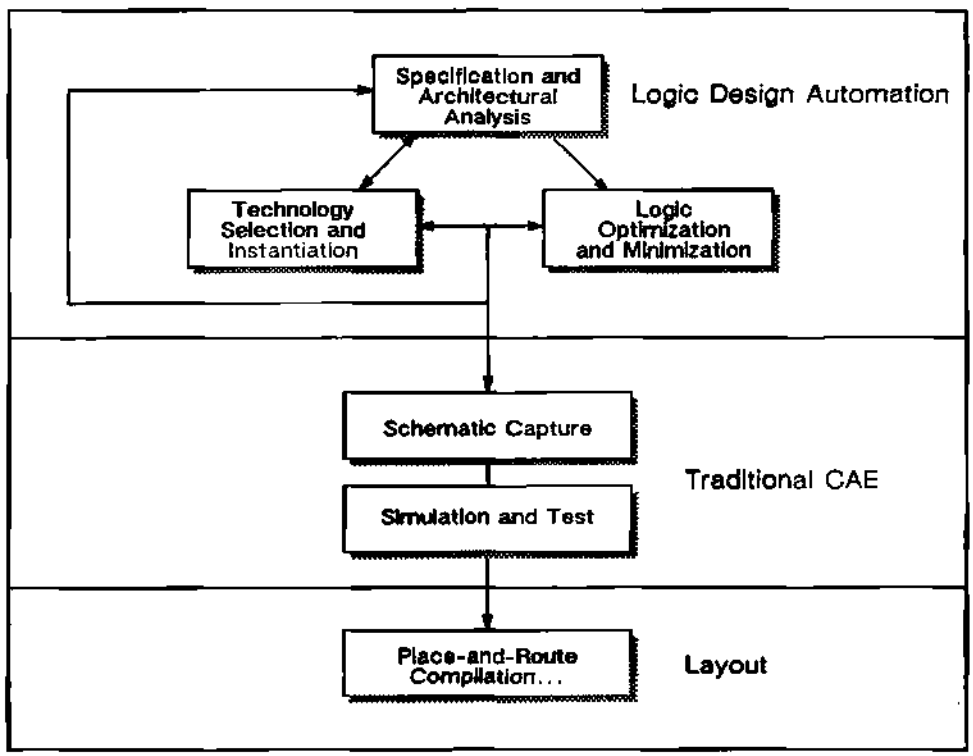
As Figure 2 indicates, LDA technologies and tools can be broken into three major categories of functionality:

- Specification and analysis languages/interfaces
- Logic optimization and minimization
- Technology selection and instantiation

© 1988 Dataquest Incorporated June

Figure 2

Logic Design Automation



Source: Dataquest June 1988

Specification and Analysis

Specification and analysis tools provide for design expression within (a) constrained language(s) and automatically generate schematics, a netlist, or an equivalent format (e.g., a palasm file). These systems can be simple mapping systems such as those used for PLD programming or sophisticated tools that allow engineers to express designs as high-level flows, controls and timing in a variety of formats (behavioral languages, Boolean equations, truth tables, or RTL), and then evaluate their behavior. Alternately, it could be a well-defined intermediate format that allowed any language to interface to schematic generation tools provided the language followed certain constraints regarding the type of allowed expression. The role of these specification tools is to furnish the engineer with a convenient way of expressing his design, validating its high-level functionality, and then automatically creating correct schematics/netlists so that detailed analysis and design exploration can begin.

© 1988 Dataquest Incorporated June

Logic Optimization and Minimization

Logic optimization and minimization tools optimize logic given specific constraints and then either modify the schematics directly or suggest design improvements that can be implemented at the engineer's discretion. This optimization can occur at several different levels. On the one hand, it can involve minimizing or factoring the logic so that a design's performance will improve or so that it will be physically smaller in terms of the number of components or die size. It could also include making a design more testable or adding scan logic. Alternately, it might determine that specific components were redundant or failing to meet a specific design objective (e.g., a specific buffer was not necessary). These optimization tools directly aid the engineer to improve the quality of a design.

Technology Selection and Instantiation

Technology selection and mapping tools are systems that help in technology selection or are able to instantiate the design in a given technology, either by reading a technology-neutral schematic or an existing design. An example of assisting in technology selection would be a tool that could predict the performance of a design if it were implemented as a standard cell or as a gate array. An example of technology instantiation is a tool that could automatically convert an existing TTL, board schematic into a gate array or transfer from one gate array vendor's library to another. Here, LDA provides the engineer with technology independence, enabling him to select the best and most cost-effective implementation for his design.

It is an easy step forward to see how these three sets of LDA tools could be applied to a given project in a highly iterative and flexible manner so that the engineer could fully explore different design alternatives:

- Using the specification/analysis tools, either a section of a design or an entire design could be set out and validated at the architectural level. A technology-neutral schematic would then be automatically generated.

- Optimization tools would be applied using different constraints for critical paths, die size, testability, or operating range.

- A specific technology implementation (e.g., a CMOS gate array) could then be created from the neutral schematics and then optimized and explored using a different set of rules.

These steps could be repeated several times with different technologies and constraints to find a preferred solution; then the design could be simulated using existing CAE tools to make sure it met the system specification.

Without LDA, this process of exploring design and technology alternatives involves hours of schematic entry followed by days of resimulation and incremental changes. A critical path in a circuit must be optimized component by component, all in the hope that another path will not go critical in the meantime. With LDA, the engineer is able to explore design options in near real time.

 © 1988 Dataquest Incorporated June

THE BENEFITS OF LDA

With LDA, the designer is allowed to focus on achieving the best design solution, the real task of engineering. Likewise, the designer is also relieved of the tedious tasks of twiddling schematics and trying to find the one foolish AND gate that should have been a NAND gate. Using LDA tools, an efficient solution can be scoped out in a very short amount of time and prepared for detailed verification. Alternatives that might not have been considered due to lack of time with existing tools can now be fully explored.

The power of LDA is that it provides both longer-term productivity gains and short-term dollar savings. At the short-term level, here are examples of some of the economic benefits:

- Quick access to the lowest-cost technology/ASIC vendor
- Significant reductions in circuit size and cost
- Reduction of time spent isolating schematic entry errors
- Preservation of existing CAE investments and training
- Low start-up costs

In other words, with one overnight run on any given design, LDA tools provide direct cost savings to the end user without significant training or sacrifice of existing CAE investment and a minimum amount of disruption to the current design methodologies.

Yet it is over the long term that the benefits of LDA demonstrate their true power in terms of designer productivity. With the adoption of behavioral languages and analysis tools that are closely coupled to schematic creation and optimization, major improvements in design methodology are possible. Engineers can:

- Evaluate technologies and architectures in parallel
- Optimize specifications and schematics at the same time
- Achieve the highest degree of technology flexibility

For example, once a specification is created today, it is practically cast in concrete. The designer optimizes only the original specification, even if a different architecture might be better with a given technology. When LDA behavioral languages are used in conjunction with optimization and technology instantiation tools, the specification can be modified and improved very quickly in light of the feedback between the tools. Conversely, when a detailed schematic already at the implementation level is fed into a logic optimization tool, it can do only so much. It is extremely difficult to go backwards and convert gate-array logic into a PLA in a cell-based design. Optimization and technology instantiation tools work best when they are supplied a high-level, technology-neutral description.

For the engineer that understands the benefits of CAE and design automation, LDA is the obvious next step. Short-term cost savings can result in immediate system justification, while over the long haul, major improvements in design methodology can become possible.

WHAT LDA IS NOT

In these discussions about the definition, functions, and benefits of logic design automation, it is equally important to remember what LDA is not. LDA is not silicon, or printed circuit boards for that matter, for everyman.

LDA helps electrical engineers do better work. Both the novice and the experienced engineer can take advantage of LDA to improve their designs, but the engineer must still understand the fundamentals of system or ASIC design. A software programmer is not going to sit down with these tools and design an efficient circuit, let alone one that would fit on a single wafer. For everyman, this dream will still have to wait; for the experienced designer, it has arrived.

THE LDA SUPPLIERS

Up until recently, LDA technology has been limited to the university setting and the advanced research labs of major corporations. Some companies such as Altera, Data I/O Futurenet, SCS, and Xilinx offer products that have some LDA functionality, but usually within a very specific context such as PLD design or silicon compilation.

Now, however, a trio of new companies focused on LDA has entered the CAE market. Silc, Synopsys, and Trimeter all offer new and innovative products that are bringing LDA to the desktop of today's engineer. Undoubtedly, these companies will face competition from additional new entrants and established participants, and we are starting to see some interesting product introductions. But, for the most part, the new LDA companies have the market all to themselves.

Silc Technologies Inc.

Silc Technologies Inc. was established in 1987 as a spin–off from GTE Laboratories and is located in Burlington, Massachusetts. Silc's president and chief executive officer, Mr. Joseph D'Angelo, joined the company from Charles River Data Systems, where he was executive vice president and chief operating officer. The vice president of engineering, Mr. Jeffrey Fox, headed the original design team at GTE Laboratories.

Silc's first product is SilcSyn, a full LDA system targeted specifically at the ASIC designer. SilcSyn runs on the VAX and Apollo, and, as part of the initial offering, has direct interfaces to the Mentor Graphics CAE tools. SilcSyn reflects more than 40 person–years and $4 million in development, and has been at commercial beta sites since October 1987. The typical price per user is about $32,000.

The SilcSyn system begins with a behavioral description language that supports system characterization at a high level in terms of timing, controls, and data flows, or at the logic and register transfer level. It is accompanied by a functional logic simulator that provides for verification of the behavioral description. Logic minimization and testability tools can be applied to these schematics, and it can be mapped into a particular technology. SilcSyn also incorporates automatic design for testability and test pattern generation.

 © 1988 Dataquest Incorporated June

SilcSyn stands out as the broadest of the new LDA product offerings. Its capabilities extend from the behavioral to the technology implementation level, and it can be used with equal effectiveness on synchronous and asynchronous designs. Silc has several corporate technology partners; not only has the system been run through numerous test cases, but a number of designs are also now entering actual production.

Synopsys, Inc.

Synopsys was founded in 1986 as a spin-off from the General Electric Microelectronics Center, and is located in Mountain View, California. Its president is Harvey C. Jones, cofounder and former chief executive officer of Daisy Systems, and its vice president for R&D is Dr. Aart J. de Geus. Dr. de Geus was a principal author of SOCRATES, one of the original logic synthesis systems. Synopsys received $5.3 million in first-round funding from GE; Harris Corporation; Merrill, Pickard, Anderson and Eyre; Oak Investment Partners; and Technology Venture Investors.

Synopsys' first commercial product is the Design Compiler, which, like the other new LDA offerings, is primarily aimed at the ASIC designer. The Design Compiler runs on Apollo, Digital Equipment, and Sun Microsystems platforms, with prices beginning at $35,000 per seat.

From a functionality standpoint, the Design Compiler begins with an interface that allows the engineer to import designs from a netlist, functions, or a behavioral language provided that language is used within certain constraints. Using a very simple graphical interface, the design then can be optimized given user-supplied data on critical paths, operating conditions, and area, and implemented in a given technology. Currently, the LSI Logic array and cell families are supported, as well as the Harris L7 CMOS and GaAs product lines.

Although the Design Compiler is Synopsys' first commercial offering, these technologies have undergone extensive use in production environments at the company's corporate partners. More than 200 designs were tested at Harris alone using SOCRATES (Synopsys' initial product) with extremely impressive results in chip performance and cost. SOCRATES was able to achieve significant reductions in die size and critical path delays in a few hours, while experienced designers took two or three weeks. The Design Compiler has benefited from the work with SOCRATES, and, using the same designs as a test bed, is achieving 30 percent better results in substantially less time. The implication here is that the general-user audience should be able to start working with the Design Compiler in a reliable and very effective manner right from the start.

Trimeter

Trimeter was founded in 1985 to develop and market ECAE tools that use knowledge-based technology. The president of the company is Jin Kim; its vice president of engineering is Rostam Joobbani. Trimeter's headquarters are in Pittsburgh, Pennsylvania.

Trimeter was the first to market with LDA tools for the ASIC engineer. Today, Trimeter offers three different systems: the Logic Consultant, the Schematic Generator, and the Knowledge Consultant. The Logic Consultant optimizes existing schematics by reducing propagation delays and decreasing gate counts, and can map designs into different technologies. The Schematic Generator automatically creates drawings from a

netlist or the Logic Consultant. The Knowledge Consultant is a graphical tool for creating the knowledge base used by the Logic Consultant. Trimeter itself has used the Knowledge Consultant to create bases for gate-array libraries from Hughes, LSI Logic, and Toshiba.

Other Suppliers and Potential Entrants

Beyond these three new companies, several other suppliers have begun to offer products that assist the engineer in logic design. In particular, the ASIC vendors have begun to offer some very innovative packages. We have also seen some moves by the CAE and silicon compilation companies in this area as well.

From the ASIC vendors, the tools that are being offered help the engineer optimize a circuit, but only for a given vendor's technology offerings. At the PLD end of the market, companies such as Altera and Xilinx now offer design packages that allow the engineer to express a design in a variety of formats, including schematic, Boolean equations, and state machine, and then minimize the logic before programming the device. At the cell and gate-array end, there are two breakthrough products from NCR and VTI. The NCR Design Advisor is an AI-based system that analyzes circuits and makes recommendations on how to minimize logic and improve testability, timing, and I/O performance. VLSI Technology's Design Assistant helps in design specification and analysis of trade-offs on chip size, power, cost, and packaging. The only limitation with these two tools is that they work only with NCR and VLSI technology cell and array libraries; they are not generalized tools, nor are they meant to compete with the new LDA offerings.

From the CAE suppliers, the offerings are primarily focused on PLDs. Daisy's PLDMaster and HP's PLD Design System provide functionality similar to that available from Altera and Xilinx, but generalized to any PLD. However, none of the CAE vendors offer a broad-based LDA for high-level ASIC design.

Silicon Compiler Systems Corp. is the one company notable among the established EDA suppliers that has extensive experience with LDA. The SCS Genesil System allows the engineer to express a design in terms of equations, truth tables, or a schematic from a commercial CAE vendor such as Mentor Graphics. The system then predicts die size, performance, and power consumption very quickly. Once the specification is complete, the engineer compiles the design into a physical layout using any of the foundries that meet the project's requirements. Clearly this is a very powerful system, but, as of today, the logic design and layout functionality are inextricably linked. An SCS-compiled layout is the only available output; the engineer does not have implementation flexibility. Yet there is nothing to say that SCS could not broaden its alternative physical implementations to include gate arrays or cell-based solutions, though still coupled to its design methodology—let the new LDA vendors beware.

TECHNOLOGY ADOPTION AND MARKET GROWTH

Dataquest believes that LDA should prove to be one of the fastest-growing new markets since ECAE began. As Figure 2 shows, our forecast indicates that LDA revenue will rise to $115 million in 1992. However, a more optimistic outlook suggests that the LDA market revenue could exceed this figure if the rate of technology adoption is faster.

 © 1988 Dataquest Incorporated June

We believe that the pace of technology adoption should be relatively fast; there is no question about the benefits to the designer. The real issue on market growth lies with how well the new vendors like Silc, Synopsys, and Trimeter are able to bring the technology to the average engineer. These companies hold their fate in their own hands.

Three factors will be key to the growth of this market:

- Delivering working tools
- Protecting users' investments
- Moving in step with other technologies

First and foremost, the new LDA tools must work. In the ASIC business, the first priority is and always will be working silicon. The LDA tools must be extremely reliable and produce correct designs. Few engineering teams except the pure R&D labs will risk a project on an unproven technology. The sooner the LDA vendors can demonstrate success in the field, the faster their sales will rise.

Second, the new LDA vendors must let the users protect their existing investments. The typical CAE site at a large company has already spent several million dollars on libraries, designs, tools, and training, and unless management is truly dissatisfied, it is not going to throw these away. The LDA tools must let users keep working with their CAE stations, but more effectively.

To some extent, the ability of the LDA vendors to link with existing CAE tools will depend on the behavior of the CAE vendors themselves. Dataquest believes that this technology is extremely powerful, and CAE suppliers that wish to stay active in ASIC will have to open up their systems to third parties like the LDA companies. Daisy's ACE PI is an excellent example of this type of procedural interface that can bridge LDA with schematic entry, and the other vendors would be wise to follow suit.

Third, several other technologies are moving into the ECAE market today, and the LDA vendors will have to adapt to these as well during the next few years. Most importantly, the trends toward system-level design, behavioral simulation, and description languages like VHDL are also gaining in the market. The LDA companies must be prepared to coexist with other new entrants like Gateway, HHB, and Vantage as they also compete for the engineer's desk.

ECAE and ASIC, while relatively young industries, are rapidly achieving high levels of complexity and interdependences. Any new firm with an advanced technology, whether it be LDA or automated test, must be prepared to deal with these complexities if it is to succeed. Technology alone will not carry these firms over barriers to entry and on to success; working silicon with minimum interruption will.

DATAQUEST CONCLUSIONS

LDA is a very exciting technology that we believe will be quick to capture the engineering community's attention. Indeed, LDA is the broadest effort to date truly to automate the engineering process. In the past, CAE tools sought largely to emulate, not automate. For example, a simulator substituted for a pattern generator and logic analyzer. It did not add to the engineer's design skills.

LDA has the potential to make today's designers better and more productive, and that is the bottom line in the ECAE industry. We believe that the new vendors, if they pay attention to the details, should enjoy success. We also think that the established vendors would be well advised to work with the LDA vendors to "catch the new wave." It should be going places.

Isadore Katz

 © 1988 Dataquest Incorporated June

Dataquest
a company of
The Dun & Bradstreet Corporation

Research Newsletter

CCIS Code: Asian Newsletters
1989-1
0004049

1988 ASIAN CAD/CAM MARKET: VENDORS BENEFIT FROM WEAK DOLLAR; JAPANESE RUSH TO TECHNICAL WORKSTATIONS

SUMMARY

Japan's $2.5 billion CAD/CAM market, the Asian region's preeminent market, spearheaded a recovery in 1988 from the two-year slump that resulted from rapid yen appreciation. Also in 1988, the UNIX and Sun fever hit Japan with unprecedented market impact. Japanese CAD/CAM sales swelled 23 percent, fueled by an aggressive entrance into the technical workstation market by Japan's major computer suppliers—Fujitsu, Hitachi, and NEC.

Overall Asian CAD/CAM sales soared 21 percent, which also benefited from a weakened dollar. Given low penetration rates and high-growth potential in the rest of the region (China, Hong Kong, Korea, Singapore, and Taiwan), Asia appears destined to retain a significant slice of the global CAD/CAM market, especially in view of the following facts:

- Today's Asian CAD/CAM market accounts for $2.8 billion, or 27 percent, of worldwide CAD/CAM revenue. Dataquest forecasts that the market will top $3.2 billion in 1989.
- Although only the third-largest regional CAD market after North America (37 percent) and Europe (34 percent), Japan, with a whopping 91 percent of the Asian market, is the second-largest CAD/CAM-using nation in the world.
- For the first time, Asian CAD/CAM suppliers control more than 50 percent of this regional market—unlike Europe, where U.S. vendors continue to enjoy market dominance.

© 1989 Dataquest Incorporated June–Reproduction Prohibited

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

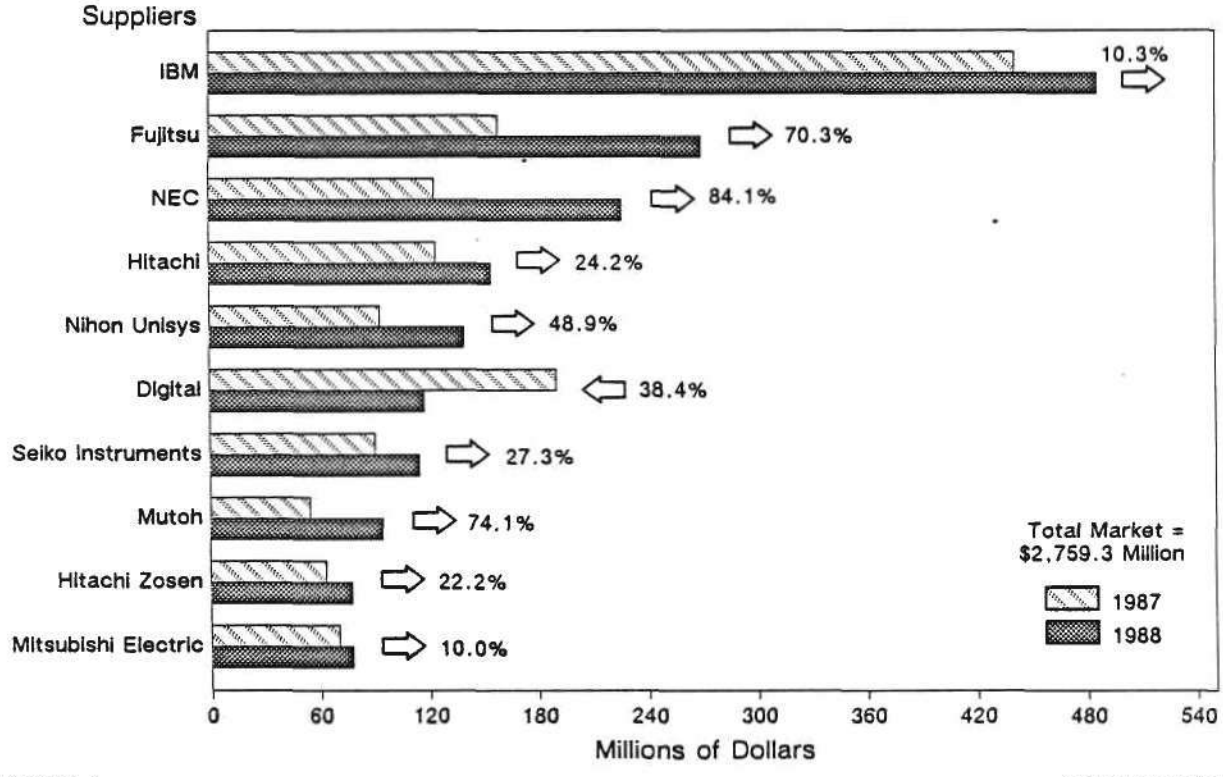
ASIAN MARKET LEADERS

Figure 1 and Tables 1 through 8 indicate vendor market share by total market and by application for all of Asia. (Tables are included at the end of this document.) Although both manufacturers' and resellers' revenue are listed in these tables to show relative market share, double counting has been eliminated in all bottom-line totals.

As the numbers indicate, U.S. vendors control just 47.1 percent of Asia's CAD/CAM, while Asian vendors account for 52.1 percent of sales. (European suppliers control the remainder.) Asia is the only regional CAD market that did not continue to be dominated by American suppliers in 1988.

Figure 1

1988 Asian CAD/CAM Market Leaders
1987-1988 Total Revenue and Growth
(Millions of Dollars and Percent Change)



0004049-1

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Number One: IBM

IBM continued to lead 1988 CAD/CAM sales in Asia, racking up 17.6 percent market share points and sales in excess of $486 million. The company's Asian market share grew 10.3 percent in revenue between 1987 and 1988. IBM's strength lies mainly in mechanical CAD, where it ranks first, and in the AEC and mapping areas, where it ranks third. IBM primarily sells the mainframe-based design products CADAM, CATIA, and CAEDS, as well as unbundled PCs and the PC-based MicroCADAM product. To retain market leadership in Japan, where technical workstation fever is rampant, IBM will have to reinforce its technical workstation product offerings.

Number Two: Fujitsu

Growing 70 percent over 1987, Fujitsu pulled ahead of the pack to become the region's largest local supplier, thus positioning itself to ride the technical workstation wave that began sweeping Japan in 1988. Fujitsu ranked second only to IBM in the Asian CAD/CAM market, with sales swelling to $269 million for a 9.7 percent share of market.

Such dramatic growth can be directly attributed to Fujitsu's new identity as a full-line hardware supplier. Fujitsu's platforms now range from PCs to mainframes, a result of its OEM agreement with Sun for technical workstations.

Also distinguishing Fujitsu is the revenue contribution made by its application products for AEC, mapping, and PCB layout. Fujitsu ranked first in both AEC and mapping in 1988 and placed second in the PCB design market. Fujitsu also is aggressively positioning itself to become the leading supplier of the Sparc RISC processor—the same chip used in the Sun-4 workstation.

Number 3: NEC

NEC captured third place in the Asian CAD/CAM market, growing 84 percent over 1987 to $226.4 million, for an 8.2 percent share of market. Like Fujitsu, NEC has successfully shifted from mainframe-based systems to the technical workstation—in NEC's case, its own EWS4800 technical workstation. NEC shipments were almost as high as IBM's total workstation shipments in Asia—largely attributed to NEC's unbundling of its own PC.

NEC has a strong application focus, and offers all major CAD/CAM applications except for IC layout. It ranks second in both MCAD and AEC market shares, and third in ECAE and PCB layout markets.

With high vertical integration similar to that of Fujitsu, NEC's wider strategic plans include microprocessor production—in particular, the MIPS RISC chip—with manufacturing plans for 20,000 to 30,000 chips per month.

© 1989 Dataquest Incorporated June

Number 4: Hitachi

Hitachi retains its market position as the fourth-largest supplier. In 1988, it had revenue of $154 million, a 5.6 percent market share, and grew 24 percent over 1987. As do Fujitsu and NEC, Hitachi now offers a full-line of hardware platforms.

Hitachi's application strengths and market share position in those markets are as follows: MCAD (number 4), AEC (number 4), and mapping (number 5). Hitachi's current workstation offerings, the TWS2050G and R-7300, use a 68020MPU. The company has not announced which RISC chip it will eventually employ.

Number 5: Nihon Unisys

Moving up from sixth- to fifth-place supplier in 1988 was Nihon Unisys, with $138.5 million in revenue and a 5.0 percent share of market. Revenue in 1988 represented growth of 49 percent over 1987. Nihon Unisys offers technical workstations and host-based systems, primarily for the MCAD market, where it ranks fourth.

Number 6: Digital

Digital Equipment Corporation slipped to sixth place in the overall Asian CAD/CAM market in 1988, with $117 million in sales, which represents a decline of 38 percent from 1987.

Number 7: Seiko Instruments

In 1988 Seiko's total revenue grew 27 percent, including OEM sales of Daisy and McDonnell Douglas. Seiko sales of its own SX-8000 IC layout product led the IC design market in Asia, capturing a commanding 34.6 percent market share of that application market.

Number 8: Mutoh Industries

Mutoh's revenue grew 74 percent in 1988, based on its sales of both Intergraph and its own products.

Number 9: Hitachi Zosen

Hitachi Zosen grew its revenue by 22 percent in 1988, to $77 million. Hitachi Zosen mainly sells technical workstations into the MCAD marketplace.

Number 10: Mitsubishi Electric

Mitsubishi grew 10 percent in revenue, offering products in MCAD, AEC, mapping, and PCB. Its strength is primarily in the mapping market, where it garnered a second-place standing in overall market share.

Number 11: Prime

Prime Computer, which merged with Computervision (only in the United States and not in Japan), had 1988 sales of $75 million and grew 67 percent in Asia. Prime Computer Japan and Computervision Japan have announced plans to merge Asian operations in the near future.

Number 12: Mentor

Mentor Graphics grew 67 percent over 1987, with $74 million in sales. The leading player in the global EDA (electronic design automation) market, Mentor ranks first in ECAE, fourth in IC layout, and sixth in PCB layout in the Asian markets. Mentor traditionally offers turnkey products running on technical workstations from Apollo Computer. Apollo's recent acquisition by Hewlett-Packard makes it imperative that Mentor clarify its future hardware plans in order to protect market position in Asia, as well as in Europe and North America.

ASIAN FORECAST BY APPLICATION

The following discussion is based on the data contained in Table 9.

Mechanical CAD/CAM (MCAD)

Although the MCAD grew 23 percent in 1988, such high levels of growth are not forecast to continue. Dataquest believes that MCAD's rapid growth actually represents a rebound effect from earlier investment cutbacks. These were cutbacks undertaken by electronic and automotive companies that, in grappling with the yen's super-appreciation in 1986 and 1987, watched significant portions of their profit margins erode. During the next five years, even given conservative predictions of shifts from expensive host-based systems to systems based on PCs and technical workstations, average selling prices, hence overall market growth rates, will be lower.

AEC

The AEC market rose 41 percent between 1987 and 1988. Such a high growth rate in this market is understandable, given the lower workstation penetration rates. While lower AEC penetration rates also are the case in Japan, the market there specifically has benefited during the past three years from the government's economic policy aimed at expanding domestic demand through subsidization of, and aggressive investment by, the Japanese construction industry. The rapid growth of this market is forecast to moderate during the next five years.

© 1989 Dataquest Incorporated June

Mapping

Mapping market revenue soared 75 percent in 1988. In Japan, high growth again was the by-product of low penetration and the government's economic policy regarding the encouragement of domestic demand. Considering the continuous requirement for mapping systems, not just in Japan but throughout Asia, the market is forecast to experience sustained high growth over the next five years.

EDA

The ECAE, IC, and PCB market segments in 1988 grew at 32 percent, 55 percent, and 38 percent, respectively. Major local vertically integrated electronic companies manufacture semiconductors in addition to computers, consumer electronics, and telecommunication equipment. These companies saw substantial profits in 1988, particularly in the memory market, where 1Mb DRAM chips commanded a price of more than $15 each. Aided by exchange rate stabilization, these windfall profits resulted in significant levels of reinvestment in R&D, particularly for EDA.

While continued high growth is forecast for each of EDA's three application areas, ECAE and IC layout markets will grow more rapidly than the PCB market. These applications are closely allied with the ASIC market in which growth is forecast at a 16.4 percent compound annual growth rate (CAGR) through 1994 and in which Fujitsu, NEC, Toshiba, and Hitachi, all major Asian EDA vendors, ranked first, second, fourth, and eighth, respectively, in 1988.

ASIAN FORECAST BY REGION

The following discussion is based on the data contained in Table 10.

Excluding Japan, market forecasting in the newly industrialized countries of Asia is largely based on macroeconomic forecasts for individual regions, because penetration rates at this stage are so low. The following factors summarize what we see as possibly affecting regional Asian CAD/CAM market growth in 1989.

Key factors in Japan include the following:

- Strong GDP growth in 1989
- Three percent consumption tax effective April 1, 1989
- Strong Tokyo stock market unaffected by the Recruit stock scandal
- Exchange rate stabilization driving aggressive investments
- High profit margins of semiconductor suppliers

© 1989 Dataquest Incorporated June

- Steel and automotive companies enjoying a healthy business climate
- Prime rate of 2.5 percent to be raised to 3.0 percent in near future

Key factors in Korea include the following:

- Strong GDP rate coming off the Olympics
- Strong Seoul stock market after the Olympics
- Continued aggressive trade policy with U.S.S.R. and China
- Some degree of labor unrest and sabotage
- Aggressive investment plans in 1989 estimated at 9.16 trillion won in 1989, up 40.3 percent from 1988
- Key industries investing in CAD/CAM include automotive, electronics, steel, machinery, petrochemical, and aerospace companies

Key factors in China include the following items:

- Strong 10 percent growth well into the 1990s
- Stronger commercial ties with the Soviet Union will contribute to stronger commercial relations with South Korea
- Possible economic slowdown as management reform and new labor laws are installed
- Political instability leading to possible disruption of trade

ASIAN FORECAST BY PLATFORM

The following discussion is based on the data contained in Table 11.

All the top 20 Asian market leaders now offer technical workstation-based systems. Most vendors have begun to de-emphasize host-based systems in favor of technical workstations in order to conform to the rapidly evolving market structure.

Although all major computer vendors initially tried to develop their own technical workstation, the environment now has changed completely. For example, Sun now sells through local OEMs C. Itoh Scientific, Fujitsu, Nippon Steel, Seiko, and Toshiba. MIPS has similar agreements with Kubota, NEC, Sony, and Sumitomo Electric.

© 1989 Dataquest Incorporated June

The possibility of M&A (merger and acquisition) activity continues to loom over the technical workstation market, as mainframe and minicomputer giants seek to absorb the leading-edge technology, which is at present the exclusive property of technical workstation vendors. In April 1989, Hewlett-Packard acquired Apollo Computer. The next M&A deal could well involve a major Japanese computer company seeking to recover market momentum. In any event, the UNIX world has forever upset the power balance that existed in the Asian CAD/CAM and computer markets.

ASIAN AVERAGE PRICE PER SEAT

The following discussion is based on the data contained in Table 12.

As in the previous five years, average selling prices are forecast to decline rapidly during the next five years. Specifically, expensive host-based systems will fall sharply due to marketwide pressure for lower prices. Asian end users, until now "captives" in a proprietary OS world, have been freed into the world of UNIX and MS-DOS, where they can be expected to choose the most cost-effective hardware solution from among many competing options.

ASIAN REVENUE SOURCE

The following discussion is based on the data contained in Table 13.

As end users switch to lower-priced technical workstations and PC-based systems, hardware, software, and service revenue for the less cost-effective host-dependent systems will decline during the forecast period. Conversely, technical workstation-related revenue is forecast to grow rapidly, given the greater number of available software packages and the implicit leap in hardware performance needed when upgrading to RISC architecture. Hardware and software revenue derived from PC-based systems is forecast to grow only until 1991, when networked technical workstations using UNIX will begin to encroach on the high-end PC market as well.

Many Asian market leaders still rely heavily on host-dependent system revenue, including IBM (84 percent of total revenue), Nihon Unisys (71 percent), Digital (66 percent), Toshiba (56 percent), Fujitsu (55 percent), and Hitachi (55 percent). We believe that these suppliers are attempting to balance their product offerings by offering a full line for hardware platforms.

We also believe that software revenue will grow at the fastest overall rate. The average selling price of software packages is virtually immune to erosion due to the unique nature of each package and to software vendors' ability to provide competitive differentiation. Hardware vendors, by contrast, are constrained from such differentiation by virtue of industry standard operating systems and architectures; hence, price decreases are inevitable. The CAGR of hardware remains half of that for software throughout the forecast.

ASIAN FORECAST BY DISTRIBUTION CLASS

The following discussion is based on the data contained in Table 14.

Given the current emphasis on standards and open architecture by vendors—and their increasing popularity among end users—unbundling, which refers to the ability of end users to purchase hardware and software from separate suppliers, is also destined to become popular. And, vendors themselves are beginning to recognize the inherent difficulties of developing and marketing both leading-edge software and leading-edge hardware products. Currently, technical workstations and PCs, as well as software packages for technical workstations and PCs, are mainly sold unbundled.

Yu Uemura
Tony Spadarella

© 1989 Dataquest Incorporated June

Table 1

1988 Asian Market Share
(Millions of Dollars/Actual Units)

Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
IBM	486.3	296.5	123.3	12,038	17.6%	17.9%	15.5%	19.4%
Fujitsu	269.0	166.0	66.7	2,975	9.7%	10.0%	8.4%	4.8%
NEC	226.4	176.0	37.1	11,400	8.2%	10.6%	4.7%	18.4%
Hitachi	154.0	100.9	37.7	1,500	5.6%	6.1%	4.8%	2.4%
Nihon Unisys	138.5	96.9	31.9	700	5.0%	5.8%	4.0%	1.1%
Digital	117.0	95.8	.0	1,475	4.2%	5.8%	.0%	2.4%
Seiko Instruments	113.9	56.6	45.9	1,030	4.1%	3.4%	5.8%	1.7%
Mutoh Industries	94.0	50.1	28.6	1,489	3.4%	3.0%	3.6%	2.4%
Hitachi Zosen	77.0	38.7	30.7	932	2.8%	2.3%	3.9%	1.5%
Mitsubishi Electric	77.0	37.8	24.5	400	2.8%	2.3%	3.1%	.6%
Prime Computer	75.0	33.7	20.2	649	2.7%	2.0%	2.5%	1.0%
Mentor Graphics	74.0	26.6	32.6	1,044	2.7%	1.6%	4.1%	1.7%
Toshiba	69.8	42.0	14.3	1,250	2.5%	2.5%	1.8%	2.0%
Hewlett-Packard	64.2	41.0	13.2	2,324	2.3%	2.5%	1.7%	3.8%
Zuken	58.5	30.0	22.7	350	2.1%	1.8%	2.9%	.6%
C. Itoh Techno-Science	57.1	32.3	4.8	247	2.1%	1.9%	.6%	.4%
Sun	57.0	51.3	.0	2,709	2.1%	3.1%	.0%	4.4%
Daisy Systems	37.6	20.1	12.5	267	1.4%	1.2%	1.6%	.4%
Sharp System Products	36.2	15.9	16.7	100	1.3%	1.0%	2.1%	.2%
Intergraph	35.3	20.5	7.3	386	1.3%	1.2%	.9%	.6%
Tokyo Electron	32.2	9.1	9.2	80	1.2%	.5%	1.2%	.1%
Marubeni Kytech	29.2	9.8	16.5	45	1.1%	.6%	2.1%	.1%
Hakuto	27.0	13.5	10.7	300	1.0%	.8%	1.3%	.5%
Apollo	25.0	17.6	.0	2,000	.9%	1.1%	.0%	3.2%
McDonnell Douglas	23.5	8.9	8.2	249	.9%	.5%	1.0%	.4%
Valid	23.5	10.3	8.9	216	.9%	.6%	1.1%	.3%
Info. Services Int'l. Dentsu	20.0	2.3	13.9	30	.7%	.1%	1.8%	.0%
Sumisho Electronics	20.0	11.0	7.0	250	.7%	.7%	.9%	.4%
Innotech	19.2	.0	17.3	0	.7%	.0%	2.2%	.0%
Cadence	18.3	.0	15.8	0	.7%	.0%	2.0%	.0%
Mitsui Engineering	17.0	12.2	3.1	114	.6%	.7%	.4%	.2%
Toyo Information Systems	16.5	8.1	6.7	150	.6%	.5%	.8%	.2%
Asahi Optical	15.4	7.7	6.2	199	.6%	.5%	.8%	.3%

(Continued)

© 1989 Dataquest Incorporated June

Table 1 (Continued)

1988 Asian Market Share
(Millions of Dollars/Actual Units)

Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share: Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Kyocera	3.8	.2	3.3	0	.1%	.0%	.4%	.0%
Zycad	3.5	3.1	.1	2	.1%	.2%	.0%	.0%
Nippon Kokan	3.5	.4	.3	0	.1%	.0%	.0%	.0%
LSI Logic	3.3	.6	2.4	11	.1%	.0%	.3%	.0%
Rikei	3.2	.7	2.3	0	.1%	.0%	.3%	.0%
Technovision	3.2	.0	3.2	0	.1%	.0%	.4%	.0%
ISICAD	2.1	1.2	.6	21	.1%	.1%	.1%	.0%
VLSI Technology	2.0	.3	1.5	26	.1%	.0%	.2%	.0%
Swanson Analysis	2.0	.0	2.0	0	.1%	.0%	.2%	.0%
Kubota Computer	1.5	.9	.5	20	.1%	.1%	.1%	.0%
ESRI	1.3	.1	1.0	2	.0%	.0%	.1%	.0%
Manufacturing Consultants	1.2	.0	1.0	0	.0%	.0%	.1%	.0%
Auto-Trol	1.0	.4	.3	12	.0%	.0%	.0%	.0%
Synercom	.7	.0	.4	0	.0%	.0%	.0%	.0%
Landmark Graphics	.6	.5	.0	5	.0%	.0%	.0%	.0%
PDA Engineering	.5	.0	.5	0	.0%	.0%	.1%	.0%
Calay	.4	.1	.3	5	.0%	.0%	.0%	.0%
Other Companies	264.3	186.9	107.8	11,069	9.6%	11.3%	13.6%	17.9%
All Companies	2,759.3	1,657.1	793.9	61,964	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1,299.7	805.5	348.7	37,729	47.1%	48.6%	43.9%	60.9%
All Asian-Based Companies	1,437.8	840.2	437.5	24,122	52.1%	50.7%	55.1%	38.9%
All European-Based Companies	21.9	11.5	7.8	114	.8%	.7%	1.0%	.2%
All Hardware Companies	454.5	464.4	.5	37,693	16.5%	28.0%	.1%	60.8%
All Turnkey & SW Companies	2,304.8	1,192.8	793.5	24,271	83.5%	72.0%	99.9%	39.2%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 2

1988 Asian Mechanical Market Share
(Millions of Dollars/Actual Units)

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	427.2	256.4	111.1	9,084	25.5%	24.6%	24.7%	24.4%
NEC	140.7	111.0	21.5	7,095	8.4%	10.7%	4.8%	19.1%
Nihon Unisys	128.8	90.2	29.6	653	7.7%	8.7%	6.6%	1.8%
Hitachi	115.5	75.7	28.3	1,125	6.9%	7.3%	6.3%	3.0%
Fujitsu	107.6	66.4	26.7	1,297	6.4%	6.4%	5.9%	3.5%
Mutoh Industries	75.2	43.4	24.6	1,188	4.5%	4.2%	5.5%	3.2%
Hitachi Zosen	69.3	34.8	27.6	846	4.1%	3.3%	6.1%	2.3%
Digital	64.4	52.8	.0	811	3.8%	5.1%	.0%	2.2%
Prime Computer	55.7	25.5	14.6	491	3.3%	2.5%	3.3%	1.3%
Toshiba	52.6	30.0	10.9	1,010	3.1%	2.9%	2.4%	2.7%
Mitsubishi Electric	46.2	21.0	15.1	237	2.8%	2.0%	3.4%	.6%
Seiko Instruments	36.1	17.8	14.7	476	2.2%	1.7%	3.3%	1.3%
Hewlett-Packard	35.5	22.5	7.4	1,133	2.1%	2.2%	1.6%	3.0%
Tokyo Electron	27.6	8.3	8.3	53	1.6%	.8%	1.8%	.1%
Hakuto	24.3	12.1	9.6	270	1.5%	1.2%	2.1%	.7%
McDonnell Douglas	23.5	8.9	8.2	249	1.4%	.9%	1.8%	.7%
Sun	23.4	21.0	.0	1,111	1.4%	2.0%	.0%	3.0%
Info. Services Int'l. Dentsu	20.0	2.3	13.9	30	1.2%	.2%	3.1%	.1%
Sharp System Products	19.5	8.6	9.0	54	1.2%	.8%	2.0%	.1%
Sumisho Electronics	15.4	8.3	5.5	196	.9%	.8%	1.2%	.5%
C. Itoh Techno-Science	14.6	10.7	2.3	75	.9%	1.0%	.5%	.2%
Toyo Information Systems	13.2	6.4	5.4	120	.8%	.6%	1.2%	.3%
Mitsui Engineering	10.9	7.9	1.9	78	.6%	.8%	.4%	.2%
Intergraph	10.8	6.3	2.3	118	.6%	.6%	.5%	.3%
Hitachi Seiko	10.5	4.9	5.6	177	.6%	.5%	1.2%	.5%
Matra Datavision	10.1	7.5	1.0	86	.6%	.7%	.2%	.2%
Apollo	9.9	7.0	.0	795	.6%	.7%	.0%	2.1%
Graphtec Engineering	9.8	4.9	3.9	0	.6%	.5%	.9%	.0%
SDRC	8.4	.0	8.4	0	.5%	.0%	1.9%	.0%
Compaq	7.8	7.8	.0	1,488	.5%	.7%	.0%	4.0%
Schlumberger (Applicon)	7.7	1.3	4.2	38	.5%	.1%	.9%	.1%
Control Data	7.4	5.1	1.0	87	.4%	.5%	.2%	.2%
MacNeal-Schwendler	6.8	.0	6.8	0	.4%	.0%	1.5%	.0%

(Continued)

 © 1989 Dataquest Incorporated June

Table 2 (Continued)

1988 Asian Mechanical Market Share
(Millions of Dollars/Actual Units)

Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Other Companies	131.4	112.8	42.6	6,132	7.8%	10.8%	9.5%	16.5%
All Companies	1,675.5	1,041.0	448.7	37,199	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	804.0	523.1	197.2	22,544	48.0%	50.2%	43.9%	60.6%
All Asian-Based Companies	861.5	510.4	250.5	14,570	51.4%	49.0%	55.8%	39.2%
All European-Based Companies	10.1	7.5	1.0	86	.6%	.7%	.2%	.2%
All Hardware Companies	263.8	274.9	.3	21,777	15.7%	26.4%	.1%	58.5%
All Turnkey & SW Companies	1,411.7	766.1	448.4	15,422	84.3%	73.6%	99.9%	41.5%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 3

1988 Asian AEC Market Share
(Millions of Dollars/Actual Units)

Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share: Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Fujitsu	80.7	49.8	20.0	972	27.1%	24.3%	29.2%	9.4%
NEC	29.6	23.3	4.6	1,470	9.9%	11.4%	6.7%	14.2%
IBM	29.2	21.6	4.9	2,106	9.8%	10.5%	7.2%	20.4%
Hitachi	23.1	15.1	5.7	225	7.8%	7.4%	8.3%	2.2%
Digital	17.6	14.3	.0	221	5.9%	7.0%	.0%	2.1%
Intergraph	15.0	8.8	3.2	165	5.1%	4.3%	4.6%	1.6%
Mutoh Industries	11.3	4.0	2.4	181	3.8%	2.0%	3.5%	1.8%
Nihon Unisys	9.7	6.8	2.2	47	3.3%	3.3%	3.3%	.5%
Toshiba	9.0	6.3	1.8	125	3.0%	3.1%	2.6%	1.2%
Hewlett-Packard	7.9	5.3	1.5	413	2.6%	2.6%	2.1%	4.0%
Hitachi Zosen	7.7	3.9	3.1	46	2.6%	1.9%	4.5%	.4%
Mitsubishi Electric	7.7	4.3	1.9	54	2.6%	2.1%	2.7%	.5%
C. Itoh Techno-Science	6.7	4.9	1.1	32	2.3%	2.4%	1.7%	.3%
Prime Computer	6.3	2.7	1.9	65	2.1%	1.3%	2.8%	.6%
CPU	5.4	1.4	3.8	300	1.8%	.7%	5.5%	2.9%
Century Research Center	4.6	2.3	1.8	52	1.5%	1.1%	2.7%	.5%
Apple Computer	4.6	4.0	.0	1,064	1.5%	2.0%	.0%	10.3%
Apollo	3.8	2.6	.0	301	1.3%	1.3%	.0%	2.9%
Toyo Information Systems	3.3	1.6	1.4	30	1.1%	.8%	2.0%	.3%
Uchida Yoko	3.1	2.0	.8	0	1.0%	1.0%	1.2%	.0%
Compaq	2.7	2.7	.0	518	.9%	1.3%	.0%	5.0%
Hakuto	2.7	1.4	1.1	30	.9%	.7%	1.6%	.3%
Autodesk	2.5	.0	2.5	0	.8%	.0%	3.6%	.0%
Sun	2.1	1.9	.0	98	.7%	.9%	.0%	1.0%
ISICAD	1.8	1.0	.5	17	.6%	.5%	.7%	.2%
Sumisho Electronics	1.6	.9	.6	20	.5%	.4%	.8%	.2%
Andor	1.4	.3	1.1	15	.5%	.1%	1.6%	.1%
Seiko Instruments	1.0	.4	.4	54	.3%	.2%	.6%	.5%
Mitsui Engineering	.9	.6	.2	5	.3%	.3%	.2%	.0%
Sony	.6	.6	.0	36	.2%	.3%	.0%	.3%
CADAM	.6	.0	.6	6	.2%	.0%	.8%	.1%
Auto-Trol	.6	.3	.2	7	.2%	.1%	.2%	.1%

(Continued)

© 1989 Dataquest Incorporated June

Table 3 (Continued)

1988 Asian AEC Market Share
(Millions of Dollars/Actual Units)

Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Design Automation	.5	.0	.5	0	.2%	.0%	.7%	.0%
Ustation	.5	.4	.1	99	.2%	.2%	.1%	1.0%
Kubota Computer	.4	.2	.1	5	.1%	.1%	.2%	.0%
Graphtec Engineering	.3	.1	.1	0	.1%	.1%	.2%	.0%
Control Data	.2	.1	.0	2	.1%	.1%	.0%	.0%
Other Companies	28.6	27.6	9.9	2,248	9.6%	13.5%	14.5%	21.8%
All Companies	297.8	204.8	68.3	10,328	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	106.5	85.6	16.8	6,699	35.8%	41.8%	24.5%	64.9%
All Asian-Based Companies	191.3	119.2	51.6	3,629	64.2%	58.2%	75.5%	35.1%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	66.4	71.6	.1	7,482	22.3%	35.0%	.1%	72.4%
All Turnkey & SW Companies	231.4	133.2	68.3	2,846	77.7%	65.0%	99.9%	27.6%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 4

1988 Asian Mapping Market Share
(Millions of Dollars/Actual Units)

Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share: Total Revenue	Market Share: Hardware Revenue	Market Share: Software Revenue	Market Share: Wkstns Shipped
Fujitsu	26.9	16.6	6.7	324	22.5%	22.4%	22.2%	18.6%
Mitsubishi Electric	15.4	8.2	5.7	56	12.9%	11.0%	19.0%	3.2%
IBM	14.6	8.9	3.7	361	12.2%	12.0%	12.2%	20.7%
Digital	11.7	9.6	.0	147	9.8%	13.0%	.0%	8.5%
Hitachi	7.7	5.1	1.9	75	6.4%	6.8%	6.3%	4.3%
Mutoh Industries	7.5	2.7	1.6	120	6.3%	3.6%	5.3%	6.9%
Intergraph	7.3	4.2	1.5	80	6.1%	5.7%	5.1%	4.6%
Prime Computer	6.8	2.9	1.9	51	5.7%	3.9%	6.2%	2.9%
Mitsui Engineering	5.3	3.7	1.1	31	4.4%	5.0%	3.5%	1.8%
Uchida Yoko	3.8	2.4	1.0	0	3.2%	3.3%	3.3%	.0%
NEC	2.8	2.0	.6	19	2.3%	2.6%	1.9%	1.1%
Sun	1.6	1.4	.0	74	1.3%	1.9%	.0%	4.2%
Century Research Center	1.5	.8	.6	17	1.3%	1.0%	2.0%	1.0%
ESRI	1.3	.1	1.0	2	1.1%	.1%	3.3%	.1%
Toshiba	.8	.5	.2	10	.6%	.7%	.5%	.6%
Synercom	.7	.0	.4	0	.6%	.0%	1.2%	.0%
Landmark Graphics	.6	.5	.0	5	.5%	.6%	.0%	.3%
Autodesk	.4	.0	.4	0	.4%	.0%	1.4%	.0%
Apple Computer	.4	.3	.0	84	.3%	.4%	.0%	4.8%
Andor	.3	.1	.3	4	.3%	.1%	.8%	.2%
Hewlett-Packard	.2	.2	.0	29	.1%	.2%	.0%	1.6%
Other Companies	11.6	7.9	3.7	313	9.7%	10.6%	12.4%	17.9%
All Companies	119.7	74.1	30.0	1,745	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	51.6	32.7	10.7	1,133	43.1%	44.1%	35.7%	64.9%
All Asian-Based Companies	68.1	41.4	19.3	612	56.9%	55.9%	64.3%	35.1%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	17.7	16.3	.0	800	14.8%	22.0%	.0%	45.9%
All Turnkey & SW Companies	102.0	57.8	30.0	944	85.2%	78.0%	100.0%	54.1%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 5

1988 Asian EDA Market Share
(Millions of Dollars/Actual Units)

Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Seiko Instruments	76.8	38.4	30.7	500	11.5%	11.4%	12.4%	3.9%
Mentor Graphics	74.0	26.6	32.6	1,044	11.1%	7.9%	13.2%	8.2%
Zuken	57.9	29.7	22.5	347	8.7%	8.8%	9.1%	2.7%
Fujitsu	53.8	33.2	13.4	382	8.1%	9.9%	5.4%	3.0%
NEC	53.4	39.8	10.5	2,815	8.0%	11.8%	4.2%	22.2%
Daisy Systems	37.6	20.1	12.5	267	5.6%	5.9%	5.0%	2.1%
C. Itoh Techno-Science	35.9	16.7	1.4	141	5.4%	5.0%	.5%	1.1%
Sun	30.0	27.0	.0	1,426	4.5%	8.0%	.0%	11.2%
Valid	23.5	10.3	8.9	216	3.5%	3.1%	3.6%	1.7%
Digital	23.4	19.1	.0	295	3.5%	5.7%	.0%	2.3%
Marubeni Hytech	23.1	7.6	13.2	35	3.5%	2.2%	5.3%	.3%
Hewlett-Packard	20.7	13.0	4.4	750	3.1%	3.9%	1.8%	5.9%
Innotech	19.2	.0	17.3	0	2.9%	.0%	7.0%	.0%
Cadence	18.5	.0	15.8	0	2.8%	.0%	6.4%	.0%
Sharp System Products	16.7	7.3	7.7	46	2.5%	2.2%	3.1%	.4%
Asahi Optical	15.4	7.7	6.2	199	2.3%	2.3%	2.5%	1.6%
IBM	15.3	9.6	3.7	486	2.3%	2.9%	1.5%	3.8%
Apollo	11.3	8.0	.0	904	1.7%	2.4%	.0%	7.1%
Racal-Redac	11.1	3.8	6.3	22	1.7%	1.1%	2.5%	.2%
Wacom	10.9	4.1	6.1	633	1.6%	1.2%	2.5%	5.0%
Kanematsu Semiconductor	8.5	3.5	4.2	65	1.3%	1.0%	1.7%	.5%
Futurenet	8.3	.0	7.0	0	1.2%	.0%	2.8%	.0%
Hitachi	7.7	5.1	1.9	75	1.2%	1.5%	.8%	.6%
Mitsubishi Electric	7.7	4.3	1.9	54	1.2%	1.3%	.7%	.4%
Toshiba	7.5	5.2	1.5	104	1.1%	1.5%	.6%	.8%
Scientific Calc.	7.2	1.3	3.8	28	1.1%	.4%	1.5%	.2%
Silicon Compiler Systems	7.0	.0	6.3	0	1.0%	.0%	2.5%	.0%
Yokogawa Electric	6.5	3.8	2.3	44	1.0%	1.1%	.9%	.3%
Prime Computer	6.1	2.7	1.8	42	.9%	.8%	.7%	.3%
Tokyo Keiki	5.4	2.2	2.7	25	.8%	.6%	1.1%	.2%
Uchida Yoko	5.3	3.4	1.4	85	.8%	1.0%	.6%	.7%
Silvar-Lisco	4.7	.0	3.2	0	.7%	.0%	1.3%	.0%

(Continued)

© 1989 Dataquest Incorporated June

Table 5 (Continued)

1988 Asian EDA Market Share
(Millions of Dollars/Actual Units)

Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share: Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Tokyo Electron	4.6	.8	.9	27	.7%	.2%	.4%	.2%
Kyocera	3.8	.2	3.3	0	.6%	.0%	1.3%	.0%
Zycad	3.5	3.1	.1	2	.5%	.9%	.0%	.0%
LSI Logic	3.3	.6	2.4	11	.5%	.2%	1.0%	.1%
Sumisho Electronics	3.0	1.8	.9	33	.5%	.5%	.4%	.3%
Sony	2.4	2.1	.0	146	.4%	.6%	.0%	1.2%
Compaq	2.3	2.3	.0	432	.3%	.7%	.0%	3.4%
Intergraph	2.2	1.2	.4	24	.3%	.4%	.2%	.2%
VLSI Technology	2.0	.3	1.5	26	.3%	.1%	.6%	.2%
CADAM	1.9	.0	1.7	4	.3%	.0%	.7%	.0%
Century Research Center	1.6	.8	.6	18	.2%	.2%	.3%	.1%
Autodesk	1.4	.0	1.4	0	.2%	.0%	.6%	.0%
Control Data	.9	.6	.1	10	.1%	.2%	.0%	.1%
Apple Computer	.8	.7	.0	175	.1%	.2%	.0%	1.4%
Ustation	.7	.6	.1	134	.1%	.2%	.0%	1.1%
Rikei	.6	.2	.3	0	.1%	.1%	.1%	.0%
Calay	.4	.1	.3	5	.1%	.0%	.1%	.0%
Andor	.3	.1	.3	4	.0%	.0%	.1%	.0%
Other Companies	92.6	38.6	51.6	2,375	13.9%	11.4%	20.9%	18.7%
All Companies	666.3	337.2	246.9	12,692	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	337.6	164.1	124.0	7,353	50.7%	48.7%	50.2%	57.9%
All Asian-Based Companies	316.9	169.2	116.0	5,311	47.6%	50.2%	47.0%	41.8%
All European-Based Companies	11.9	3.9	6.8	28	1.8%	1.2%	2.8%	.2%
All Hardware Companies	106.6	101.6	.1	7,633	16.0%	30.1%	.0%	60.1%
All Turnkey & SW Companies	559.8	235.7	246.8	5,058	84.0%	69.9%	100.0%	39.9%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 6

1988 Asian Electronic CAE Market Share
(Millions of Dollars/Actual Units)

Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Mentor Graphics	53.4	19.0	23.7	862	21.9%	15.5%	26.7%	14.6%
Seiko Instruments	28.5	14.2	11.4	231	11.7%	11.6%	12.8%	3.9%
Daisy Systems	24.7	12.6	8.6	197	10.1%	10.2%	9.6%	3.3%
Marubeni Hytech	23.1	7.6	13.2	35	9.5%	6.2%	14.9%	.6%
NEC	21.8	15.6	5.0	1,206	8.9%	12.7%	5.6%	20.5%
Valid	18.7	8.3	7.1	199	7.7%	6.7%	8.0%	3.4%
Sun	16.6	14.9	.0	787	6.8%	12.2%	.0%	13.4%
Digital	11.7	9.6	.0	148	4.8%	7.8%	.0%	2.5%
Fujitsu	10.8	6.6	2.7	130	4.4%	5.4%	3.0%	2.2%
Hewlett-Packard	8.9	5.7	1.9	402	3.7%	4.6%	2.1%	6.8%
Zuken	8.8	4.5	3.4	45	3.6%	3.6%	3.9%	.8%
Futurenet	8.3	.0	7.0	0	3.4%	.0%	7.9%	.0%
Apollo	7.1	5.0	.0	565	2.9%	4.1%	.0%	9.6%
Wacom	5.1	1.9	2.9	239	2.1%	1.6%	3.2%	4.1%
Innotech	3.8	.0	3.5	0	1.6%	.0%	3.9%	.0%
Toshiba	3.7	2.6	.8	52	1.5%	2.1%	.8%	.9%
Zycad	3.5	3.1	.1	2	1.5%	2.5%	.1%	.0%
LSI Logic	3.0	.5	2.1	10	1.2%	.4%	2.4%	.2%
Cadence	2.7	.0	2.3	0	1.1%	.0%	2.6%	.0%
Silicon Compiler Systems	2.1	.0	1.9	0	.9%	.0%	2.1%	.0%
Tokyo Electron	1.8	.6	.6	8	.7%	.5%	.7%	.1%
VLSI Technology	1.7	.2	1.2	22	.7%	.2%	1.4%	.4%
Racal-Redac	1.5	.5	.8	3	.6%	.4%	.9%	.1%
IBM	1.1	1.1	.0	187	.5%	.9%	.0%	3.2%
Compaq	1.0	1.0	.0	192	.4%	.8%	.0%	3.3%
Silvar-Lisco	.9	.0	.6	0	.4%	.0%	.7%	.0%
Kanematsu Semiconductor	.9	.0	.8	0	.3%	.0%	.9%	.0%
Century Research Center	.8	.4	.3	9	.3%	.3%	.4%	.2%
Sony	.8	.7	.0	47	.3%	.5%	.0%	.8%
Control Data	.5	.4	.1	5	.2%	.3%	.1%	.1%
Intergraph	.4	.2	.1	4	.2%	.2%	.1%	.1%
Apple Computer	.2	.2	.0	53	.1%	.2%	.0%	.9%

(Continued)

 © 1989 Dataquest Incorporated June

Table 6 (Continued)

1988 Asian Electronic CAE Market Share
(Millions of Dollars/Actual Units)

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Ustation	.2	.2	.0	51	.1%	.2%	.0%	.9%
Other Companies	28.2	11.2	17.4	848	11.5%	9.2%	19.5%	14.4%
All Companies	244.1	122.5	88.8	5,893	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	183.9	89.6	67.3	4,140	75.4%	73.2%	75.7%	70.3%
All Asian-Based Companies	58.6	32.4	20.7	1,749	24.0%	26.4%	23.3%	29.7%
All European-Based Companies	1.5	.5	.8	4	.6%	.4%	.9%	.1%
All Hardware Companies	53.0	49.5	.0	3,641	21.7%	40.4%	.0%	61.8%
All Turnkey & SW Companies	191.1	73.0	88.8	2,252	78.3%	59.6%	100.0%	38.2%

Source: Dataquest June 1989

© 1989 Dataquest Incorporated June

Table 7

1988 Asian IC Layout Market Share
(Millions of Dollars/Actual Units)

Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Seiko Instruments	44.6	22.3	17.8	236	34.6%	48.6%	27.2%	18.5%
C. Itoh Techno-Science	32.1	14.2	.5	114	24.9%	31.0%	.8%	8.9%
Cadence	15.4	.0	13.1	0	12.0%	.0%	20.1%	.0%
Innotech	15.4	.0	13.8	0	11.9%	.0%	21.1%	.0%
Mentor Graphics	9.8	3.4	4.4	82	7.6%	7.5%	6.6%	6.4%
Sun	7.8	7.0	.0	369	6.0%	15.2%	.0%	28.9%
Fujitsu	5.4	3.4	1.3	100	4.2%	7.5%	2.0%	7.8%
Silicon Compiler Systems	4.9	.0	4.4	0	3.8%	.0%	6.7%	.0%
Daisy Systems	4.4	2.6	1.4	16	3.4%	5.6%	2.1%	1.3%
Kyocera	3.8	.2	3.3	0	2.9%	.3%	5.0%	.0%
Silvar-Lisco	3.8	.0	2.6	0	2.9%	.0%	3.9%	.0%
Digital	3.5	2.8	.0	44	2.7%	6.2%	.0%	3.5%
Valid	2.8	1.2	1.1	9	2.2%	2.7%	1.6%	.7%
Apollo	2.1	1.5	.0	169	1.6%	3.3%	.0%	13.3%
Wacom	1.5	.6	.8	70	1.2%	1.2%	1.3%	5.5%
Hewlett-Packard	1.2	.8	.3	28	.9%	1.7%	.4%	2.2%
Sony	1.0	.8	.0	63	.8%	1.8%	.0%	4.9%
Autodesk	.6	.0	.6	0	.5%	.0%	1.0%	.0%
Rikei	.6	.2	.3	0	.4%	.4%	.5%	.0%
Intergraph	.4	.2	.1	4	.3%	.4%	.1%	.3%
LSI Logic	.3	.1	.2	1	.3%	.1%	.4%	.1%
VLSI Technology	.3	.0	.2	4	.2%	.1%	.3%	.3%
Ustation	.2	.2	.0	49	.2%	.4%	.0%	3.9%
Control Data	.2	.1	.0	2	.1%	.2%	.0%	.2%
Prime Computer	.1	.0	.1	0	.0%	.0%	.1%	.0%

(Continued)

© 1989 Dataquest Incorporated June

Table 7 (Continued)

1988 Asian IC Layout Market Share
(Millions of Dollars/Actual Units)

Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Other Companies	27.7	3.5	20.5	266	21.5%	7.6%	31.3%	20.8%
All Companies	128.9	45.8	65.5	1,275	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	66.6	21.4	33.9	811	51.7%	46.8%	51.7%	63.6%
All Asian-Based Companies	62.3	24.4	31.7	464	48.3%	53.2%	48.3%	36.4%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	16.0	13.9	.0	779	12.4%	30.4%	.0%	61.1%
All Turnkey & SW Companies	112.9	31.9	65.5	496	87.6%	69.6%	100.0%	38.9%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 8

1988 Asian PCB Layout Market Share
(Millions of Dollars/Actual Units)

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Zuken	49.1	25.2	19.0	302	16.7%	14.9%	20.6%	5.5%
Fujitsu	37.7	23.2	9.4	152	12.8%	13.7%	10.2%	2.8%
NEC	31.5	24.2	5.5	1,609	10.7%	14.3%	5.9%	29.1%
Sharp System Products	16.7	7.3	7.7	46	5.7%	4.3%	8.3%	.8%
Asahi Optical	15.4	7.7	6.2	199	5.2%	4.6%	6.7%	3.6%
IBM	14.2	8.5	3.7	299	4.8%	5.0%	4.0%	5.4%
Mentor Graphics	10.8	4.1	4.5	101	3.7%	2.5%	4.9%	1.8%
Newlett-Packard	10.6	6.6	2.3	320	3.6%	3.9%	2.4%	5.8%
Racal-Redac	9.6	3.3	5.4	19	3.3%	1.9%	5.9%	.3%
Daisy Systems	8.6	4.9	2.5	54	2.9%	2.9%	2.7%	1.0%
Digital	8.2	6.7	.0	103	2.8%	4.0%	.0%	1.9%
Hitachi	7.7	5.1	1.9	75	2.6%	3.0%	2.0%	1.4%
Mitsubishi Electric	7.7	4.3	1.9	54	2.6%	2.6%	2.0%	1.0%
Kanematsu Semiconductor	7.7	3.5	3.5	65	2.6%	2.0%	3.7%	1.2%
Scientific Calc.	7.2	1.3	3.8	28	2.5%	.8%	4.1%	.5%
Yokogawa Electric	6.5	3.8	2.3	44	2.2%	2.3%	2.5%	.8%
Prime Computer	6.1	2.7	1.7	42	2.1%	1.6%	1.9%	.8%
Sun	5.7	5.1	.0	270	1.9%	3.0%	.0%	4.9%
Tokyo Keiki	5.4	2.2	2.7	25	1.8%	1.3%	2.9%	.5%
Uchida Yoko	5.3	3.4	1.4	85	1.8%	2.0%	1.5%	1.5%
Wacom	4.3	1.6	2.4	324	1.5%	1.0%	2.6%	5.9%
Seiko Instruments	3.8	1.9	1.5	33	1.3%	1.1%	1.6%	.6%
Toshiba	3.7	2.6	.8	52	1.3%	1.5%	.8%	.9%
C. Itoh Techno-Science	3.7	2.5	.8	27	1.3%	1.5%	.9%	.5%
Sumisho Electronics	3.0	1.8	.9	33	1.0%	1.1%	1.0%	.6%
Tokyo Electron	2.8	.2	.3	19	1.0%	.1%	.3%	.3%
Apollo	2.1	1.5	.0	169	.7%	.9%	.0%	3.1%
Valid	1.9	.8	.7	8	.7%	.5%	.8%	.2%
CADAM	1.9	.0	1.7	4	.6%	.0%	1.8%	.1%
Intergraph	1.5	.8	.3	16	.5%	.5%	.3%	.3%
Compaq	1.3	1.3	.0	240	.4%	.7%	.0%	4.3%
Century Research Center	.8	.4	.3	9	.3%	.2%	.3%	.2%

(Continued)

© 1989 Dataquest Incorporated June

Table 8 (Continued)

1988 Asian PCB Layout Market Share
(Millions of Dollars/Actual Units)

Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share: Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Autodesk	.7	.0	.7	0	.3%	.0%	.8%	.0%
Sony	.7	.6	.0	36	.2%	.4%	.0%	.7%
Apple Computer	.5	.5	.0	123	.2%	.3%	.0%	2.2%
Calay	.4	.1	.3	5	.1%	.1%	.3%	.1%
Cadence	.4	.0	.3	0	.1%	.0%	.3%	.0%
Andor	.3	.1	.3	4	.1%	.0%	.3%	.1%
Control Data	.3	.2	.0	3	.1%	.1%	.0%	.1%
Ustation	.2	.2	.0	33	.1%	.1%	.0%	.6%
Other Companies	36.7	23.8	13.7	1,261	12.5%	14.1%	14.8%	22.8%
All Companies	293.3	168.9	92.5	5,524	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	87.0	53.1	22.9	2,401	29.7%	31.4%	24.7%	43.5%
All Asian-Based Companies	196.0	112.4	63.7	3,098	66.8%	66.6%	68.8%	56.1%
All European-Based Companies	10.3	3.4	6.0	25	3.5%	2.0%	6.4%	.4%
All Hardware Companies	37.6	38.2	.0	3,213	12.8%	22.6%	.0%	58.2%
All Turnkey & SW Companies	255.7	130.8	92.5	2,311	87.2%	77.4%	100.0%	41.8%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 9

Asian CAD/CAM Market by Application
(Millions of Dollars/Actual Units)

	1988	1989	1990	1991	1992	1993	CAGR
All Applications							
Revenue	2,759	3,191	3,601	3,821	4,107	4,422	9.9%
Systems	54,131	71,470	90,200	106,040	119,500	133,220	19.7%
Workstations	61,964	78,720	96,810	111,400	124,420	137,720	17.3%
Mechanical							
Revenue	1,676	1,861	2,029	2,053	2,159	2,264	6.2%
Systems	30,931	39,800	49,280	57,110	62,920	68,680	17.3%
Workstations	37,199	45,640	54,680	61,530	67,130	72,640	14.3%
AEC							
Revenue	298	360	401	419	422	440	8.1%
Systems	9,753	13,740	17,920	21,300	24,320	27,740	23.3%
Workstations	10,328	14,320	18,430	21,700	24,600	27,930	22.0%
Mapping							
Revenue	120	152	183	212	236	261	16.9%
Systems	1,431	1,950	2,480	2,980	3,460	4,010	22.9%
Workstations	1,745	2,280	2,800	3,280	3,720	4,240	19.4%
Electronic CAE							
Revenue	244	316	390	445	509	570	18.5%
Systems	5,795	7,750	10,190	12,670	15,230	17,650	24.9%
Workstations	5,893	7,810	10,230	12,690	15,260	17,670	24.6%
IC Layout							
Revenue	129	171	218	259	289	325	20.3%
Systems	1,248	1,890	2,520	2,910	3,290	3,650	23.9%
Workstations	1,275	1,900	2,520	2,910	3,290	3,650	23.4%
PCB Layout							
Revenue	293	330	380	433	492	563	13.9%
Systems	4,973	6,340	7,820	9,070	10,280	11,500	18.3%
Workstations	5,524	6,770	8,150	9,280	10,420	11,590	16.0%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 10

Asian Market by Region
(Millions of Dollars/Actual Units)

	1988	1989	1990	1991	1992	1993	CAGR
Asia							
Revenue	2,759	3,191	3,601	3,821	4,107	4,422	9.9%
Systems	54,131	71,470	90,200	106,040	119,500	133,220	19.7%
Workstations	61,964	78,720	96,810	111,400	124,420	137,720	17.3%
China							
Revenue	42	53	63	67	80	88	15.7%
Systems	787	1,340	1,840	2,240	2,650	3,120	31.7%
Workstations	1,088	1,640	2,170	2,560	3,030	3,510	26.4%
Hong Kong							
Revenue	41	48	55	59	65	70	11.1%
Systems	927	1,520	1,950	2,290	2,580	2,880	25.4%
Workstations	1,194	1,700	2,120	2,440	2,750	3,040	20.6%
Japan							
Revenue	2,531	2,917	3,287	3,459	3,720	4,005	9.6%
Systems	49,607	63,990	80,400	94,100	105,720	117,400	18.8%
Workstations	55,887	69,810	85,560	97,870	109,080	120,410	16.6%
Korea							
Revenue	68	81	91	122	113	124	12.9%
Systems	1,320	2,130	2,760	3,390	3,920	4,520	27.9%
Workstations	1,766	2,570	3,200	4,050	4,390	5,000	23.1%
Singapore							
Revenue	26	32	37	41	45	46	12.6%
Systems	517	855	1,143	1,399	1,604	1,814	28.5%
Workstations	676	1,028	1,320	1,575	1,791	1,978	24.0%
Taiwan							
Revenue	50	60	68	73	85	89	12.3%
Systems	972	1,637	2,120	2,613	3,036	3,496	29.2%
Workstations	1,353	1,960	2,439	2,906	3,372	3,785	22.8%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 11

Asian Market by Platform
(Millions of Dollars/Actual Units)

	1988	1989	1990	1991	1992	1993	CAGR
All Platforms							
Revenue	2,759	3,191	3,601	3,821	4,107	4,422	9.9%
Systems	54,131	71,470	90,200	106,040	119,500	133,220	19.7%
Workstations	61,964	78,720	96,810	111,400	124,420	137,720	17.3%
Technical Workstation							
Revenue	1,101	1,527	2,002	2,412	2,794	3,186	23.7%
Systems	15,523	23,800	34,300	44,880	56,120	67,080	34.0%
Workstations	15,524	23,800	34,300	44,880	56,120	67,080	34.0%
Host-Dependent/Server							
Revenue	1,184	1,147	1,054	856	790	732	-9.2%
Systems	2,312	2,610	2,660	2,400	2,470	2,510	1.7%
Workstations	10,145	9,860	9,270	7,760	7,380	7,000	-7.2%
Personal Computer							
Revenue	475	517	545	552	524	505	1.2%
Systems	36,295	45,060	53,240	58,760	60,910	63,640	11.9%
Workstations	36,295	45,060	53,240	58,760	60,910	63,640	11.9%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 12

Asian Average Selling Price
(Thousands of Dollars)

	1988	1989	1990	1991	1992	1993	CAGR
Turnkey & Hardware-Only							
Technical Workstation	53.1	46.7	41.4	36.9	33.0	30.5	-10.5%
Host-Dependent/Server	425.1	355.1	316.2	280.7	247.4	222.3	-12.2%
Personal Computer	10.8	9.3	8.2	7.5	6.8	6.1	-10.8%
All Platforms	40.7	34.4	29.9	26.1	24.1	22.5	-11.2%
Turnkey							
Technical Workstation	82.1	76.5	71.4	66.9	63.4	62.3	-5.4%
Host-Dependent/Server	623.9	585.4	545.2	524.5	492.9	464.0	-5.8%
Personal Computer	27.7	25.5	23.1	21.5	20.1	18.3	-8.0%
All Platforms	99.1	90.8	83.2	73.5	68.3	65.8	-7.9%
Hardware-Only							
Technical Workstation	16.7	15.2	13.8	12.5	11.4	10.9	-8.2%
Host-Dependent/Server	150.8	123.2	111.6	103.3	99.3	95.6	-8.7%
Personal Computer	6.2	6.2	6.1	5.8	5.3	5.0	-4.2%
All Platforms	12.1	11.3	10.5	9.6	9.2	8.9	-6.0%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 13

Asian Revenue Source
(Millions of Dollars)

	1988	1989	1990	1991	1992	1993	CAGR
All Platforms							
Hardware	1,657	1,795	1,960	2,003	2,070	2,149	5.3%
Software	794	1,006	1,197	1,343	1,520	1,711	16.6%
Service	337	390	443	474	517	562	10.8%
Total	2,759	3,191	3,601	3,821	4,107	4,422	9.9%
Technical Workstation							
Hardware	574	771	983	1,143	1,276	1,408	19.7%
Software	363	537	733	926	1,120	1,326	29.6%
Service	157	218	286	343	397	452	23.5%
Total	1,101	1,527	2,002	2,412	2,794	3,186	23.7%
Host-Dependent/Server							
Hardware	732	700	635	514	469	431	-10.1%
Software	298	293	277	226	215	203	-7.4%
Service	161	154	142	116	106	98	-9.5%
Total	1,184	1,147	1,054	856	790	732	-9.2%
Personal Computer							
Hardware	351	324	342	346	325	311	-2.4%
Software	133	176	187	192	185	182	6.3%
Service	19	17	16	15	13	12	-8.0%
Total	475	517	545	552	524	505	1.2%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

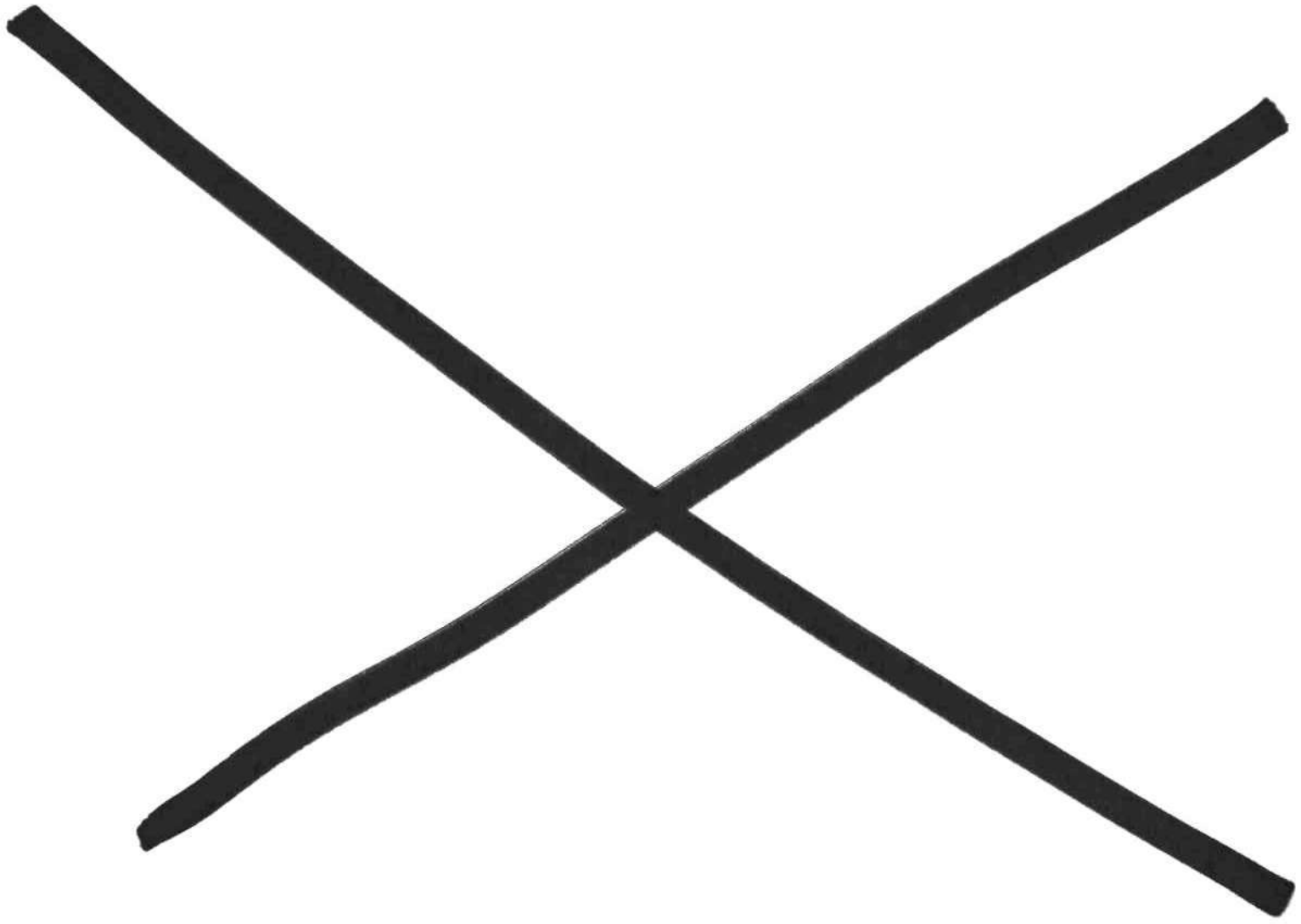
Table 14

Asian Turnkey Versus Unbundled
(Millions of Dollars/Actual Units)

	1988	1989	1990	1991	1992	1993	CAGR
Total Hardware and Software Revenue							
Turnkey	1,746	1,943	2,074	2,088	2,139	2,184	4.6%
Unbundled	705	858	1,083	1,258	1,451	1,676	18.9%
Total	2,451	2,801	3,158	3,347	3,590	3,861	9.5%
Hardware Revenue							
Turnkey	1,193	1,278	1,339	1,324	1,333	1,340	2.4%
Unbundled	464	517	621	679	737	809	11.8%
Total	1,657	1,795	1,960	2,003	2,070	2,149	5.3%
Software Revenue							
Turnkey	553	665	735	764	806	844	8.8%
Unbundled	241	341	462	579	714	867	29.2%
Total	794	1,006	1,197	1,343	1,520	1,711	16.6%
Workstation Shipments							
Turnkey	24,271	26,870	29,580	31,700	33,960	35,190	7.7%
Unbundled	37,693	51,850	67,230	79,700	90,460	102,520	22.2%
Total	61,964	78,720	96,810	111,400	124,420	137,720	17.3%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June



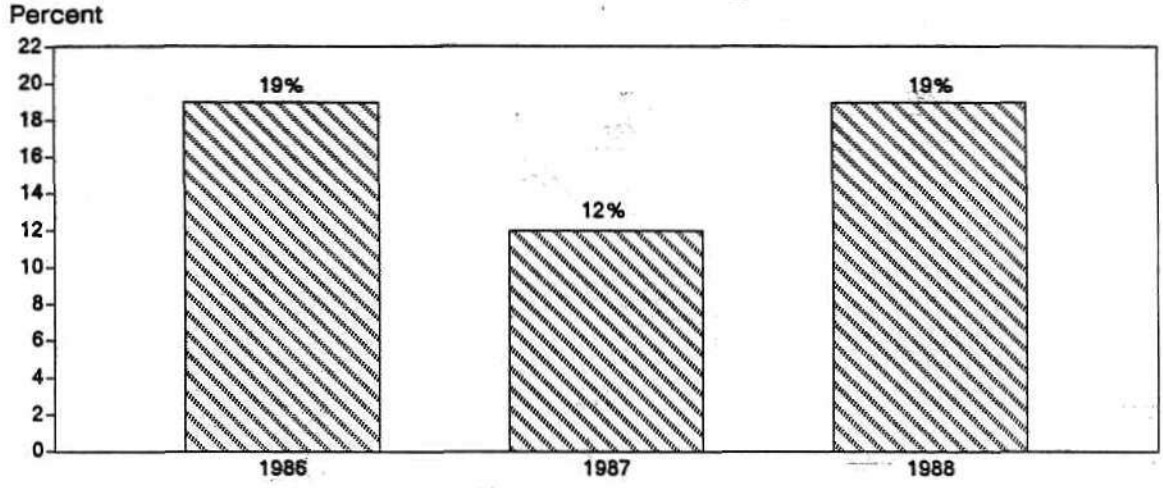
EDA Industry Overview

SUMMARY

Rebounding from its modest 12.1 percent growth in 1987, the electronic design automation (EDA) market forged ahead at 18.6 percent growth in 1988. Spearheading this expansion was the computer-aided engineering (CAE) sector, which grew by 20.8 percent, with revenue reaching $1.12 billion. The PCB layout market exhibited equally strong growth, jumping 20.3 percent to $884.0 million. The IC layout market showed only a moderate increase of 8.7 percent, however, advancing to $333.6 million. Figure 1 illustrates the growth trend over the past four years.

Figure 1

Worldwide EDA Market Percentage Growth Rates



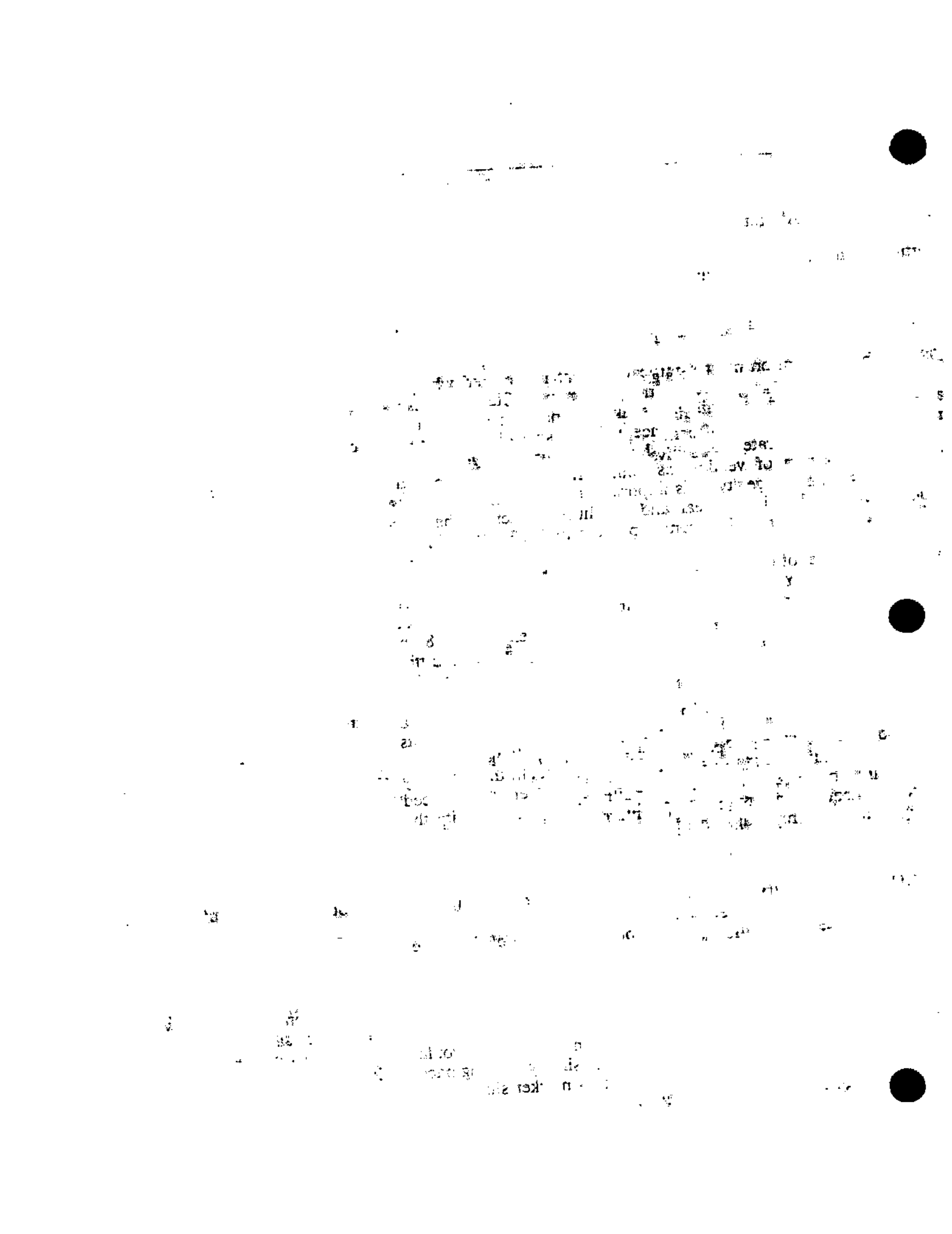
0004011-1

Source: Dataquest June 1989

This document discusses our new worldwide EDA market review and forecast (see Tables 1 through 7 at the end of this document) and addresses the following issues:

- Signs of maturity in the EDA market
- The forces behind consolidation in the EDA arena
- What the mergers and acquisitions did for the players
- Analysis of 1988 market growth
- Regional analysis of the EDA market (North America, Asia, Europe)
- Changing EDA business models

© 1989 Dataquest Incorporated June



- 1988 events impacting EDA's future
- Future opportunities in EDA

EDA INDUSTRY MOVES TOWARD MATURITY

What makes 1988's robust expansion most significant is that it occurred while the industry averaged more than one merger or acquisition per month. Clearly, consolidation and the volatility of the EDA industry failed to shake the market's confidence in either suppliers or technology. Yet market confidence will be short-lived for those merged vendors that fail to demonstrate positive short-term gains; customers will perceive lackluster growth as a sign of vendor instability and will turn quickly to suppliers demonstrating strength and longevity. It is important to note that many of the mergers and acquisitions occurred late in the year and had little impact on the 1988 growth. Market reaction to those mergers will become apparent in 1989 and 1990.

Dataquest believes that this level of consolidation demonstrates that the industry has begun moving into its adolescence. Yet consolidation has had a negligible effect on concentration: the top ten vendors captured 53.2 percent of revenue in 1988, compared with 50.9 percent in 1987. Similarly, the top 20 held 71.8 percent of revenue in 1988, up slightly from 68.7 percent in 1987. Insignificant changes in concentration indicate that more consolidation can be expected.

Moreover, the leading EDA vendor, Mentor Graphics, commands only a 12.6 percent market share, which is a far cry from market dominance. Daisy, with its acquisition of Cadnetix, now holds an 8.8 percent market share, pulling to within striking distance of Mentor. And Valid's string of acquisitions has brought the company 6.0 percent of the EDA pie. In sum, 1988 was the year that market leaders were forced to become stronger, either by acquisitions, mergers or internal expansion; despite the consolidation, the industry remains highly fragmented.

THE FORCE BEHIND CONSOLIDATION

Several reasons for the high rate of consolidation stand out. Discussion of the more important reasons follow.

Critical Mass

In some instances, vendors recognized that competing with Mentor Graphics would first require reaching "critical mass." Other vendors concluded that simply keeping pace with Mentor's EDA growth (35.6 percent in 1988), or narrowing its market share lead, could be accomplished only through mergers or acquisitions.

© 1989 Dataquest Incorporated June

Filling Product Voids

Competitors also acknowledged that unsuccessful and undeveloped product voids had to be filled immediately, thus precluding in-house product development. Ostensibly, the urgency was in response to the market's demand for integrated, end-to-end EDA solutions. But merging products from different companies does not necessarily result in a tightly integrated EDA product line. In fact, it usually does not. Dissimilar data bases and user interfaces, for example, present a roadblock to seamless integration. Over the long term, there is little doubt that vendors that acquire products through acquisitions will tightly integrate these tools into their environments, but this is by no means an overnight process.

Product Line Differentiation

With compute environments becoming more standardized across the EDA industry (e.g., platform, operating system, networking, graphics), vendors can no longer differentiate themselves along the "compute dimension." In essence, the workstation, is becoming somewhat of a commodity. So the more application software an EDA vendor acquires or develops, the more the vendor distinguishes itself from its competitors.

End-to-End Solution

Expanding product line breadth instantaneously via acquisitions is advantageous from a market positioning standpoint. It provides a tactical edge for competing against focused niche players that are selling tools accredited with either functionality or performance superiority. Here, the goal is to offset that superiority by providing the market with an "integrated" product line together with one-stop shopping. One-stop shopping simplifies service and support, which is extremely important to schedule-conscious EDA managers, many of whom do not relish the idea of dealing with a myriad of suppliers.

Although a full-line, integrated product suite is beneficial, Dataquest believes that the EDA market will not adopt tools from a full-line supplier if these products exhibit any substantial disparities in either performance or functionality when compared with competitive offerings. Gateway Design Automation, with its Verilog simulator, is a prime example of a niche player that continued to haunt the full-line suppliers in 1988. Companies are buying EDA tools primarily to increase productivity and slash time to market. EDA packages unable to deliver a noticeable edge in these areas will be unsuccessful in the market, even if they come from a vendor offering a plethora of "integrated" EDA products. As a result, "integration" frequently will take a back seat to performance and functionality. However, this will not always be the case. Dataquest believes that use of a truly integrated EDA intertool system (i.e., common data base, common user interface, intertool communication) will slash more time off the design cycle than a set of loosely coupled, high-performance tools. As a result, individual tool

© 1989 Dataquest Incorporated June

capabilities will become secondary to integration, as vendors begin delivering truly integrated systems. Of course, the optimal situation is to provide the market with tightly integrated, full-featured, high-performance tools—a goal that EDA vendors continue to strive toward.

WHAT THE MERGERS AND ACQUISITIONS DID FOR THE PLAYERS

The slew of mergers and acquisitions in 1988 changed the competitive forces within the EDA industry significantly. In almost every case, the combination yielded a more competitive company in one area or another. These mergers and their effects include the following:

- Daisy's acquisition of Cadnetix thrust Daisy into the top slot in the PCB layout arena, a significant accomplishment given that Daisy was at the bottom in 1987.
- Cadnetix's purchase of HHB Systems gave the company a solid base of simulation and automatic test generation technology in which to complement the firm's increasing strength in PCB layout. However, Cadnetix did not anticipate the initially hostile takeover orchestrated by Daisy Systems. (The Daisy/Cadnetix/HHB Systems merger resulted in duplication of products in several key areas, including simulation, leaving Daisy with little choice but to either sell part or all of HHB Systems.)
- SDA's merger with ECAD, which resulted in a renaming of the combination to Cadence Design Systems, provided the firms with the critical mass and product-line depth needed to accelerate them into a leadership position in IC design tools.
- Cadence's acquisition of Tangent Systems from Intergraph further strengthened Cadence's product line (with Tangent's auto place-and-route software for sea-of-gates gate arrays) and customer base.
- Silicon Compiler Systems' acquisition of Caeco helped reposition it from a silicon compiler company to a full-line supplier of IC design tools, which was necessary in order to compete with Cadence, Mentor, Valid, Silvar-Lisco and Seiko.
- Valid Logic's purchase of Analog Design Tools catapulted the firm into leadership position in the analog design automation market.
- Valid's acquisition of Calma (IC division) gave Valid an installed base of 3,000 seats and the opportunity to significantly grow its fledgling IC layout business.

© 1989 Dataquest Incorporated June

- Valid's purchase of Integrated Measurement Systems yielded a presence in the prototype ASIC verification market, which sets the stage for the company's foray into the automatic test equipment (ATE) market.

- Mentor Graphics' purchase of Trimeter Technologies in 1989 was initiated to bring logic synthesis technology into the Mentor product fold.

- Mentor's acquisition of Tektronix's CAE Systems Division increased the Mentor installed base and gave Mentor computer-aided software engineering (CASE) technology.

- Mentor's purchase of Contour Design Systems bolstered Mentor's analog design automation technology.

- Cadam's purchase of PCAD gave the former a low-end PCB layout product to complement its high-end Prance offering.

- Prime Computer's merger with Computervision moved Prime into the EDA field, while Computervision received an infusion of marketing and sales support from Prime.

Can The Niche Player Survive?

Dataquest expects 1988's market forces to remain in place throughout 1989 and into 1990, resulting in further consolidation. Can the niche player remain viable? Surviving as a niche player will require three elements, as follows:

- Significant product differentiation

- Integration of the tool into an existing design environment must be a straightforward task.

- Diversified distribution channels and strategic alliances must be established (e.g., direct sales, a few strategic OEMs, reference selling, joint marketing).

ANALYSIS OF 1988'S MARKET GROWTH

Standards

Further proliferation of standards (e.g., platform, operating system, networking, graphics, EDIF) was a significant factor driving 1988's expansion. The market has been far more receptive toward EDA solutions configured around nonproprietary compute environments. Dataquest believes that the continuing push toward standards will play a major role in fueling continued growth (e.g., VHDL, UNIX, X-Windows, FDDI, CAD Framework Initiative).

© 1989 Dataquest Incorporated June

Renewed Confidence

Also contributing to the growth was renewed confidence in the technology and suppliers. For example, the number of $1 million-dollar orders jumped significantly in 1988. However, the market remains very sensitive to delivery delays. Addressing this issue will be critical for recently merged or acquired vendors.

Similarly, because nearly all EDA systems are unavoidably shipped with software bugs, among the most important deliverables to today's EDA market is customer service and support (e.g., helping customers to work around inherent system deficiencies). This fact was confirmed in Dataquest's 1988 end-user survey, in which the single most common reason cited for not repurchasing from a vendor was poor support and service. Moreover, consolidation and instability of the EDA industry makes rapid, uninterrupted, quality service even more important—especially in the Far East, where mergers and acquisitions are an unfamiliar phenomenon.

Workstation Performance

The dramatic increases in workstation performance was also a major factor behind 1988's growth. EDA managers saw productivity gains reaped from workstations churning away at 4 to 10 mips. Time to market is the primary litmus test used by EDA managers in evaluating the tools—whether the tools will help shrink product development cycles—and today's systems are yielding noticeable return on investment (ROI) in this domain. The competitive pressure on workstation manufacturers to double performance every two years will undoubtedly provide further leverage for EDA market expansion.

Tumbling ASPs

In an effort to grab market share (installed base), both workstation vendors and EDA suppliers continued slashing prices in 1988. EDA suppliers and workstation vendors recognize that increasing market share now, while their respective markets are riding high-growth curves, is imperative. Capturing market share when the industry reaches its maturing, slower growth stage will be far more difficult.

More Expensive Systems

Much of the industry's revenue growth resulted from vendors shipping systems that have high software value (e.g., PCB layout). Vendors have a greater incentive to ship these kinds of systems because margins are so much higher in comparison with front-end products (e.g., design entry).

© 1989 Dataquest Incorporated June

EDA MARKET REGIONAL ANALYSIS

North America

In 1988, the North American market for EDA tools grew 12.2 percent over 1987. Much of this growth stems from sales related to spending by the military and aerospace industries, which were preparing for possible cuts in defense projects due to the uncertainties of a new administration.

Similarly, EDA companies received an increased number of $1 million-to-$2 million orders from U.S. customers, especially in the military and aerospace industries. The U.S. semiconductor and computer industries also consumed large quantities of EDA tools.

Market Leadership

Mentor continued to dominate North America, outpacing its nearest competitor, Daisy, by nearly a 2:1 margin. Mentor's $143.6 million revenue translated to a 14.8 percent market share, up from $112.6 million and a 12.9 percent market share in 1987.

However, both Daisy and Valid gave Mentor reason to start looking over its shoulder, as each firm's North American EDA revenue doubled from the previous year. Daisy recorded revenue of $87.3 million, equivalent to a 9.0 percent market share, and Valid weighed in at $74.8 million, giving the company a 7.7 percent slice of the pie.

Daisy's North American growth was due primarily to its acquisition of Cadnetix, and much of Valid's increase came from its acquisition of Analog Design Tools and Integrated Measurement Systems. It is highly doubtful that the firms can repeat 1988's growth without additional acquisitions or mergers.

Although Mentor enjoyed considerable success in 1988, Apollo's eroding position in the marketplace made it difficult or impossible for Mentor to penetrate some accounts. This fueled speculation that Mentor would complement its Apollo-based offering with a second platform. Dataquest believes that the platform issue may have been solved with Hewlett-Packard's acquisition of Apollo, which resulted in workstation market-share leadership for HP/Apollo, as of the end of 1988 (30.4 percent).

But the acquisition also creates a conflict between HP/Apollo and Mentor, because HP sells not only workstations, but EDA software that competes with Mentor's product line. With the acquisition, HP controls the workstations that Mentor purchases from Apollo. Dataquest believes that HP may address the problem by selling its EDA business to Mentor in exchange for Mentor's commitment to port to the HP platforms, since HP has not been a major player in EDA software. In fact, of HP's $70.4 million in 1988 EDA sales, only $14.0 million was in software. The revenue HP would derive from

© 1989 Dataquest Incorporated June

Mentor selling HP workstations would substantially outweigh its loss of EDA software business.

Asia

The Asian EDA market grew by 27.3 percent in 1988, from $524.0 million in 1987 to $667.0 in 1988. Dataquest believes that several factors explain the Asian market's growth in 1988, as follows:

- Rebound from market sluggishness in 1987 resulted from the yen's appreciation.
- After factoring the yen's appreciation into 1988's market growth, actual growth was approximately 16.0 percent.
- Profitability for Japanese semiconductor manufacturers over the past two years was very high, allowing for increased investment in EDA tools.

Market Leadership

What is most significant about the Asian market is the marginal penetration by U.S. vendors: Four of the top five market-share slots are held by Japanese suppliers, although Mentor Graphics remains the leader with revenue of $74.0 million and an 11.1 percent market share. Mentor's strength was primarily due to its CAE business, which accounted for more than 70 percent of its Asian revenue.

Following Mentor are Zuken ($57.9 million), Fujitsu ($53.8 million), NEC ($53.4 million), and Seiko ($42.2 million). Despite the lack of U.S. penetration, Dataquest anticipates that U.S. EDA vendors will begin making significant inroads into the Asian market in 1989, as U.S. firms turn their sights from North America to the Far East. Vendors making successful penetration in 1989 will derive 20 percent to 35 percent of their worldwide revenue from Asian campaigns.

Unlike the CAE sector, the PCB layout market, which expanded by 26 percent to $293.9 million in 1988, was completely dominated by Japanese suppliers: Zuken (15.1 percent), Fujitsu (11.5 percent), NEC (9.7 percent), and Sharp (5.1 percent). Zuken's success is tied to its stable position in the marketplace—it is one of the oldest PCB layout companies in the industry and has been the revenue leader for many years. However, in 1988, with an increasing number of vendors competing for the Asian PCB market, the firm expanded into CAE, unveiling schematic capture and simulation tools for both analog and digital design. This was a positive move for Zuken, as its CAE offerings accounted for more than 15 percent of the firm's 1988 revenue.

© 1989 Dataquest Incorporated June

A big surprise in Japan came from Seiko, which continued to hold onto its leadership position in IC layout, despite the increasing competition from Cadence and Mentor. Seiko captured a 29.7 percent market share in Asia in 1988, down slightly from its 30.1 percent share in 1987; Cadence is the next closest competitor, with 12.0 percent. And worldwide, Seiko ranks second (11.5 percent) behind Cadence (15.4 percent). Seiko's recent success stems from its SX-8000 IC layout system, which the company has been actively marketing since Daisy's commitment in the IC layout market became questionable. (Seiko is a distributor for Daisy.) Daisy is still selling its ChipMaster IC design system, but no further development of the product is planned.

Europe

The European market grew 20.9 percent in 1988, from $561.0 million to $678.1 million. CAE experienced the largest growth, with revenue climbing 23.7 percent, from $270 million in 1987 to $333.9 million in 1988. Also exhibiting robust expansion was the PCB arena, where revenue grew to $272.5 million, up from $229.0 million in 1987. (After factoring in appreciation of European currencies, 1988 EDA growth was approximately 17.7 percent.)

Presently, Europe is in a transition period and is attempting to enhance its competitive position against Japan and the United States. Examples of the European commitment include the following:

- Europe's goal of tearing down internal trade barriers by 1992 is well underway.
- Many of Europe's large system manufacturers are striking alliances with foreign companies (e.g., VLSI Technology and Philips) to gain access to strategic areas of technology.
- European electronics manufacturers also have been upgrading their EDA capabilities significantly, as witnessed by the steady growth over the past two years.

Dataquest anticipates that many U.S. and Asian electronics firms will establish manufacturing and design sites in Europe during the next two to three years to avoid the tariff that will be imposed in 1992. And large European systems manufacturers will continue upgrading EDA capabilities during the next few years as they strive to reduce development costs and increase product offerings. This upgrading, together with the increased effort EDA vendors are putting on European sales and marketing, will provide healthy expansion of the European EDA market during the next few years.

Market Leadership

In 1988, Mentor and Daisy were locked in a heated race for EDA market-share leadership, finishing up the year with 11.6 percent and 11.4 percent, respectively. Daisy held a slight edge over Mentor in PCB layout (9.7 percent to 7.2 percent), whereas

© 1989 Dataquest Incorporated June

Mentor was just ahead of Daisy in CAE sales (15.7 percent to 14.5 percent). This is in sharp contrast to the North American CAE sector, where Mentor outpaced Daisy by a 2:1 margin.

Racal-Redac was third in the European market, with revenue of $53.9 million. Racal-Redac, whose primary business is PCB layout, maintained its leadership position in this area with a 16.1 percent market share. However, the firm also had a presence in CAE, deriving more than 13 percent of its revenue from front-end design tools (e.g., Racal is an OEM of HHB Systems' CADAT simulator).

In 1988, Racal-Redac, like Zuken in Asia, began feeling the competitive pressures from U.S. PCB layout vendors (e.g., Mentor, Valid, Daisy,) and, as such, put more emphasis on its CAE business. But the company is an OEM of the CADAT simulator and, thus, is unable to enjoy high margins on the product. Dataquest believes that an acquisition of HHB Systems by Racal-Redac would provide Racal-Redac with the margin incentives to expand into the CAE arena aggressively into the CAE arena. The combination also would provide Racal-Redac with a much stronger position against Mentor, Daisy, and Valid.

CHANGING BUSINESS MODELS

The EDA industry is undergoing a major change, moving from a predominantly turnkey business (Daisy Systems, Mentor Graphics, Valid Logic) to one that now includes a healthy mix of software-only vendors (e.g., Cadence, Silicon Compiler Systems) and workstation suppliers (Sun, Digital Equipment, IBM, HP/Apollo, Intergraph, Solbourne, Sony) selling directly to EDA end-users.

Dataquest believes that this trend toward unbundling is driven by the following factors:

- A better deal. Large-volume workstation customers often believe they can extract higher discounts for the hardware if they buy it separately through an alternate distribution channel (i.e., a non-EDA workstation OEM such as a workstation clone manufacturer).

- Network licenses. The market is beginning to demand network licenses for EDA software instead of site-and-node licenses. With network licensing, the customer purchases the software either separately or bundled on a file server. The license allows a fixed number of nodes to use the software concurrently, and the customer is free to load the software onto any node on the network. Thus, the customer is not purchasing a turnkey workstation for each license. Valid's Access system, for example, is among the first to meet this new market demand. Several other vendors, including Cadence, also have begun offering network licensing.

© 1989 Dataquest Incorporated June

- Market expectancy. With an increasing number of vendors unbundling their software, the market is expecting other vendors to do the same.

- Porting gets easier. With standards such as the C language and the UNIX operating system becoming more pervasive, porting to additional platforms is becoming less burdensome. Yet, the costs and complexities (e.g., inventory, quality control, service) of selling multiple-platform turnkey systems can become prohibitive. Shipping only software simplifies and expedites porting to new platforms.

- Shrinking hardware margins. Vendors supporting even one turnkey platform are finding it increasingly difficult to sustain turnkey profit margins because hardware margins are slipping, a result of the tumbling workstation prices.

Dataquest believes that the combination of these factors will continue chipping away at the once healthy turnkey profit margins, thereby slowing the growth of turnkey systems. However, many EDA vendors remain committed to selling turnkey systems, and large segments of the EDA market still wish to buy both hardware and software from a single supplier.

Extending the Life of Turnkey Systems

Dataquest believes that vendors can forestall the market's demand for unbundling by leveraging the turnkey solution with attractive service contracts, which include both hardware and software maintenance. Because EDA managers are looking for complete design automation solutions, and not simply a list of separate technical requirements (e.g., the application software, workstations, operating systems, networking, graphics), large segments of the market will be inclined to buy turnkey systems if the unified service contract makes buying the hardware separately less palatable.

Solutions to Falling Margins

Dataquest believes that EDA suppliers will combat slipping hardware margins by attempting to ship more turnkey systems that have a higher software value content. This strategy preserves system margins due to the dramatically wider margins reaped from software.

Vendors also will attack the problem by improving inventory management. For Mentor Graphics, employing this strategy in 1988 yielded positive results: Sales volumes increased, yet inventory levels as of December 31, 1988, were $20.6 million, down from $23.3 million in 1987. However, this reduction in inventory could also be indicative of the close relationship between Apollo Computer and Mentor.

Similarly, some vendors have resorted to just-in-time (JIT) inventory management. This, of course, is risky business, but an increasing number of companies across a range of different industries have resorted to it.

© 1989 Dataquest Incorporated June

The Achilles Heel: Software Pricing

Falling average selling prices (ASPs) of hardware will present another problem for EDA suppliers: Customers will expect a corresponding erosion of software prices. This puts EDA vendors in a difficult position, because software development costs are rising. The problem is less acute for vendors selling turnkey systems, because software pricing can be buried in the bundled system price. Nonetheless, the huge margins on software are in jeopardy, as more and more software is sold unbundled.

To solve the problem and reduce the cost of development, some vendors are turning to object-oriented programming languages such as C++, which appears to be an emerging standard in the EDA industry. Several EDA vendors, including Mentor, Valid, and Cadence, have been using C++ extensively. In fact, Mentor's Package Station is based exclusively on C++. The C++ language is an extension of C that adds the concept of class, a mechanism for creating user-defined data types. The language was developed at the Computer Science Research Center at AT&T Bell Laboratories (Murray Hill, New Jersey).

Object-oriented programming is a relatively new style of programming that seems to be yielding significant increases in programmer productivity. Much of the assets of today's EDA vendors is measured by the productivity of the firms' software engineers, so a boost in productivity will produce a more favorable asset turnover (sales/total assets). Even more important, object-oriented programming enables code reuse and better maintainability, which can dramatically increase the code's life span.

On the down side, because object-oriented software construction is a new style of programming, there are relatively few experts in the field. Recognizing the importance of using C++, however, both Mentor and Valid established in-house training projects to get developers up to speed.

Dataquest believes that EDA vendors that are able to significantly reduce the cost of software development and maintenance will be among the most competitive in the 1990s.

1988 EVENTS IMPACTING 1989 AND BEYOND

VHDL Comes of Age

The VHSIC Hardware Description Language (IEEE-1076) leaped to center stage in 1988. Most of the major EDA vendors have announced that they will support it. However, the vast majority of the market is unfamiliar with VHDL, and several issues have yet to be resolved (e.g., whether existing simulators will be afforded the luxury of accepting only a particular "standard" subset of VHDL constructs). As a result, VHDL

© 1989 Dataquest Incorporated June

will not immediately impact the market. In fact, the VHDL test validation suite, which will enable the Department of Defense (DOD) to verify the capabilities of each vendor's VHDL simulator, will not be available until early 1990. The suite of software test programs is being developed by Intermetrics and Vantage Analysis Systems, both of which provide VHDL simulators.

Presently, the market is curious about VHDL, as much has been written about it in the press over the last year. However, Dataquest believes that VHDL's rate of market penetration in the commercial sector will depend on how well it performs against competitive hardware description language (HDLs).

Logic Synthesis

Logic synthesis made its debut in 1988, with three start-up companies capturing most of the attention: Synopsys, Silc Technologies, and Trimeter Technologies. Briefly, logic synthesis allows engineers to describe the behavior of a design in a hardware description language; from this description, a circuit is automatically synthesized by the logic synthesis system. The circuit is then optimized to minimize the number of gates necessary to implement the design.

Logic synthesis' primary advantage is twofold: First, the optimization ensures that the least amount of real estate will be consumed by the design; and second, working with a high-level language instead of gates simplifies and speeds the design process dramatically, since the designer is not bogged down with the intricacies of gates and primitive macrocells.

Logic synthesis is a step higher than silicon and cell compilation, both of which require the designer to work at the structural level of design (e.g., block- and register-level). Silicon and cell compilation can be thought of as a subset of logic synthesis, since the high-level descriptions used in logic synthesis are transformed into structural representations, which are then compiled into a physical representation and mapped onto a selected physical structure (e.g., a full-custom, gate array, cell-based, programmable logic device).

The total market for logic synthesis tools in 1988 is estimated at $8.0 million (including logic synthesis tools for PLD design—Boolean equations, state machines, etc.). Dataquest expects this figure to jump to $13.0 million in 1989. Most of the large EDA vendors, as well as the ASIC vendors, are currently formulating a strategy to meet the market's demand for logic synthesis tools. Mentor took the first step by announcing its intent to acquire Trimeter Technologies in early 1989. Others, such as Cadence and LSI Logic, have become OEMs of the Synopsys product.

The central issue surrounding logic synthesis is which hardware description language will become the de facto standard for describing circuit behavior. Silc Technologies provides its own language, Synopsys offers Gateway Design Automation's Verilog language, and Trimeter supports VHDL. However, because VHDL is becoming

© 1989 Dataquest Incorporated June

a broadly supported standard, both Silc and Synopsys have committed to developing VHDL-based logic synthesis tools. The problem with VHDL is its all-encompassing nature, which makes synthesis of the entire language impossible. So again, the issue will be which VHDL constructs the logic synthesis vendors will support.

New Muscle behind Analog Design Automation

Dataquest estimates that the analog design automation market in 1988 was between $50 million and $60 million. Until now, most EDA vendors have given little attention to the analog design automation market due to its limited size. However, because almost all of the analog design automation environments are a composite of very loosely integrated tools from universities, in-house development projects, and commercial vendors, a substantial need for sophisticated, high-performance tools existed. In 1988, EDA vendors took aim at this market. The results were as follows:

- Valid acquired Analog Design Tools, the leader in the analog design automation market with 1988 revenue of $15.4 million.
- Daisy acquired SimuCAD, a niche company focusing on analog simulation, as part of its Cadnetix/HHB Systems acquisition. Daisy's analog design automation groups have consolidated and now exist as separate divisions.
- Mentor Graphics increased the depth of its analog offering by purchasing Contour Design Systems, a supplier of analog component libraries and modeling technology.
- Cadence is establishing its place in the analog design automation field by adopting a series of technology partners. This is the same strategy used by the firm (formerly SDA) during its start-up period several years ago. Under the agreements, Cadence receives an infusion of capital and feedback for improvements on Cadence's products from each of its partners. In return, the partner receives access to the technology born from the development.
- Dataquest believes the significant muscle now behind the development of analog design automation tools will translate to high growth. In addition, analog design automation technology will benefit from major research efforts currently underway at universities throughout the United States, where areas of focus include analog synthesis, simulation, modeling, and physical design.

Mixed-Signal Simulation Gains Momentum

Mixed-signal simulation (i.e., analog/digital) took a leap forward as HHB Systems, GenRad, and Gateway Design Automation each teamed independently with Analogy to link their logic simulators with Saber, Analogy's behavioral-level analog simulator. These Saber-based products join several other mixed-signal simulators already on the

© 1989 Dataquest Incorporated June

market, including those from ViewLogic/MicroSim, Silicon Compiler Systems, Silvar-Lisco, and Sierra Semiconductor.

Dataquest believes that development and proliferation of board-level, mixed-signal simulators will significantly boost the penetration of simulation technology into the mainstream systems design houses. However, for these products to be successful, they must possess robust component model libraries and exhibit high execution speeds.

A New Push Toward Standardization: CAD Framework Initiative

With 1988 came the birth of the CAD Framework Initiative (CFI). The CFI comprises a body of EDA vendors and users whose charter is to develop guidelines for standard EDA framework implementation. A framework is a software infrastructure providing a common operating environment for EDA tools. The CFI is currently addressing six elements: system environments (e.g., operating systems), design methodology management, design data management, design representation, user interfaces, and intertool communications.

The CFI group is attempting to solve the problems of heterogeneous design environments, since most current EDA environments consist of a mixture of software and hardware from an array of vendors. Heterogeneous environments are what the market is demanding—users want the freedom to buy design tools from different suppliers and to easily integrate them into a standard EDA environment.

Some vendors have responded by offering software utilities that allow users to more easily integrate tools into that vendor's proprietary framework. This is a good first step, but the market still remains fearful of relying on any particular vendor's framework, for even with such an "open" system, users must base their design environment on a nonstandard framework from a single vendor.

Dataquest views formation of the CFI as very positive. Most of the market is unaware of the group, but those that are—mostly EDA managers—are hopeful, although somewhat skeptical, that the CFI will bear fruit. Skepticism stems from the fact that a large amount of plurality and bias exists among the CFI vendor membership, which may slow development of a standard framework.

Despite the CFI's aggressive development schedule to generate a preliminary standard by late 1990, Dataquest believes that it may be well into 1991 or early 1992 before an industry-endorsed standard set of guidelines emerges from the group. However, development and acceptance will accelerate as more large EDA users pressure the group to come to a consensus. Currently, CFI has approximately 40 members, including Mentor Graphics, Valid Logic Systems, Cadence Design Systems, EDA Systems, Digital Equipment Corporation, Hewlett-Packard, Motorola, MCC, VLSI Technology, Sony, Philips, Siemens, and Nixdorf.

© 1989 Dataquest Incorporated June

Silicon Vendors Aim at Software Market

Several chip manufacturers, most notably LSI Logic and VLSI Technology, launched major EDA software campaigns to leverage their silicon offerings in 1988. Both firms surpassed the $20 million barrier and will continue developing and marketing EDA software that facilitates silicon sales. As ASIC manufacturing becomes more of a commodity, ASIC vendors will attempt to differentiate themselves not only on fabrication capabilities, but design tools as well.

But the high cost of developing tools, as well as the difficulty of keeping pace with the technology advances from commercial EDA vendor offerings, is increasingly prohibiting in-house development. To solve the problem, several ASIC vendors are opting to serve as OEMs for commercial EDA suppliers. ASIC vendors are offering customers with "open" EDA systems that combine the ASIC vendor's proprietary tools with third-party packages. Among the first to espouse this strategy are Motorola, LSI Logic, and NEC.

EDA vendors also are doing their part to open the newly discovered ASIC-vendor distribution channel. For instance, Cadence recently established its Silicon Access Alliance (SAA) OEM program, whereby Cadence helps the ASIC vendor integrate proprietary, third-party, and Cadence software into a common design environment. All or part of the resulting design automation system is then remarketed to the ASIC supplier's customers, which are predominantly systems houses. Initial members of the SAA program include National Semiconductor, Harris Semiconductor, and European Silicon Structures.

Cadence's strategy thus provides the firm with a second distribution channel into the systems market that complements its direct channel. This channel will "prime the pump" for Cadence to more effectively penetrate electronic systems manufacturers.

Cadence: A New Member of the Daisy-Mentor-Valid Triumvirate?

Cadence, which traditionally has been attacking the back end of the IC design process, has clearly begun targeting the systems market with not only back-end IC design tools, but front-end system design products. Cadence is using the following strategies to penetrate this territory:

- Establishing a separate division whose charter is to thrust the company into the systems domain
- The SAA OEM program
- Signing of several technology partner agreements with systems houses
- Striking an agreement with Gateway Design Automation to integrate and reference sell the Verilog simulator, a tool used for front-end design

© 1989 Dataquest Incorporated June

- Signing an agreement with Synopsys to be an OEM of the Design Compiler logic synthesis system, which is used by systems engineers for front-end ASIC design

Dataquest anticipates that Cadence will pose a significant threat to the market shares of Mentor, Daisy, and Valid. In fact, in 1988, Cadence surpassed Valid in software revenue.

FUTURE OPPORTUNITIES

Dataquest believes the EDA market will adopt tools that deliver verifiable productivity increases to engineers. The kinds of products that are needed, and that will be successful over the next few years are as follows:

- VHDL-based products
- Logic synthesis tools
- Automatic/interactive partitioning tools
- Analog design automation (e.g., modeling, simulation, layout, synthesis)
- Test synthesis tools (e.g., scan, ATPG)
- Advanced PC board layout systems (e.g., automatic timing-driven layout—crosstalk, impedance matching)
- Mixed-signal simulators
- Design management systems
- Hybrid IC layout tools
- System simulation packages
- IC layout tools geared toward the system designer (e.g., floor-planning)

DATAQUEST CONCLUSIONS

Dataquest believes that the hardy growth witnessed in 1988 will continue over the next five years. Electronic design automation, previously viewed as a luxury by most companies, is now clearly recognized as a necessity for remaining competitive. We expect this to be the underlying force driving our forecast 15 percent compound annual growth rate (CAGR) through 1993.

© 1989 Dataquest Incorporated June

Table 1

1988 EDA Worldwide Market Share

	Revenue	Units	Revenue Share	Units Share
Mentor Graphics	295.9	4,083	12.6%	6.8%
Daisy Systems	205.2	2,005	8.8%	3.3%
Digital	156.0	1,967	6.7%	3.3%
Valid	141.0	1,277	6.0%	2.1%
Sun	124.9	5,942	5.3%	9.8%
Apollo	96.6	5,010	4.1%	8.3%
Racal-Redac	77.0	149	3.3%	.2%
Hewlett-Packard	70.4	4,040	3.0%	6.7%
Cadence	61.7	0	2.6%	.0%
Intergraph	60.4	662	2.6%	1.1%
Zuken	58.0	347	2.5%	.6%
Fujitsu	53.8	382	2.3%	.6%
NEC	53.4	2,815	2.3%	4.7%
Prime Computer	51.7	403	2.2%	.7%
Compaq	50.0	9,600	2.1%	15.9%
IBM	48.3	1,760	2.1%	2.9%
Seiko - No OEM	42.2	200	1.8%	.3%
Zycad	35.4	51	1.5%	.1%
Silicon Compiler Systems	30.4	0	1.3%	.0%
Scientific Calc.	29.0	101	1.2%	.2%
Other	603.1	19,531	25.7%	32.4%
All Companies	2,344.4	60,324	100.0%	100.0%
All U.S.-Based Companies	1,854.1	53,114	79.1%	88.0%
All Asian-Based Companies	317.0	5,410	13.5%	9.0%
All European-Based Companies	173.4	1,799	7.4%	3.0%
All Hardware Companies	566.9	44,204	24.2%	73.3%
All Turnkey & SW Companies	1,777.6	16,119	75.8%	26.7%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 2

EDA Worldwide Forecast by Application

	1988	1989	1990	1991	1992	1993	CAGR
All EDA Applicat.							
Revenue	2,344	2,732	3,174	3,662	4,126	4,645	14.7%
Systems	58,599	69,800	83,400	95,580	110,750	125,150	16.4%
Workstations	60,324	71,140	84,360	96,230	111,160	125,440	15.8%
Electronic CAE							
Revenue	1,127	1,307	1,525	1,760	1,959	2,169	14.0%
Systems	31,590	37,120	45,570	53,140	62,210	69,920	17.2%
Workstations	31,851	37,290	45,690	53,230	62,290	70,020	17.1%
IC Layout							
Revenue	334	420	505	581	652	740	17.3%
Systems	4,152	5,670	7,240	8,510	9,800	11,460	22.5%
Workstations	4,314	5,790	7,320	8,560	9,830	11,480	21.6%
PCB Layout							
Revenue	884	1,004	1,144	1,321	1,515	1,736	14.4%
Systems	22,856	27,010	30,580	33,940	38,740	43,770	13.9%
Workstations	24,158	28,060	31,350	34,440	39,040	43,950	12.7%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 3

EDA Worldwide Forecast by Region

	1988	1989	1990	1991	1992	1993	CAGR
	****	****	****	****	****	****	****
Worldwide							
Revenue	2,344	2,732	3,174	3,662	4,126	4,645	14.7%
Systems	58,599	69,800	83,400	95,580	110,750	125,150	16.4%
Workstations	60,324	71,140	84,360	96,230	111,160	125,440	15.8%
North America							
Revenue	971	1,075	1,195	1,342	1,504	1,680	11.6%
Systems	29,952	34,420	38,420	41,370	45,970	49,510	10.6%
Workstations	30,491	34,760	38,590	41,440	45,990	49,520	10.2%
Europe							
Revenue	678	797	932	1,107	1,234	1,378	15.2%
Systems	15,796	18,270	22,800	27,210	32,630	38,210	19.3%
Workstations	16,264	18,700	23,150	27,460	32,760	38,270	18.7%
Far East							
Revenue	667	821	993	1,142	1,296	1,465	17.0%
Systems	12,114	16,100	20,690	24,860	29,060	33,070	22.2%
Workstations	12,790	16,610	21,070	25,110	29,220	33,190	21.0%
Rest of World							
Revenue	29	39	53	71	92	122	33.6%
Systems	737	1,010	1,480	2,140	3,090	4,350	42.6%
Workstations	779	1,060	1,550	2,220	3,190	4,470	41.8%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 4

EDA Worldwide Forecast by Platform

	1988	1989	1990	1991	1992	1993	CAGR
	****	****	****	****	****	****	****
All Platforms							
Revenue	2,344	2,732	3,174	3,662	4,126	4,645	14.7%
Systems	58,599	69,800	83,400	95,580	110,750	125,150	16.4%
Workstations	60,324	71,140	84,360	96,230	111,160	125,440	15.8%
Technical Workstation							
Revenue	1,536	1,945	2,480	3,118	3,699	4,314	22.9%
Systems	24,582	33,610	47,220	65,550	85,910	106,800	34.1%
Workstations	24,583	33,610	47,220	65,550	85,910	106,800	34.1%
Host-Dependent/Server							
Revenue	459	426	354	271	214	175	-17.5%
Systems	2,179	2,370	2,200	1,860	1,600	1,390	-8.6%
Workstations	3,902	3,710	3,170	2,510	2,020	1,690	-15.4%
Personal Computer							
Revenue	349	361	340	274	213	155	-14.9%
Systems	31,838	33,820	33,980	28,170	23,240	16,960	-11.8%
Workstations	31,838	33,820	33,980	28,170	23,240	16,960	-11.8%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 5

EDA Worldwide Average Price per Seat Forecast by Platform

	1988	1989	1990	1991	1992	1993	CAGR
Turnkey & Hardware-Only							
Technical Workstation	39.6	35.3	30.8	26.7	22.9	20.5	-12.3%
Host-Dependent/Server	152.1	128.6	112.1	98.6	86.9	77.9	-12.5%
Personal Computer	5.4	5.4	5.1	4.8	4.5	4.3	-4.5%
All Platforms	25.2	23.9	22.5	21.6	19.9	19.0	-5.5%
Turnkey							
Technical Workstation	62.0	58.2	54.3	50.4	48.4	48.2	-4.9%
Host-Dependent/Server	376.8	361.4	341.6	315.9	317.4	321.0	-3.2%
Personal Computer	15.1	16.9	14.4	13.0	13.1	9.6	-8.7%
All Platforms	64.9	61.3	56.4	51.9	49.4	49.0	-5.5%
Hardware-Only							
Technical Workstation	18.1	16.4	14.9	13.5	12.4	11.9	-8.0%
Host-Dependent/Server	88.1	79.5	72.9	68.6	62.6	57.1	-8.3%
Personal Computer	4.6	4.7	4.7	4.6	4.3	4.3	-1.3%
All Platforms	11.7	11.6	11.3	11.4	11.1	11.2	-.9%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 6

EDA Worldwide Revenue Sources Forecast by Platform

	1988	1989	1990	1991	1992	1993	CAGR
	****	****	****	****	****	****	****
All Platforms							
Hardware	1,154	1,236	1,385	1,524	1,639	1,779	9.0%
Software	866	1,114	1,338	1,606	1,879	2,175	20.2%
Service	325	382	451	532	607	690	16.3%
Total	2,344	2,732	3,174	3,662	4,126	4,645	14.7%
Technical Workstation							
Hardware	703	835	1,032	1,252	1,430	1,623	18.2%
Software	587	806	1,062	1,383	1,700	2,031	28.2%
Service	241	304	385	482	569	659	22.3%
Total	1,536	1,945	2,480	3,118	3,699	4,314	22.9%
Host-Dependent/Server							
Hardware	282	235	193	147	114	91	-20.3%
Software	110	131	111	87	71	61	-11.1%
Service	65	60	49	37	29	24	-18.3%
Total	459	426	354	271	214	175	-17.5%
Personal Computer							
Hardware	169	166	159	124	95	66	-17.2%
Software	169	177	165	137	108	82	-13.4%
Service	18	18	16	13	10	7	-17.1%
Total	349	361	340	274	213	155	-14.9%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

Table 7

EDA Worldwide Forecast by Distribution Class

	1988	1989	1990	1991	1992	1993	CAGR
	****	****	****	****	****	****	****
Total Hardware and Software Revenue							
Turnkey	960	1,106	1,222	1,327	1,345	1,371	7.4%
Unbundled	1,061	1,243	1,501	1,803	2,173	2,583	19.5%
Total	2,021	2,350	2,723	3,130	3,518	3,954	14.4%
Hardware Revenue							
Turnkey	637	671	731	783	777	774	4.0%
Unbundled	518	565	654	741	862	1,005	14.2%
Total	1,154	1,236	1,385	1,524	1,639	1,779	9.0%
Software Revenue							
Turnkey	323	436	491	544	568	597	13.1%
Unbundled	543	678	847	1,063	1,311	1,578	23.8%
Total	866	1,114	1,338	1,606	1,879	2,175	20.2%
Workstation Shipments							
Turnkey	16,119	18,360	21,420	24,720	25,830	26,130	10.1%
Unbundled	44,204	52,780	62,940	71,510	85,330	99,310	17.6%
Total	60,324	71,140	84,360	96,230	111,160	125,440	15.8%

Source: Dataquest
June 1989

© 1989 Dataquest Incorporated June

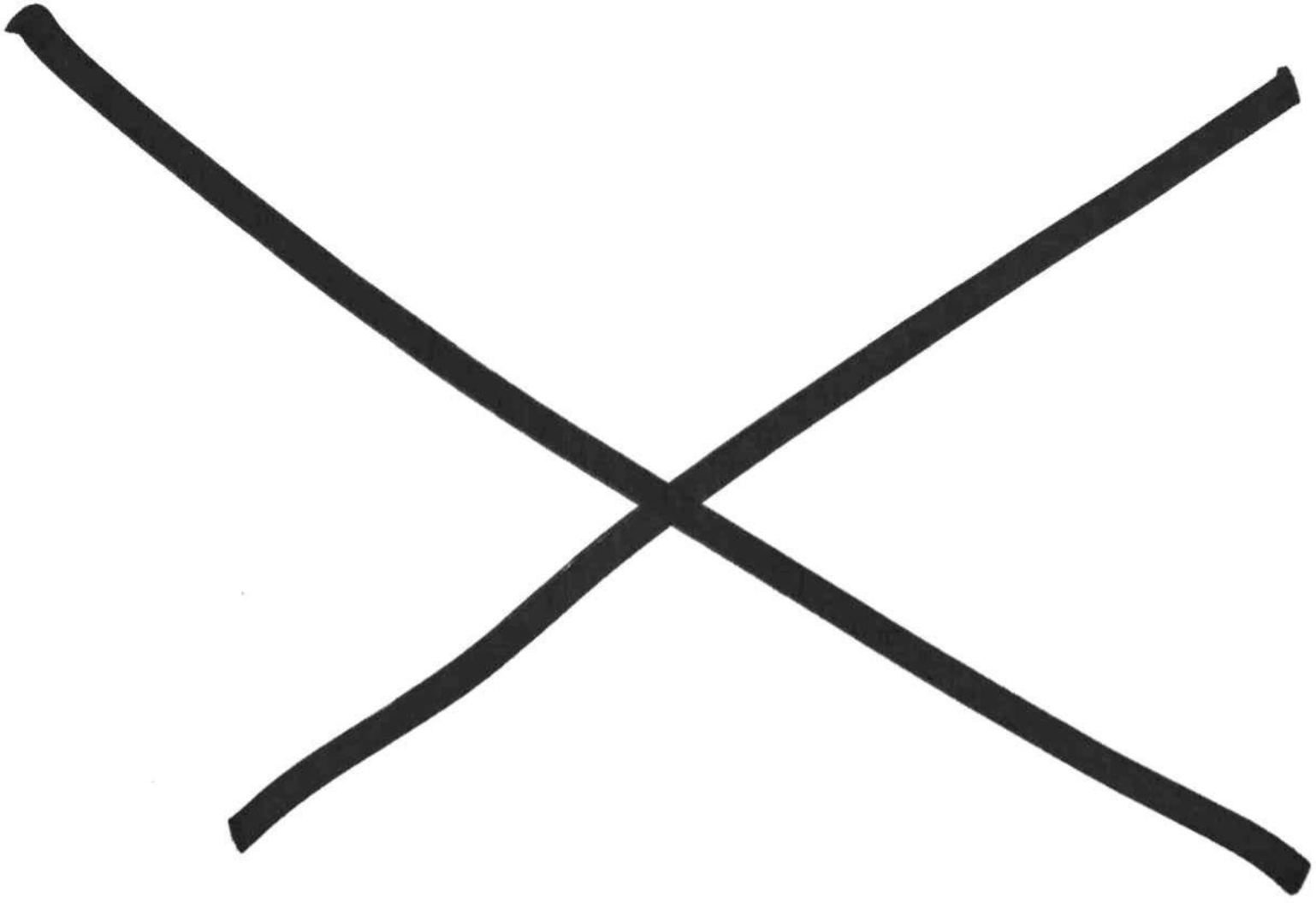


TABLE NUMBER: 1
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Worldwide
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	11,607	21,979	43,846	49,963	58,599	69,800	83,400	95,580	110,750	125,150	50%	16%
Workstation Shipments	13,620	23,905	46,401	52,510	60,324	71,140	84,360	96,230	111,160	125,440	45%	16%
CPU Installed Base	15,006	36,938	71,610	118,820	178,325	232,160	288,690	346,470	419,610	508,620	86%	23%
Workstation Installed Base	19,720	43,492	80,465	129,014	190,065	243,970	300,010	356,530	428,400	516,060	76%	22%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	104.7	97.9	74.9	49.6	64.9	61.3	56.4	51.9	49.4	49.0	-11%	-5%
Hardware-Only ASP	34.5	28.2	14.6	14.3	11.7	11.6	11.3	11.4	11.1	11.2	-24%	-1%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	924	1,079	1,023	1,154	1,236	1,385	1,524	1,639	1,779	NA	9%
CPU Revenue	NA	618	780	727	792	854	969	1,077	1,179	1,297	NA	10%
Workstation Revenue	NA	106	124	105	54	83	72	58	45	36	NA	-8%
Peripheral Revenue	NA	200	175	191	308	299	344	389	415	446	NA	8%
Software Revenue	NA	401	535	711	866	1,114	1,338	1,606	1,879	2,175	NA	20%
Bundled	NA	309	299	265	323	436	491	544	568	597	NA	13%
Unbundled	NA	92	237	446	543	678	847	1,063	1,311	1,578	NA	24%
Service Revenue	NA	134	172	257	325	382	451	532	607	690	NA	16%
Total Revenue	849	1,484	1,763	1,976	2,344	2,732	3,174	3,662	4,126	4,645	29%	15%
Increase over Prior Year	NA	75%	19%	12%	19%	17%	16%	15%	13%	13%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 2
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Worldwide
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	5,072	8,827	12,354	18,563	24,582	33,610	47,220	65,550	85,910	106,800	48%	34%
Workstation Shipments	5,159	8,827	12,354	18,563	24,583	33,610	47,220	65,550	85,910	106,800	48%	34%
CPU Installed Base	6,946	15,771	28,759	47,846	67,656	96,280	135,100	187,980	261,340	356,290	77%	39%
Workstation Installed Base	6,946	15,771	28,759	47,846	67,656	96,280	135,100	187,980	261,340	356,290	77%	39%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	55.6	82.3	76.4	47.2	62.0	58.2	54.3	50.4	48.4	48.2	3%	-5%
Hardware-Only ASP	31.8	28.6	24.7	22.8	18.1	16.4	14.9	13.5	12.4	11.9	-13%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	365	473	492	703	835	1,032	1,252	1,430	1,623	NA	18%
CPU Revenue	NA	260	384	394	498	591	736	901	1,046	1,202	NA	19%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	105	89	98	205	244	296	351	384	421	NA	16%
Software Revenue	NA	242	290	445	587	806	1,062	1,383	1,700	2,031	NA	28%
Bundled	NA	224	208	205	265	350	424	496	533	572	NA	17%
Unbundled	NA	18	83	240	322	456	638	887	1,167	1,460	NA	35%
Service Revenue	NA	69	82	150	241	304	385	482	569	659	NA	22%
Total Revenue	286	701	857	1,087	1,536	1,945	2,480	3,118	3,699	4,314	52%	23%
Increase over Prior Year	NA	146%	22%	27%	41%	27%	27%	26%	19%	17%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 3
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Worldwide
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	1,017	1,326	1,390	1,665	2,179	2,370	2,200	1,860	1,600	1,390	21%	-9%
Workstation Shipments	2,943	3,251	3,945	4,212	3,902	3,710	3,170	2,510	2,020	1,690	7%	-15%
CPU Installed Base	2,542	3,822	5,076	6,321	7,926	9,650	10,970	11,720	12,280	12,780	33%	10%
Workstation Installed Base	7,256	10,377	13,931	16,515	19,666	21,460	22,290	21,780	21,070	20,220	28%	1%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	455.0	384.2	539.0	282.2	376.8	361.4	341.6	315.9	317.4	321.0	-5%	-3%
Hardware-Only ASP	387.0	354.1	248.1	225.9	88.1	79.5	72.9	68.6	62.6	57.1	-31%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	441	406	377	282	235	193	147	114	91	NA	-20%
CPU Revenue	NA	251	214	190	144	113	91	67	52	41	NA	-22%
Workstation Revenue	NA	106	124	105	54	83	72	58	45	36	NA	-8%
Peripheral Revenue	NA	84	69	82	84	38	30	22	17	13	NA	-31%
Software Revenue	NA	90	113	110	110	131	111	87	71	61	NA	-11%
Bundled	NA	52	49	40	47	70	53	37	25	18	NA	-18%
Unbundled	NA	38	64	70	63	61	59	50	46	43	NA	-7%
Service Revenue	NA	62	71	84	65	60	49	37	29	24	NA	-18%
Total Revenue	505	591	593	570	459	426	354	271	214	175	-2%	-18%
Increase over Prior Year	NA	17%	0%	-4%	-19%	-7%	-17%	-23%	-21%	-18%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 4
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Worldwide
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	5,518	11,826	30,103	29,735	31,838	33,820	33,980	28,170	23,240	16,960	55%	-12%
Workstation Shipments	5,518	11,826	30,103	29,735	31,838	33,820	33,980	28,170	23,240	16,960	55%	-12%
CPU Installed Base	5,518	17,344	37,775	64,653	102,744	126,230	142,620	146,770	145,990	139,550	108%	6%
Workstation Installed Base	5,518	17,344	37,775	64,653	102,744	126,230	142,620	146,770	145,990	139,550	108%	6%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	34.1	36.3	27.2	13.5	15.1	16.9	14.4	13.0	13.1	9.6	-18%	-9%
Hardware-Only ASP	10.3	8.9	3.6	4.1	4.6	4.7	4.7	4.6	4.3	4.3	-18%	-1%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	118	199	154	169	166	159	124	95	66	NA	-17%
CPU Revenue	NA	107	182	143	150	149	142	108	81	54	NA	-19%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	11	17	11	19	16	17	16	14	12	NA	-9%
Software Revenue	NA	69	133	156	169	177	165	137	108	82	NA	-13%
Bundled	NA	32	42	20	10	16	14	11	9	8	NA	-5%
Unbundled	NA	36	91	136	159	161	151	125	99	74	NA	-14%
Service Revenue	NA	3	19	23	18	18	16	13	10	7	NA	-17%
Total Revenue	59	191	312	318	349	361	340	274	213	155	56%	-15%
Increase over Prior Year	NA	226%	63%	2%	10%	3%	-6%	-20%	-22%	-27%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 5
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: North America
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	8,444	15,288	24,147	25,242	29,952	34,420	38,420	41,370	45,970	49,510	37%	11%
Workstation Shipments	9,740	16,373	25,090	26,327	30,491	34,760	38,590	41,440	45,990	49,520	33%	10%
CPU Installed Base	10,500	25,761	45,611	72,124	97,483	121,760	144,320	164,750	189,850	218,530	75%	18%
Workstation Installed Base	13,622	29,909	50,515	77,092	102,802	126,530	148,250	167,720	191,980	219,850	66%	16%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	100.3	86.2	64.3	43.7	62.8	58.4	53.2	48.8	46.6	46.9	-11%	-6%
Hardware-Only ASP	25.8	21.3	12.9	12.8	10.8	10.5	10.4	10.5	10.7	11.1	-20%	1%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	506	485	448	474	473	507	530	563	606	NA	5%
CPU Revenue	NA	344	358	315	339	354	384	403	430	464	NA	6%
Workstation Revenue	NA	52	47	45	18	24	17	12	8	6	NA	-20%
Peripheral Revenue	NA	110	80	88	117	95	106	116	125	136	NA	3%
Software Revenue	NA	255	251	304	360	447	512	607	707	809	NA	18%
Bundled	NA	187	98	72	110	157	168	178	176	179	NA	10%
Unbundled	NA	68	153	232	250	290	344	430	531	629	NA	20%
Service Revenue	NA	92	96	121	139	155	176	205	234	265	NA	14%
Total Revenue	537	853	807	865	971	1,075	1,195	1,342	1,504	1,680	16%	12%
Increase over Prior Year	NA	59%	-5%	7%	12%	11%	11%	12%	12%	12%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 6
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: North America
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	3,579	5,795	6,511	9,314	10,995	14,360	19,790	26,520	34,820	43,210	32%	31%
Workstation Shipments	3,579	5,795	6,511	9,314	10,995	14,360	19,790	26,520	34,820	43,210	32%	31%
CPU Installed Base	4,872	10,665	17,743	27,391	35,008	46,190	61,030	80,780	108,820	145,250	64%	33%
Workstation Installed Base	4,872	10,665	17,743	27,391	35,008	46,190	61,030	80,780	108,820	145,250	64%	33%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	56.0	70.8	59.2	35.5	57.2	54.0	50.9	47.6	46.1	46.6	1%	-4%
Hardware-Only ASP	31.9	27.6	23.3	22.0	18.3	16.6	15.0	13.6	12.5	11.9	-13%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	214	207	217	275	306	371	433	495	563	NA	15%
CPU Revenue	NA	158	170	174	203	226	276	325	376	432	NA	16%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	56	37	43	72	80	94	108	118	132	NA	13%
Software Revenue	NA	161	135	180	238	318	408	531	653	773	NA	27%
Bundled	NA	146	79	59	99	127	148	165	169	176	NA	12%
Unbundled	NA	15	56	121	138	190	260	366	484	597	NA	34%
Service Revenue	NA	42	48	71	102	124	153	189	223	257	NA	20%
Total Revenue	202	417	391	469	613	747	932	1,153	1,371	1,594	32%	21%
Increase over Prior Year	NA	106%	-6%	20%	31%	22%	25%	24%	19%	16%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 7
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: North America
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	557	691	702	798	1,079	1,090	890	640	530	460	18%	-16%
Workstation Shipments	1,853	1,776	1,644	1,883	1,618	1,430	1,060	720	550	470	-3%	-22%
CPU Installed Base	1,320	1,986	2,627	3,138	3,966	4,670	5,070	5,130	5,130	5,110	32%	5%
Workstation Installed Base	4,441	6,134	7,532	8,106	9,286	9,440	9,000	8,100	7,260	6,430	20%	-7%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	468.2	390.0	587.2	206.6	256.3	234.3	215.2	199.1	183.6	172.2	-14%	-8%
Hardware-Only ASP	407.0	296.2	219.8	217.8	86.1	79.0	71.2	66.0	58.6	51.9	-32%	-10%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	212	188	161	119	84	60	40	29	23	NA	-28%
CPU Revenue	NA	108	101	73	57	46	33	21	16	13	NA	-26%
Workstation Revenue	NA	52	47	45	18	24	17	12	8	6	NA	-20%
Peripheral Revenue	NA	52	39	44	43	14	10	6	5	4	NA	-38%
Software Revenue	NA	50	52	46	39	53	38	25	16	12	NA	-21%
Bundled	NA	26	9	9	8	28	19	12	7	3	NA	-15%
Unbundled	NA	24	43	37	31	25	19	13	10	8	NA	-23%
Service Revenue	NA	47	38	40	27	23	16	10	7	5	NA	-28%
Total Revenue	292	309	278	247	185	161	114	75	52	40	-11%	-27%
Increase over Prior Year	NA	6%	-10%	-11%	-25%	-13%	-29%	-35%	-30%	-24%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 8
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: North America
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	4,308	8,802	16,935	15,130	17,879	18,960	17,740	14,200	10,620	5,850	43%	-20%
Workstation Shipments	4,308	8,802	16,935	15,130	17,879	18,960	17,740	14,200	10,620	5,850	43%	-20%
CPU Installed Base	4,308	13,111	25,240	41,595	58,508	70,900	78,220	78,840	75,890	68,160	92%	3%
Workstation Installed Base	4,308	13,111	25,240	41,595	58,508	70,900	78,220	78,840	75,890	68,160	92%	3%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	34.1	32.7	20.1	20.7	24.8	24.1	22.2	20.2	18.7	17.0	-8%	-7%
Hardware-Only ASP	9.5	9.0	3.5	3.8	4.2	4.2	4.2	4.0	3.7	3.5	-18%	-4%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	80	90	69	80	83	76	58	40	21	NA	-24%
CPU Revenue	NA	78	86	68	79	82	74	56	38	20	NA	-24%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	2	3	2	1	1	2	2	2	1	NA	1%
Software Revenue	NA	44	64	79	83	76	66	51	37	24	NA	-22%
Bundled	NA	15	10	4	2	1	1	0	0	0	NA	-50%
Unbundled	NA	28	53	74	81	75	65	51	37	24	NA	-22%
Service Revenue	NA	2	9	9	9	8	7	5	4	2	NA	-25%
Total Revenue	42	126	138	149	172	168	148	114	81	47	42%	-23%
Increase over Prior Year	NA	199%	9%	8%	16%	-3%	-11%	-23%	-29%	-42%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 9
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Europe
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	1,944	3,515	11,537	13,544	15,796	18,270	22,800	27,210	32,630	38,210	69%	19%
Workstation Shipments	2,292	3,772	11,918	14,035	16,264	18,700	23,150	27,460	32,760	38,270	63%	19%
CPU Installed Base	2,748	6,262	14,079	25,923	45,187	60,020	76,490	94,220	117,470	146,500	101%	27%
Workstation Installed Base	3,436	7,205	15,395	27,683	47,777	62,850	79,580	97,280	120,410	149,190	93%	26%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	90.7	109.5	69.0	33.2	53.5	53.9	50.6	46.1	43.7	42.9	-12%	-4%
Hardware-Only ASP	65.8	42.9	11.8	15.7	12.5	12.5	12.0	12.7	12.3	12.3	-34%	-0%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	198	258	248	326	368	423	496	538	594	NA	13%
CPU Revenue	NA	125	204	180	234	259	302	358	401	452	NA	14%
Workstation Revenue	NA	14	14	21	11	23	21	17	11	7	NA	-8%
Peripheral Revenue	NA	59	41	47	81	86	100	121	127	135	NA	11%
Software Revenue	NA	68	153	234	252	313	372	443	508	573	NA	18%
Bundled	NA	51	99	64	74	97	111	131	133	138	NA	13%
Unbundled	NA	17	54	171	178	216	261	312	374	436	NA	20%
Service Revenue	NA	24	36	81	97	116	138	167	188	211	NA	17%
Total Revenue	175	283	455	561	678	797	932	1,107	1,234	1,378	40%	15%
Increase over Prior Year	NA	62%	61%	23%	21%	18%	17%	19%	11%	12%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 10
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Europe
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	1,045	1,501	3,567	5,385	6,960	9,550	13,570	20,400	27,200	34,390	61%	38%
Workstation Shipments	1,132	1,501	3,567	5,385	6,960	9,550	13,570	20,400	27,200	34,390	57%	38%
CPU Installed Base	1,560	3,061	6,555	12,091	18,186	26,630	38,190	55,240	79,190	110,370	85%	43%
Workstation Installed Base	1,560	3,061	6,555	12,091	18,186	26,630	38,190	55,240	79,190	110,370	85%	43%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	49.7	101.5	79.8	38.9	56.5	52.5	48.5	44.5	42.8	42.6	3%	-5%
Hardware-Only ASP	31.5	32.5	26.7	23.5	20.0	18.2	16.5	15.0	13.7	13.0	-11%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	86	146	125	217	265	330	428	492	564	NA	21%
CPU Revenue	NA	49	118	99	156	190	239	313	370	432	NA	23%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	37	27	26	61	75	91	115	122	132	NA	17%
Software Revenue	NA	41	93	155	170	225	292	376	454	533	NA	26%
Bundled	NA	39	80	56	62	83	100	123	128	135	NA	17%
Unbundled	NA	2	14	99	107	142	191	253	326	398	NA	30%
Service Revenue	NA	17	19	51	75	95	119	153	178	204	NA	22%
Total Revenue	54	145	272	331	465	585	741	957	1,124	1,302	71%	23%
Increase over Prior Year	NA	166%	88%	22%	40%	26%	27%	29%	17%	16%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 11
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Europe
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	266	151	149	333	559	570	540	480	340	250	20%	-15%
Workstation Shipments	527	408	530	825	1,027	1,010	900	730	470	310	18%	-21%
CPU Installed Base	555	704	850	1,174	1,629	2,050	2,420	2,710	2,870	3,020	31%	13%
Workstation Installed Base	1,242	1,648	2,166	2,934	4,219	4,880	5,510	5,770	5,820	5,710	36%	6%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	368.2	386.9	537.1	393.4	301.6	328.5	305.6	272.7	257.0	226.1	-5%	-6%
Hardware-Only ASP	367.7	692.3	389.0	232.2	96.7	89.1	83.4	78.1	71.7	63.5	-28%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	89	60	85	67	61	53	42	26	16	NA	-25%
CPU Revenue	NA	60	39	45	39	29	25	19	12	7	NA	-28%
Workstation Revenue	NA	14	14	21	11	23	21	17	11	7	NA	-8%
Peripheral Revenue	NA	15	8	18	18	10	8	6	4	2	NA	-37%
Software Revenue	NA	13	21	31	24	26	22	18	13	10	NA	-16%
Bundled	NA	5	5	4	8	11	10	8	5	3	NA	-20%
Unbundled	NA	8	15	27	16	15	13	10	8	7	NA	-15%
Service Revenue	NA	6	13	22	17	16	14	11	7	5	NA	-22%
Total Revenue	113	101	96	138	109	104	90	71	47	31	-1%	-22%
Increase over Prior Year	NA	-11%	-5%	44%	-21%	-5%	-13%	-21%	-34%	-34%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 12
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Europe
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	633	1,864	7,821	7,826	8,277	8,150	8,680	6,340	5,090	3,580	90%	-15%
Workstation Shipments	633	1,864	7,821	7,826	8,277	8,150	8,680	6,340	5,090	3,580	90%	-15%
CPU Installed Base	633	2,497	6,674	12,658	25,372	31,330	35,880	36,270	35,410	33,110	152%	5%
Workstation Installed Base	633	2,497	6,674	12,658	25,372	31,330	35,880	36,270	35,410	33,110	152%	5%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	73.8	26.7	7.9	13.1	19.6	15.1	9.4	8.5	8.1	NA	-9%
Hardware-Only ASP	11.5	9.0	3.8	3.9	4.3	4.4	4.4	4.2	3.9	3.6	-22%	-3%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	23	53	38	42	41	39	26	20	13	NA	-21%
CPU Revenue	NA	16	47	35	40	39	38	26	19	12	NA	-21%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	7	6	3	2	2	1	1	1	1	NA	-19%
Software Revenue	NA	14	39	48	58	62	58	49	40	31	NA	-12%
Bundled	NA	7	14	3	4	3	1	0	0	0	NA	-65%
Unbundled	NA	7	25	45	55	59	57	49	40	31	NA	-11%
Service Revenue	NA	1	5	9	5	5	5	4	3	2	NA	-14%
Total Revenue	8	37	88	92	104	109	102	79	63	46	92%	-15%
Increase over Prior Year	NA	391%	136%	5%	13%	4%	-6%	-22%	-21%	-27%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 13
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Asia
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	1,094	2,847	7,306	10,418	12,114	16,100	20,690	24,860	29,060	33,070	82%	22%
Workstation Shipments	1,433	3,398	8,387	11,349	12,790	16,610	21,070	25,110	29,220	33,190	73%	21%
CPU Installed Base	1,258	4,104	10,411	18,717	32,968	46,910	63,320	81,400	103,700	131,230	126%	32%
Workstation Installed Base	1,710	5,106	12,520	21,803	36,597	50,910	67,390	85,200	107,150	134,350	115%	30%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	161.9	120.8	100.0	79.9	81.2	72.9	66.1	61.8	58.4	57.4	-16%	-7%
Hardware-Only ASP	61.7	73.6	22.2	16.1	13.0	12.7	12.0	11.1	10.3	9.8	-32%	-5%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	208	298	308	337	374	429	464	495	525	NA	9%
CPU Revenue	NA	140	191	219	206	228	267	295	319	344	NA	11%
Workstation Revenue	NA	39	56	36	23	32	29	23	19	15	NA	-8%
Peripheral Revenue	NA	30	51	52	108	114	133	146	157	166	NA	9%
Software Revenue	NA	75	128	168	248	342	436	529	630	745	NA	25%
Bundled	NA	68	100	127	138	178	207	229	251	270	NA	14%
Unbundled	NA	7	28	40	110	164	229	300	379	475	NA	34%
Service Revenue	NA	15	36	52	85	105	128	149	171	195	NA	18%
Total Revenue	126	331	457	524	667	821	993	1,142	1,296	1,465	52%	17%
Increase over Prior Year	NA	163%	38%	15%	27%	23%	21%	15%	13%	13%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 14
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Asia
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	429	1,358	1,856	3,628	6,219	9,140	13,080	17,500	22,210	26,740	95%	34%
Workstation Shipments	429	1,358	1,856	3,628	6,221	9,140	13,080	17,500	22,210	26,740	95%	34%
CPU Installed Base	495	1,853	3,820	7,485	13,235	21,760	33,570	48,770	68,710	93,830	127%	48%
Workstation Installed Base	495	1,853	3,820	7,485	13,235	21,760	33,570	48,770	68,710	93,830	127%	48%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	66.7	115.0	135.9	88.8	76.1	71.1	65.9	61.4	57.8	56.9	3%	-6%
Hardware-Only ASP	31.7	28.0	26.0	24.0	15.5	14.0	12.8	11.5	10.5	10.0	-16%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	60	108	143	202	255	320	375	421	464	NA	18%
CPU Revenue	NA	48	84	115	132	168	211	250	282	314	NA	19%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	11	23	28	70	88	108	125	139	151	NA	17%
Software Revenue	NA	39	61	108	177	256	350	456	566	687	NA	31%
Bundled	NA	38	48	89	103	137	173	204	231	254	NA	20%
Unbundled	NA	1	12	20	74	119	177	252	335	433	NA	42%
Service Revenue	NA	8	13	26	61	82	107	133	158	183	NA	24%
Total Revenue	28	132	179	278	444	594	777	964	1,145	1,335	100%	25%
Increase over Prior Year	NA	372%	36%	55%	60%	34%	31%	24%	19%	17%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 15
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Asia
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	176	466	441	489	495	640	670	630	600	530	29%	1%
Workstation Shipments	516	1,017	1,522	1,421	1,170	1,150	1,050	870	770	640	23%	-11%
CPU Installed Base	275	740	1,178	1,690	2,111	2,650	3,140	3,460	3,760	4,010	66%	14%
Workstation Installed Base	726	1,742	3,287	4,776	5,740	6,650	7,200	7,260	7,210	7,130	68%	4%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	521.9	372.4	513.9	332.9	566.1	524.9	481.0	443.8	416.5	393.8	2%	-7%
Hardware-Only ASP	374.8	279.6	264.2	240.5	74.3	63.9	59.0	55.7	52.5	49.3	-33%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	134	136	120	89	80	68	52	43	34	NA	-17%
CPU Revenue	NA	79	60	66	44	34	29	22	18	14	NA	-21%
Workstation Revenue	NA	39	56	36	23	32	29	23	19	15	NA	-8%
Peripheral Revenue	NA	16	20	18	22	14	11	8	6	5	NA	-26%
Software Revenue	NA	26	39	33	46	49	48	40	37	35	NA	-5%
Bundled	NA	20	34	27	31	29	22	15	11	8	NA	-24%
Unbundled	NA	6	5	6	15	20	26	26	26	27	NA	13%
Service Revenue	NA	7	18	20	20	19	17	13	12	10	NA	-13%
Total Revenue	90	172	193	173	155	148	133	106	92	79	14%	-13%
Increase over Prior Year	NA	91%	12%	-11%	-10%	-5%	-10%	-20%	-13%	-14%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 16
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Asia
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	488	1,023	5,009	6,300	5,400	6,320	6,940	6,740	6,250	5,810	82%	1%
Workstation Shipments	488	1,023	5,009	6,300	5,400	6,320	6,940	6,740	6,250	5,810	82%	1%
CPU Installed Base	488	1,511	5,413	9,542	17,622	22,500	26,620	29,170	31,230	33,390	145%	14%
Workstation Installed Base	488	1,511	5,413	9,542	17,622	22,500	26,620	29,170	31,230	33,390	145%	14%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	29.7	31.3	18.2	13.6	13.9	12.9	11.3	10.2	9.3	NA	-7%
Hardware-Only ASP	14.6	9.0	4.0	5.2	7.0	7.0	6.9	6.5	6.0	5.7	-17%	-4%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	14	55	44	46	39	41	36	30	26	NA	-11%
CPU Revenue	NA	12	47	38	30	26	27	23	19	16	NA	-11%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	2	8	6	16	13	14	13	11	10	NA	-10%
Software Revenue	NA	11	29	27	25	36	38	33	27	23	NA	-2%
Bundled	NA	9	18	12	4	12	12	11	9	8	NA	15%
Unbundled	NA	1	11	15	21	25	26	22	18	15	NA	-6%
Service Revenue	NA	0	5	5	3	4	4	3	2	2	NA	-12%
Total Revenue	8	27	85	73	69	80	83	72	59	51	71%	-6%
Increase over Prior Year	NA	240%	212%	-14%	-6%	16%	4%	-14%	-18%	-14%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 17
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Rest of World
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	125	330	856	759	737	1,010	1,480	2,140	3,090	4,350	56%	43%
Workstation Shipments	154	363	1,006	799	779	1,060	1,550	2,220	3,190	4,470	50%	42%
CPU Installed Base	499	810	1,510	2,056	2,687	3,480	4,550	6,110	8,610	12,360	52%	36%
Workstation Installed Base	953	1,272	2,035	2,435	2,890	3,690	4,780	6,340	8,860	12,670	32%	34%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	274.4	171.9	63.6	46.3	32.8	30.8	29.4	27.8	28.2	28.7	-41%	-3%
Hardware-Only ASP	33.8	28.7	42.3	23.1	22.7	21.5	18.0	15.2	12.8	11.2	-9%	-13%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	13	37	19	18	21	27	33	43	54	NA	25%
CPU Revenue	NA	9	27	13	13	13	17	22	29	37	NA	24%
Workstation Revenue	NA	2	7	3	2	4	5	6	7	8	NA	36%
Peripheral Revenue	NA	2	3	3	3	3	4	5	7	9	NA	25%
Software Revenue	NA	2	3	4	7	12	18	26	34	48	NA	48%
Bundled	NA	2	1	2	2	4	5	6	8	10	NA	45%
Unbundled	NA	0	2	3	5	8	14	21	27	38	NA	49%
Service Revenue	NA	2	4	3	4	6	8	11	15	19	NA	35%
Total Revenue	12	18	44	26	29	39	53	71	92	122	25%	34%
Increase over Prior Year	NA	51%	152%	-40%	8%	36%	37%	33%	30%	32%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 18
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Rest of World
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	18	174	420	236	408	550	780	1,140	1,690	2,470	117%	43%
Workstation Shipments	18	174	420	236	408	550	780	1,140	1,690	2,470	117%	43%
CPU Installed Base	18	193	641	879	1,227	1,700	2,320	3,190	4,620	6,830	186%	41%
Workstation Installed Base	18	193	641	879	1,227	1,700	2,320	3,190	4,620	6,830	186%	41%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	66.7	84.7	55.0	41.3	27.4	24.7	22.6	20.6	19.3	19.3	-20%	-7%
Hardware-Only ASP	29.0	27.5	27.4	25.3	19.8	18.0	16.4	14.9	13.6	12.9	-9%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	6	12	6	8	10	12	16	22	31	NA	30%
CPU Revenue	NA	4	12	5	7	8	10	13	18	24	NA	29%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	1	1	1	2	2	2	3	5	6	NA	33%
Software Revenue	NA	1	1	2	3	7	12	19	26	38	NA	63%
Bundled	NA	1	1	1	1	2	3	3	5	7	NA	43%
Unbundled	NA	0	0	1	2	5	10	16	22	32	NA	70%
Service Revenue	NA	1	2	1	2	4	5	8	10	15	NA	43%
Total Revenue	1	8	16	9	14	20	30	43	59	84	90%	43%
Increase over Prior Year	NA	605%	100%	-39%	51%	41%	50%	44%	36%	43%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 19
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Rest of World
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	18	18	98	44	46	70	90	110	140	150	27%	26%
Workstation Shipments	48	50	248	84	88	120	150	180	230	270	17%	25%
CPU Installed Base	393	391	421	319	219	270	340	420	520	640	-14%	24%
Workstation Installed Base	846	853	946	698	422	480	570	650	770	940	-16%	17%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	534.2	627.1	483.9	644.2	458.6	424.7	392.5	374.2	372.1	363.0	-4%	-5%
Hardware-Only ASP	360.5	316.3	230.7	215.3	146.9	134.1	122.4	112.1	102.1	92.6	-20%	-9%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	7	23	11	8	9	11	13	15	18	NA	18%
CPU Revenue	NA	4	14	6	4	4	4	5	6	7	NA	11%
Workstation Revenue	NA	2	7	3	2	4	5	6	7	8	NA	36%
Peripheral Revenue	NA	1	2	2	1	1	2	2	2	3	NA	12%
Software Revenue	NA	1	1	1	1	3	3	3	4	5	NA	29%
Bundled	NA	1	0	0	0	1	2	2	3	3	NA	54%
Unbundled	NA	0	0	0	1	1	1	1	1	1	NA	6%
Service Revenue	NA	1	2	2	2	2	2	3	3	4	NA	20%
Total Revenue	10	9	26	13	10	14	17	19	23	26	2%	20%
Increase over Prior Year	NA	-7%	192%	-51%	-19%	33%	20%	16%	18%	15%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 20
TITLE: History and Forecast
APPLICATION: Electronic Design Automation
REGION: Rest of World
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	88	138	338	479	283	390	610	890	1,270	1,720	34%	44%
Workstation Shipments	88	138	338	479	283	390	610	890	1,270	1,720	34%	44%
CPU Installed Base	88	226	448	858	1,241	1,500	1,900	2,490	3,470	4,890	94%	32%
Workstation Installed Base	88	226	448	858	1,241	1,500	1,900	2,490	3,470	4,890	94%	32%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	.0	15.0	9.3	16.9	20.8	29.5	48.0	77.8	3.8	NA	-26%
Hardware-Only ASP	11.2	5.0	3.5	4.3	4.1	4.2	4.1	4.0	3.7	3.5	-22%	-3%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	1	2	2	2	2	3	4	6	6	NA	28%
CPU Revenue	NA	1	2	2	2	2	3	4	5	6	NA	28%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	0	0	0	0	0	0	0	1	0	NA	24%
Software Revenue	NA	0	1	2	2	2	3	3	4	5	NA	19%
Bundled	NA	0	0	0	0	0	0	0	0	0	NA	-32%
Unbundled	NA	0	1	2	2	2	3	3	4	5	NA	20%
Service Revenue	NA	0	0	0	0	0	1	1	1	1	NA	17%
Total Revenue	1	1	3	4	4	5	6	8	11	12	41%	25%
Increase over Prior Year	NA	-10%	206%	54%	-6%	25%	32%	29%	27%	11%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 21
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Worldwide
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	8,922	15,975	29,120	29,641	31,590	37,120	45,570	53,140	62,210	69,920	37%	17%
Workstation Shipments	8,970	15,877	30,080	30,202	31,851	37,290	45,690	53,230	62,290	70,020	37%	17%
CPU Installed Base	10,545	26,514	49,137	77,895	108,882	134,740	162,580	192,540	231,650	279,470	79%	21%
Workstation Installed Base	10,709	26,581	50,150	79,344	111,158	137,130	164,990	194,790	233,730	281,370	79%	20%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	53.5	71.8	53.6	38.0	48.5	47.0	43.8	40.5	38.2	37.3	-2%	-5%
Hardware-Only ASP	25.8	22.3	13.4	13.7	11.8	11.8	11.4	11.2	11.0	11.2	-18%	-1%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	451	583	513	557	588	679	762	822	888	NA	10%
CPU Revenue	NA	332	437	375	377	408	477	538	592	649	NA	11%
Workstation Revenue	NA	11	46	28	13	30	25	19	16	15	NA	3%
Peripheral Revenue	NA	108	100	110	166	151	177	205	214	224	NA	6%
Software Revenue	NA	206	259	308	411	533	625	737	844	955	NA	18%
Bundled	NA	148	134	119	144	216	243	272	273	272	NA	14%
Unbundled	NA	59	125	189	267	316	382	464	572	683	NA	21%
Service Revenue	NA	48	82	121	158	187	221	261	293	326	NA	16%
Total Revenue	353	721	890	933	1,127	1,307	1,525	1,760	1,959	2,169	34%	14%
Increase over Prior Year	NA	104%	24%	5%	21%	16%	17%	15%	11%	11%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 22
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Worldwide
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	3,981	5,553	7,317	10,982	14,621	20,090	28,500	38,880	50,230	61,670	38%	33%
Workstation Shipments	3,981	5,553	7,317	10,982	14,621	20,090	28,500	38,880	50,230	61,670	38%	33%
CPU Installed Base	5,398	10,949	18,236	29,066	41,209	57,920	81,070	112,250	154,820	209,320	66%	38%
Workstation Installed Base	5,398	10,949	18,236	29,066	41,209	57,920	81,070	112,250	154,820	209,320	66%	38%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	53.0	75.2	62.3	37.9	48.7	45.6	42.6	39.6	37.4	36.5	-2%	-6%
Hardware-Only ASP	32.0	28.3	25.7	23.2	18.0	16.3	14.8	13.4	12.3	11.7	-13%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	202	252	249	359	428	539	656	735	819	NA	18%
CPU Revenue	NA	143	202	197	248	297	378	464	533	606	NA	20%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	59	50	52	111	132	161	192	202	213	NA	14%
Software Revenue	NA	138	131	196	288	383	496	641	775	906	NA	26%
Bundled	NA	125	92	104	132	176	214	252	259	261	NA	15%
Unbundled	NA	13	39	92	156	207	281	390	517	645	NA	33%
Service Revenue	NA	29	43	76	123	153	193	241	277	313	NA	20%
Total Revenue	214	386	419	522	773	965	1,228	1,538	1,788	2,039	38%	21%
Increase over Prior Year	NA	80%	9%	24%	48%	25%	27%	25%	16%	14%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 23
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Worldwide
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	215	399	576	895	1,096	1,200	1,080	830	740	720	50%	-8%
Workstation Shipments	262	300	1,536	1,457	1,357	1,360	1,190	930	820	820	51%	-10%
CPU Installed Base	420	816	1,376	2,179	3,253	4,320	5,180	5,660	6,050	6,430	67%	15%
Workstation Installed Base	584	882	2,390	3,628	5,528	6,710	7,590	7,910	8,130	8,340	75%	9%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	392.9	598.3	1200.0	194.3	277.9	259.2	237.4	215.8	237.7	287.3	-8%	1%
Hardware-Only ASP	379.1	344.3	267.8	203.0	78.5	70.3	63.9	59.7	55.9	52.4	-33%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	154	184	174	112	80	65	47	41	40	NA	-19%
CPU Revenue	NA	98	101	93	52	39	31	22	19	19	NA	-18%
Workstation Revenue	NA	11	46	28	13	30	25	19	16	15	NA	3%
Peripheral Revenue	NA	45	37	53	47	12	9	7	6	6	NA	-34%
Software Revenue	NA	23	40	40	38	62	50	35	25	18	NA	-14%
Bundled	NA	3	6	6	6	32	23	16	11	8	NA	5%
Unbundled	NA	19	34	34	32	30	27	19	14	10	NA	-20%
Service Revenue	NA	16	25	32	23	22	18	13	10	9	NA	-17%
Total Revenue	92	189	249	245	175	164	133	95	76	68	17%	-17%
Increase over Prior Year	NA	105%	32%	-1%	-29%	-6%	-19%	-29%	-20%	-11%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 24
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Worldwide
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	4,727	10,023	21,227	17,764	15,873	15,830	16,000	13,420	11,240	7,530	35%	-14%
Workstation Shipments	4,727	10,023	21,227	17,764	15,873	15,830	16,000	13,420	11,240	7,530	35%	-14%
CPU Installed Base	4,727	14,750	29,525	46,650	64,421	72,490	76,330	74,640	70,780	63,710	92%	-0%
Workstation Installed Base	4,727	14,750	29,525	46,650	64,421	72,490	76,330	74,640	70,780	63,710	92%	-0%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	34.1	32.0	28.4	13.0	16.9	22.0	20.0	22.1	62.6	.0	-16%	-100%
Hardware-Only ASP	9.6	9.0	3.7	4.2	4.6	4.7	4.7	4.6	4.2	4.1	-17%	-2%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	95	147	91	86	80	75	59	46	29	NA	-20%
CPU Revenue	NA	91	134	85	77	72	68	52	40	24	NA	-21%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	4	13	5	9	7	7	7	6	4	NA	-13%
Software Revenue	NA	46	88	72	85	87	79	60	44	30	NA	-19%
Bundled	NA	20	36	10	6	7	6	4	3	3	NA	-15%
Unbundled	NA	26	51	62	79	80	73	56	41	28	NA	-19%
Service Revenue	NA	3	15	13	12	12	10	7	5	4	NA	-21%
Total Revenue	47	146	222	166	179	178	163	127	95	63	40%	-19%
Increase over Prior Year	NA	212%	52%	-25%	8%	-0%	-8%	-22%	-25%	-34%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 25
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: North America
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	6,814	11,769	16,583	15,215	16,717	18,880	21,550	23,470	26,500	28,190	25%	11%
Workstation Shipments	6,938	11,637	17,004	15,346	16,784	18,900	21,560	23,470	26,500	28,190	25%	11%
CPU Installed Base	8,076	19,841	33,336	50,021	62,452	73,790	84,370	94,460	107,580	122,390	67%	14%
Workstation Installed Base	8,396	20,029	33,945	50,675	63,210	74,490	84,990	94,980	108,000	122,710	66%	14%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	53.3	65.3	51.6	35.6	52.6	49.3	44.5	40.6	37.8	36.5	-0%	-7%
Hardware-Only ASP	21.5	17.7	12.0	12.7	10.8	10.8	10.9	10.7	10.7	11.3	-16%	1%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	275	287	250	261	249	274	285	302	319	NA	4%
CPU Revenue	NA	206	212	179	178	187	207	216	231	245	NA	7%
Workstation Revenue	NA	4	22	11	6	8	6	4	3	3	NA	-12%
Peripheral Revenue	NA	65	54	60	76	55	61	65	68	71	NA	-1%
Software Revenue	NA	143	135	136	197	246	270	317	371	423	NA	16%
Bundled	NA	98	50	37	65	100	103	106	97	89	NA	7%
Unbundled	NA	45	84	99	132	146	167	211	274	334	NA	20%
Service Revenue	NA	34	51	61	77	84	95	109	123	137	NA	12%
Total Revenue	248	452	454	442	534	579	639	711	796	879	21%	11%
Increase over Prior Year	NA	82%	0%	-3%	21%	9%	10%	11%	12%	10%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 26
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: North America
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	2,992	3,654	4,013	5,776	6,841	8,870	12,380	16,080	20,640	25,160	23%	30%
Workstation Shipments	2,992	3,654	4,013	5,776	6,841	8,870	12,380	16,080	20,640	25,160	23%	30%
CPU Installed Base	4,165	7,817	11,901	17,591	22,455	29,020	38,070	49,840	66,180	87,020	52%	31%
Workstation Installed Base	4,165	7,817	11,901	17,591	22,455	29,020	38,070	49,840	66,180	87,020	52%	31%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	52.6	65.0	51.2	29.8	47.8	44.6	41.6	38.9	36.7	35.9	-2%	-6%
Hardware-Only ASP	32.0	27.5	24.3	22.6	18.1	16.4	14.9	13.5	12.3	11.7	-13%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	120	117	123	155	170	207	238	265	294	NA	14%
CPU Revenue	NA	90	95	98	111	123	152	177	201	226	NA	15%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	30	22	25	44	47	55	61	64	68	NA	9%
Software Revenue	NA	97	66	79	137	173	217	283	350	413	NA	25%
Bundled	NA	85	41	33	62	76	86	95	91	86	NA	7%
Unbundled	NA	11	25	46	75	97	130	188	259	327	NA	34%
Service Revenue	NA	20	27	39	58	67	82	101	117	133	NA	18%
Total Revenue	160	237	209	241	349	410	506	621	733	841	22%	19%
Increase over Prior Year	NA	48%	-12%	15%	45%	18%	23%	23%	18%	15%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 27
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: North America
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	112	252	347	534	591	620	530	360	330	330	52%	-11%
Workstation Shipments	237	121	767	664	658	640	530	360	330	330	29%	-13%
CPU Installed Base	201	452	792	1,243	1,865	2,420	2,820	2,980	3,100	3,220	75%	12%
Workstation Installed Base	521	640	1,400	1,897	2,623	3,120	3,440	3,490	3,520	3,540	50%	6%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	458.3	626.9	1966.8	122.2	249.0	228.9	211.1	196.0	181.8	169.2	-14%	-7%
Hardware-Only ASP	411.3	279.6	235.9	190.5	77.7	70.8	64.5	59.2	54.3	49.7	-34%	-9%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	84	104	85	63	38	29	18	16	15	NA	-25%
CPU Revenue	NA	47	54	40	25	23	18	11	10	9	NA	-18%
Workstation Revenue	NA	4	22	11	6	8	6	4	3	3	NA	-12%
Peripheral Revenue	NA	33	29	34	32	7	5	3	3	3	NA	-38%
Software Revenue	NA	16	25	20	19	38	26	16	9	4	NA	-25%
Bundled	NA	2	1	1	2	23	16	11	6	3	NA	15%
Unbundled	NA	14	24	18	18	14	10	5	3	1	NA	-41%
Service Revenue	NA	13	17	17	13	11	8	5	4	3	NA	-25%
Total Revenue	53	113	146	121	95	87	64	40	29	23	16%	-25%
Increase over Prior Year	NA	115%	29%	-17%	-22%	-9%	-26%	-38%	-28%	-20%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 28
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: North America
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	3,710	7,862	12,223	8,905	9,285	9,390	8,650	7,030	5,530	2,700	26%	-22%
Workstation Shipments	3,710	7,862	12,223	8,905	9,285	9,390	8,650	7,030	5,530	2,700	26%	-22%
CPU Installed Base	3,710	11,572	20,644	31,187	38,132	42,350	43,470	41,640	38,310	32,150	79%	-3%
Workstation Installed Base	3,710	11,572	20,644	31,187	38,132	42,350	43,470	41,640	38,310	32,150	79%	-3%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	34.1	25.9	20.6	35.3	24.9	24.2	22.3	20.3	18.8	17.1	-8%	-7%
Hardware-Only ASP	9.4	9.0	3.5	4.0	4.2	4.3	4.2	4.0	3.7	3.5	-18%	-4%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	70	66	43	43	42	37	29	21	9	NA	-26%
CPU Revenue	NA	69	63	42	42	41	36	28	20	9	NA	-26%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	1	3	1	1	1	1	1	1	0	NA	-8%
Software Revenue	NA	30	44	37	41	36	27	19	12	6	NA	-33%
Bundled	NA	11	9	3	2	1	1	0	0	0	NA	-100%
Unbundled	NA	19	35	34	39	35	27	19	12	6	NA	-33%
Service Revenue	NA	2	7	6	6	5	4	3	2	1	NA	-33%
Total Revenue	36	103	99	81	90	82	68	50	35	16	26%	-29%
Increase over Prior Year	NA	187%	-3%	-19%	12%	-8%	-17%	-27%	-31%	-55%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 29
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Europe
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	1,244	2,522	6,761	8,124	8,638	9,860	12,860	15,540	18,320	21,030	62%	19%
Workstation Shipments	1,208	2,571	6,849	8,289	8,731	9,940	12,920	15,600	18,350	21,040	64%	19%
CPU Installed Base	1,476	3,997	8,340	15,286	26,280	34,010	43,060	53,080	65,950	81,610	105%	25%
Workstation Installed Base	1,391	3,962	8,379	15,475	27,051	34,880	43,990	54,000	66,820	82,420	110%	25%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	48.5	76.0	49.6	27.5	42.0	43.5	41.5	38.7	36.3	35.4	-4%	-3%
Hardware-Only ASP	41.7	34.0	12.1	15.2	12.9	12.8	11.7	12.4	12.2	12.5	-25%	-1%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	102	131	134	165	187	222	271	288	313	NA	14%
CPU Revenue	NA	68	102	97	116	128	156	190	209	233	NA	15%
Workstation Revenue	NA	4	4	6	3	9	6	5	3	3	NA	-3%
Peripheral Revenue	NA	29	25	30	46	50	60	76	75	77	NA	11%
Software Revenue	NA	35	66	100	121	147	175	207	223	243	NA	15%
Bundled	NA	22	42	28	35	50	59	74	71	70	NA	15%
Unbundled	NA	13	25	72	85	97	116	133	152	173	NA	15%
Service Revenue	NA	8	13	38	47	56	68	84	90	98	NA	16%
Total Revenue	60	141	205	270	334	390	465	563	601	654	54%	14%
Increase over Prior Year	NA	136%	46%	32%	24%	17%	19%	21%	7%	9%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 30
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Europe
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	597	991	1,883	3,148	4,157	5,840	8,430	12,460	15,900	19,560	62%	36%
Workstation Shipments	597	991	1,883	3,148	4,157	5,840	8,430	12,460	15,900	19,560	62%	36%
CPU Installed Base	781	1,771	3,545	6,626	10,551	15,770	23,050	33,590	47,620	65,330	92%	44%
Workstation Installed Base	781	1,771	3,545	6,626	10,551	15,770	23,050	33,590	47,620	65,330	92%	44%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	48.6	87.3	61.9	32.2	46.8	44.0	41.1	38.2	36.1	35.2	-1%	-6%
Hardware-Only ASP	31.7	31.0	28.2	24.0	19.9	18.1	16.4	14.9	13.6	12.9	-11%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	48	69	66	115	146	188	248	272	301	NA	21%
CPU Revenue	NA	26	52	51	79	100	130	174	198	226	NA	23%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	21	17	15	37	46	58	74	74	76	NA	16%
Software Revenue	NA	22	35	66	82	105	136	175	198	224	NA	22%
Bundled	NA	21	28	25	30	44	55	72	70	69	NA	18%
Unbundled	NA	2	7	41	52	61	80	104	128	155	NA	25%
Service Revenue	NA	7	8	25	37	47	61	79	86	95	NA	20%
Total Revenue	30	76	112	157	236	298	385	503	556	620	68%	21%
Increase over Prior Year	NA	158%	47%	40%	51%	26%	29%	31%	11%	11%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 31
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Europe
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	62	49	47	178	297	270	210	170	130	130	48%	-15%
Workstation Shipments	26	98	135	342	390	350	280	220	160	140	97%	-19%
CPU Installed Base	110	158	201	379	648	890	1,060	1,170	1,250	1,340	56%	16%
Workstation Installed Base	26	122	240	568	1,420	1,760	1,990	2,090	2,130	2,160	173%	9%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	1250.0	871.1	512.3	196.5	178.9	164.9	153.0	141.7	134.6	NA	-7%
Hardware-Only ASP	351.6	737.0	548.9	210.9	84.8	78.1	71.1	65.3	59.8	54.8	-30%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	40	26	43	27	20	15	11	7	7	NA	-25%
CPU Revenue	NA	30	19	24	16	9	6	5	3	3	NA	-29%
Workstation Revenue	NA	4	4	6	3	9	6	5	3	3	NA	-3%
Peripheral Revenue	NA	6	3	13	8	3	2	2	1	1	NA	-38%
Software Revenue	NA	5	9	14	12	13	11	9	7	6	NA	-14%
Bundled	NA	0	0	1	3	4	3	3	2	1	NA	-18%
Unbundled	NA	5	8	13	9	9	8	7	6	5	NA	-13%
Service Revenue	NA	1	1	8	7	6	4	3	3	2	NA	-20%
Total Revenue	24	41	37	65	47	39	30	24	17	14	18%	-21%
Increase over Prior Year	NA	72%	-12%	79%	-29%	-17%	-22%	-21%	-28%	-16%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 32
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Europe
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	585	1,483	4,831	4,799	4,184	3,750	4,210	2,910	2,290	1,340	64%	-20%
Workstation Shipments	585	1,483	4,831	4,799	4,184	3,750	4,210	2,910	2,290	1,340	64%	-20%
CPU Installed Base	585	2,068	4,594	8,280	15,080	17,350	18,950	18,320	17,070	14,930	125%	-0%
Workstation Installed Base	585	2,068	4,594	8,280	15,080	17,350	18,950	18,320	17,070	14,930	125%	-0%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	26.6	29.6	8.8	13.9	24.9	22.9	.0	.0	.0	NA	-100%
Hardware-Only ASP	10.2	9.0	3.8	4.1	4.2	4.4	4.4	4.2	3.9	3.6	-20%	-3%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	14	36	25	22	21	19	12	9	5	NA	-26%
CPU Revenue	NA	12	30	22	21	20	19	12	8	5	NA	-26%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	2	6	2	1	1	1	0	0	0	NA	-29%
Software Revenue	NA	8	23	21	27	29	28	22	18	13	NA	-13%
Bundled	NA	2	13	2	2	2	0	0	0	0	NA	-100%
Unbundled	NA	7	9	19	24	27	28	22	18	13	NA	-12%
Service Revenue	NA	0	4	4	3	3	2	2	2	1	NA	-17%
Total Revenue	6	23	56	48	51	53	50	36	28	19	71%	-18%
Increase over Prior Year	NA	287%	144%	-15%	7%	4%	-6%	-27%	-23%	-32%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 33
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Asia
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	755	1,498	5,215	5,818	5,819	7,780	10,230	12,720	15,300	17,710	67%	25%
Workstation Shipments	718	1,480	5,546	6,081	5,917	7,840	10,270	12,750	15,320	17,730	69%	25%
CPU Installed Base	844	2,341	6,648	11,329	18,463	24,800	32,340	41,150	52,560	67,280	116%	30%
Workstation Installed Base	778	2,258	6,897	11,815	19,085	25,490	33,070	41,850	53,210	67,890	123%	29%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	63.3	92.3	61.6	56.3	52.8	50.4	47.7	45.2	43.1	42.1	-4%	-4%
Hardware-Only ASP	41.2	51.1	17.1	13.6	13.4	13.2	12.1	10.9	10.1	9.6	-24%	-6%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	68	143	119	123	142	170	189	208	224	NA	13%
CPU Revenue	NA	53	107	91	77	86	105	120	135	149	NA	14%
Workstation Revenue	NA	3	16	10	3	12	11	8	6	5	NA	9%
Peripheral Revenue	NA	12	19	18	43	44	54	60	66	71	NA	11%
Software Revenue	NA	28	57	70	89	132	167	195	230	266	NA	24%
Bundled	NA	27	42	54	43	64	79	89	100	107	NA	20%
Unbundled	NA	1	16	16	46	68	89	106	130	159	NA	28%
Service Revenue	NA	5	16	20	33	43	54	62	72	81	NA	20%
Total Revenue	41	121	206	207	244	317	391	445	510	570	56%	18%
Increase over Prior Year	NA	192%	71%	0%	18%	30%	23%	14%	15%	12%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 34
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Asia
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	375	799	1,148	1,904	3,355	5,030	7,210	9,650	12,670	15,460	73%	36%
Workstation Shipments	375	799	1,148	1,904	3,356	5,030	7,210	9,650	12,670	15,460	73%	36%
CPU Installed Base	435	1,234	2,384	4,289	7,403	12,030	18,470	26,810	38,190	52,800	103%	48%
Workstation Installed Base	435	1,234	2,384	4,289	7,403	12,030	18,470	26,810	38,190	52,800	103%	48%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	63.3	115.4	109.4	66.4	55.4	51.8	48.3	45.1	42.6	41.7	-3%	-6%
Hardware-Only ASP	31.9	27.8	26.5	23.8	15.4	13.9	12.7	11.4	10.5	10.0	-17%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	31	59	57	84	108	138	162	187	208	NA	20%
CPU Revenue	NA	25	48	46	54	71	90	107	126	141	NA	21%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	6	11	11	29	38	47	54	61	67	NA	18%
Software Revenue	NA	19	30	50	67	100	134	170	211	250	NA	30%
Bundled	NA	19	23	45	40	56	71	83	95	103	NA	21%
Unbundled	NA	0	7	5	27	45	63	87	116	147	NA	40%
Service Revenue	NA	2	7	11	27	36	47	57	68	78	NA	24%
Total Revenue	23	70	89	118	180	244	318	388	466	536	66%	24%
Increase over Prior Year	NA	197%	28%	33%	52%	36%	30%	22%	20%	15%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 35
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Asia
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	37	90	133	160	186	270	290	240	200	170	50%	-2%
Workstation Shipments	0	72	464	423	283	330	330	270	230	180	NA	-9%
CPU Installed Base	65	155	286	442	615	870	1,120	1,280	1,410	1,510	75%	20%
Workstation Installed Base	0	72	534	929	1,237	1,560	1,850	1,980	2,070	2,110	NA	11%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	506.6	761.3	337.1	1527.6	1308.7	1205.5	1116.2	1025.6	955.4	NA	-9%
Hardware-Only ASP	336.1	270.4	261.6	231.1	65.4	55.7	50.8	46.7	42.9	39.4	-34%	-10%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	27	41	40	19	18	16	12	9	7	NA	-18%
CPU Revenue	NA	20	20	26	9	5	4	3	2	2	NA	-28%
Workstation Revenue	NA	3	16	10	3	12	11	8	6	5	NA	9%
Peripheral Revenue	NA	5	4	5	6	1	1	1	1	0	NA	-40%
Software Revenue	NA	2	7	7	6	11	11	8	7	5	NA	-2%
Bundled	NA	1	4	4	2	4	3	2	2	1	NA	-3%
Unbundled	NA	1	2	3	4	6	8	6	5	4	NA	-2%
Service Revenue	NA	3	5	6	4	4	4	3	2	2	NA	-13%
Total Revenue	14	32	52	53	29	33	32	23	18	14	20%	-13%
Increase over Prior Year	NA	127%	66%	0%	-46%	15%	-3%	-28%	-21%	-22%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 36
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Asia
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	344	609	3,934	3,754	2,278	2,470	2,730	2,830	2,420	2,080	60%	-2%
Workstation Shipments	344	609	3,934	3,754	2,278	2,470	2,730	2,830	2,420	2,080	60%	-2%
CPU Installed Base	344	953	3,979	6,598	10,445	11,900	12,750	13,060	12,950	12,970	135%	4%
Workstation Installed Base	344	953	3,979	6,598	10,445	11,900	12,750	13,060	12,950	12,970	135%	4%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	44.0	32.1	13.9	15.9	16.7	15.4	14.1	.0	.0	NA	-100%
Hardware-Only ASP	10.6	9.0	4.1	4.8	7.0	6.9	6.9	6.5	6.0	5.7	-10%	-4%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	10	43	22	20	16	16	15	12	9	NA	-14%
CPU Revenue	NA	9	39	20	13	10	10	10	7	6	NA	-15%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	1	4	2	7	5	6	5	4	4	NA	-12%
Software Revenue	NA	7	21	13	16	21	22	17	12	10	NA	-9%
Bundled	NA	7	14	5	2	4	4	4	3	3	NA	10%
Unbundled	NA	0	7	8	14	17	17	13	9	8	NA	-12%
Service Revenue	NA	0	4	3	2	3	3	2	1	1	NA	-15%
Total Revenue	4	19	65	36	36	40	41	34	25	20	73%	-11%
Increase over Prior Year	NA	389%	235%	-45%	0%	12%	2%	-16%	-26%	-19%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 37
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Rest of World
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	109	186	561	484	416	600	940	1,410	2,090	2,990	40%	48%
Workstation Shipments	105	189	682	487	419	610	940	1,420	2,120	3,060	41%	49%
CPU Installed Base	149	335	813	1,259	1,688	2,140	2,820	3,850	5,570	8,190	83%	37%
Workstation Installed Base	143	331	930	1,379	1,811	2,270	2,940	3,970	5,700	8,360	89%	36%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	66.7	205.4	44.6	95.9	22.2	20.7	19.5	19.1	21.2	22.3	-24%	0%
Hardware-Only ASP	24.6	30.0	38.6	20.2	21.9	19.7	15.3	12.6	10.6	9.5	-3%	-15%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	6	22	11	9	10	13	18	24	32	NA	30%
CPU Revenue	NA	4	16	8	6	7	9	12	17	22	NA	28%
Workstation Revenue	NA	0	4	1	1	2	2	2	3	4	NA	53%
Peripheral Revenue	NA	1	1	2	2	2	2	3	4	6	NA	28%
Software Revenue	NA	0	1	2	4	8	12	17	20	23	NA	42%
Bundled	NA	0	0	1	1	2	2	3	4	6	NA	53%
Unbundled	NA	0	1	1	3	6	10	14	16	17	NA	39%
Service Revenue	NA	1	2	2	2	3	5	7	8	10	NA	34%
Total Revenue	3	7	25	15	15	21	30	41	52	65	44%	35%
Increase over Prior Year	NA	98%	262%	-41%	1%	43%	43%	36%	27%	25%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 38
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Rest of World
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	17	110	273	153	267	350	480	680	1,010	1,500	98%	41%
Workstation Shipments	17	110	273	153	267	350	480	680	1,010	1,500	98%	41%
CPU Installed Base	17	127	406	560	799	1,100	1,480	2,000	2,840	4,170	161%	39%
Workstation Installed Base	17	127	406	560	799	1,100	1,480	2,000	2,840	4,170	161%	39%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	66.7	79.3	45.5	82.9	18.4	17.2	16.0	15.0	14.1	13.8	-28%	-6%
Hardware-Only ASP	31.8	27.4	28.0	25.0	19.6	17.8	16.2	14.6	13.3	12.7	-11%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	3	8	4	4	5	6	8	11	16	NA	30%
CPU Revenue	NA	2	7	3	4	4	5	6	9	13	NA	29%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	1	0	1	1	1	1	2	2	4	NA	32%
Software Revenue	NA	0	0	1	2	5	9	14	16	18	NA	52%
Bundled	NA	0	0	1	1	1	1	2	3	4	NA	42%
Unbundled	NA	0	0	0	2	4	8	12	13	15	NA	55%
Service Revenue	NA	0	1	1	1	2	3	5	6	7	NA	39%
Total Revenue	1	4	9	6	8	12	19	27	33	42	66%	39%
Increase over Prior Year	NA	232%	161%	-35%	35%	50%	55%	41%	24%	27%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 39
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Rest of World
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	4	8	49	24	22	30	50	60	80	90	56%	32%
Workstation Shipments	0	10	170	27	25	40	50	70	110	160	NA	45%
CPU Installed Base	44	51	98	115	125	150	180	230	290	360	30%	24%
Workstation Installed Base	38	47	215	235	248	280	310	340	410	530	60%	16%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	1000.0	2888.9	596.8	583.3	536.2	494.5	459.2	425.8	396.4	NA	-7%
Hardware-Only ASP	335.1	304.8	256.1	198.0	135.5	123.5	112.5	103.2	94.6	86.6	-20%	-9%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	3	13	5	3	4	5	6	8	11	NA	28%
CPU Revenue	NA	2	8	3	2	2	2	3	4	5	NA	20%
Workstation Revenue	NA	0	4	1	1	2	2	2	3	4	NA	53%
Peripheral Revenue	NA	1	1	1	1	1	1	1	1	2	NA	22%
Software Revenue	NA	0	0	0	1	1	1	2	2	3	NA	33%
Bundled	NA	0	0	0	0	1	1	1	2	2	NA	114%
Unbundled	NA	0	0	0	1	1	1	1	1	1	NA	0%
Service Revenue	NA	0	1	1	1	1	1	1	2	2	NA	30%
Total Revenue	1	3	14	6	5	6	7	9	12	16	34%	29%
Increase over Prior Year	NA	112%	376%	-56%	-28%	35%	19%	21%	37%	34%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 40
TITLE: History and Forecast
APPLICATION: Electronic CAE
REGION: Rest of World
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	88	69	239	307	127	220	410	660	1,000	1,400	9%	62%
Workstation Shipments	88	69	239	307	127	220	410	660	1,000	1,400	9%	62%
CPU Installed Base	88	157	308	585	764	890	1,150	1,630	2,450	3,660	72%	37%
Workstation Installed Base	88	157	308	585	764	890	1,150	1,630	2,450	3,660	72%	37%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	.0	11.0	36.8	240.0	233.5	215.4	195.9	181.6	164.8	NA	-7%
Hardware-Only ASP	11.2	4.9	3.6	4.5	4.2	4.3	4.2	4.0	3.7	3.5	-22%	-4%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	0	1	2	1	1	2	3	5	5	NA	38%
CPU Revenue	NA	0	1	2	1	1	2	3	4	5	NA	39%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	0	0	0	0	0	0	0	0	0	NA	19%
Software Revenue	NA	0	0	1	1	1	2	2	2	2	NA	10%
Bundled	NA	0	0	0	0	0	0	0	0	0	NA	-100%
Unbundled	NA	0	0	1	1	1	2	2	2	2	NA	11%
Service Revenue	NA	0	0	0	0	0	0	1	1	1	NA	13%
Total Revenue	1	0	1	2	2	3	4	6	7	7	22%	27%
Increase over Prior Year	NA	-66%	306%	76%	-10%	36%	44%	34%	27%	-1%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 41
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Worldwide
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	702	1,516	2,514	4,066	4,152	5,670	7,240	8,510	9,800	11,460	56%	23%
Workstation Shipments	1,413	1,983	2,688	4,288	4,314	5,790	7,320	8,560	9,830	11,480	32%	22%
CPU Installed Base	1,103	2,607	5,005	8,885	12,825	17,610	23,200	29,190	36,550	45,710	85%	29%
Workstation Installed Base	2,631	4,569	7,069	10,911	14,608	19,120	24,350	29,980	37,170	46,240	53%	26%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	250.3	126.9	120.7	58.7	94.9	76.9	71.3	73.2	71.4	72.6	-22%	-5%
Hardware-Only ASP	188.6	124.8	35.9	26.5	23.0	20.0	17.3	15.1	13.3	12.2	-41%	-12%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	137	124	122	127	143	160	166	170	183	NA	8%
CPU Revenue	NA	82	91	93	89	97	109	115	119	130	NA	8%
Workstation Revenue	NA	26	13	12	6	12	11	9	7	5	NA	-5%
Peripheral Revenue	NA	29	20	17	32	35	40	42	45	49	NA	9%
Software Revenue	NA	71	99	157	159	218	274	332	387	449	NA	23%
Bundled	NA	50	40	31	33	48	56	60	65	72	NA	17%
Unbundled	NA	21	59	126	126	170	218	272	323	377	NA	25%
Service Revenue	NA	28	23	29	46	59	71	83	94	107	NA	18%
Total Revenue	191	241	245	307	334	420	505	581	652	740	15%	17%
Increase over Prior Year	NA	26%	2%	25%	9%	26%	20%	15%	12%	14%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 42
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Worldwide
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	386	1,204	1,661	2,617	3,446	4,680	6,160	7,680	9,110	10,940	73%	26%
Workstation Shipments	386	1,204	1,661	2,617	3,446	4,680	6,160	7,680	9,110	10,940	73%	26%
CPU Installed Base	410	1,615	3,431	6,156	9,071	13,220	18,340	24,310	31,730	41,060	117%	35%
Workstation Installed Base	410	1,615	3,431	6,156	9,071	13,220	18,340	24,310	31,730	41,060	117%	35%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	78.0	88.3	101.9	66.7	108.2	98.8	92.0	85.3	80.2	77.8	9%	-6%
Hardware-Only ASP	31.4	29.2	21.7	21.7	17.7	16.1	14.6	13.2	12.0	11.5	-13%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	52	66	72	96	111	130	143	153	171	NA	12%
CPU Revenue	NA	37	53	61	70	80	93	103	110	124	NA	12%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	16	13	12	26	31	36	40	43	47	NA	13%
Software Revenue	NA	40	70	120	129	182	234	294	351	414	NA	26%
Bundled	NA	35	34	27	32	44	52	58	62	70	NA	17%
Unbundled	NA	5	35	93	97	138	182	237	289	343	NA	29%
Service Revenue	NA	12	14	21	39	50	63	75	87	101	NA	21%
Total Revenue	28	110	150	212	264	343	426	512	591	686	75%	21%
Increase over Prior Year	NA	290%	36%	42%	24%	30%	24%	20%	15%	16%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 43
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Worldwide
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	315	264	242	180	348	380	380	350	300	230	2%	-8%
Workstation Shipments	1,027	732	415	402	510	500	460	400	330	250	-16%	-13%
CPU Installed Base	692	945	1,171	1,277	1,430	1,630	1,780	1,890	2,010	2,130	20%	8%
Workstation Installed Base	2,221	2,908	3,235	3,303	3,213	3,140	2,930	2,680	2,630	2,650	10%	-4%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	458.1	371.4	487.7	305.5	308.0	339.3	315.5	289.1	260.7	235.4	-9%	-5%
Hardware-Only ASP	391.9	364.6	193.8	239.2	76.4	68.0	61.9	56.5	51.1	47.4	-34%	-9%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	84	54	43	28	27	25	20	15	11	NA	-18%
CPU Revenue	NA	45	34	27	16	13	11	9	7	5	NA	-22%
Workstation Revenue	NA	26	13	12	6	12	11	9	7	5	NA	-5%
Peripheral Revenue	NA	13	7	5	6	3	3	2	2	1	NA	-26%
Software Revenue	NA	29	24	22	19	24	27	28	30	31	NA	10%
Bundled	NA	14	6	3	1	2	2	2	1	1	NA	13%
Unbundled	NA	15	19	19	19	22	25	27	28	30	NA	10%
Service Revenue	NA	16	9	7	7	8	8	7	7	6	NA	-4%
Total Revenue	163	128	88	72	56	59	60	56	52	48	-24%	-3%
Increase over Prior Year	NA	-21%	-32%	-17%	-23%	6%	1%	-7%	-7%	-8%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 44
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Worldwide
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	0	47	612	1,270	358	600	700	490	400	280	NA	-5%
Workstation Shipments	0	47	612	1,270	358	600	700	490	400	280	NA	-5%
CPU Installed Base	0	47	403	1,452	2,324	2,760	3,080	3,000	2,820	2,530	NA	2%
Workstation Installed Base	0	47	403	1,452	2,324	2,760	3,080	3,000	2,820	2,530	NA	2%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	30.7	25.7	6.3	18.6	14.9	13.6	12.4	11.4	10.3	NA	-11%
Hardware-Only ASP	.0	.0	4.2	4.5	4.0	3.8	3.8	3.5	3.3	3.0	NA	-6%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	1	3	6	3	5	6	3	2	2	NA	-13%
CPU Revenue	NA	0	3	6	3	4	5	3	2	1	NA	-14%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	1	0	0	0	1	1	0	0	0	NA	-10%
Software Revenue	NA	2	4	16	10	12	13	10	6	5	NA	-15%
Bundled	NA	1	0	1	1	2	2	1	1	1	NA	-9%
Unbundled	NA	1	4	15	10	11	11	9	6	4	NA	-16%
Service Revenue	NA	0	0	1	0	1	1	0	0	0	NA	-1%
Total Revenue	0	3	8	22	14	18	19	13	9	6	NA	-14%
Increase over Prior Year	NA	NA	198%	193%	-39%	31%	6%	-30%	-31%	-32%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 45
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: North America
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	462	952	1,753	2,018	1,909	2,420	2,960	3,440	4,020	4,900	43%	21%
Workstation Shipments	842	1,260	1,847	2,116	1,988	2,470	2,990	3,450	4,030	4,910	24%	20%
CPU Installed Base	742	1,685	3,232	5,115	6,937	8,760	10,700	12,710	15,380	18,940	75%	22%
Workstation Installed Base	1,735	2,960	4,526	6,271	7,923	9,510	11,180	12,950	15,540	19,080	46%	19%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	218.3	122.7	84.1	51.9	77.7	71.0	66.1	61.7	58.2	56.9	-23%	-6%
Hardware-Only ASP	139.3	103.9	28.1	23.5	23.2	19.9	17.0	14.8	13.3	12.3	-36%	-12%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	78	61	54	50	51	54	55	58	65	NA	6%
CPU Revenue	NA	47	47	40	36	35	38	40	42	48	NA	6%
Workstation Revenue	NA	15	5	4	3	5	4	3	2	2	NA	-13%
Peripheral Revenue	NA	16	10	10	11	10	12	13	14	16	NA	8%
Software Revenue	NA	46	60	90	62	81	95	107	120	135	NA	17%
Bundled	NA	35	20	7	7	13	16	18	19	23	NA	27%
Unbundled	NA	11	40	82	55	68	80	90	100	112	NA	15%
Service Revenue	NA	21	16	17	18	22	25	29	32	36	NA	15%
Total Revenue	107	146	136	160	130	154	175	191	209	236	5%	13%
Increase over Prior Year	NA	36%	-7%	17%	-19%	19%	13%	10%	10%	13%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 46
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: North America
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	291	791	1,028	1,410	1,622	2,130	2,680	3,220	3,840	4,760	54%	24%
Workstation Shipments	291	791	1,028	1,410	1,622	2,130	2,680	3,220	3,840	4,760	54%	24%
CPU Installed Base	310	1,101	2,189	3,629	4,974	6,750	8,790	11,040	13,900	17,680	100%	29%
Workstation Installed Base	310	1,101	2,189	3,629	4,974	6,750	8,790	11,040	13,900	17,680	100%	29%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	77.5	87.8	74.9	50.9	75.3	70.3	65.6	61.2	57.8	56.6	-1%	-6%
Hardware-Only ASP	31.5	27.7	20.4	20.7	18.1	16.4	14.9	13.5	12.3	11.7	-13%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	35	32	36	35	38	44	48	52	61	NA	12%
CPU Revenue	NA	26	26	29	27	29	34	37	39	46	NA	11%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	9	6	7	8	9	11	12	13	15	NA	14%
Software Revenue	NA	30	44	68	46	65	80	95	110	126	NA	22%
Bundled	NA	26	18	7	6	12	15	17	19	23	NA	29%
Unbundled	NA	4	26	62	40	53	65	77	91	103	NA	21%
Service Revenue	NA	9	10	12	15	19	23	26	30	35	NA	19%
Total Revenue	21	74	85	117	96	122	147	169	192	222	46%	18%
Increase over Prior Year	NA	256%	15%	37%	-18%	28%	20%	15%	13%	16%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 47
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: North America
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	171	152	131	69	184	170	150	120	100	80	2%	-15%
Workstation Shipments	551	460	225	167	263	220	170	130	110	80	-17%	-21%
CPU Installed Base	433	576	694	696	751	800	810	790	820	840	15%	2%
Workstation Installed Base	1,425	1,850	1,988	1,852	1,736	1,550	1,290	1,020	980	990	5%	-11%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	440.0	353.1	281.3	111.8	296.0	272.1	250.9	233.0	216.1	201.2	-9%	-7%
Hardware-Only ASP	393.8	316.9	200.0	244.3	73.5	67.0	61.0	56.0	51.3	47.0	-34%	-9%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	43	26	15	14	12	9	7	5	4	NA	-24%
CPU Revenue	NA	21	17	9	8	5	4	3	2	2	NA	-28%
Workstation Revenue	NA	15	5	4	3	5	4	3	2	2	NA	-13%
Peripheral Revenue	NA	7	4	2	3	1	1	1	1	1	NA	-30%
Software Revenue	NA	16	14	11	8	8	8	7	7	7	NA	-3%
Bundled	NA	9	2	1	0	1	0	0	0	0	NA	-6%
Unbundled	NA	7	12	10	8	8	7	7	7	7	NA	-3%
Service Revenue	NA	12	6	4	3	3	3	2	2	2	NA	-13%
Total Revenue	86	71	46	30	26	23	19	16	14	13	-26%	-14%
Increase over Prior Year	NA	-18%	-36%	-35%	-11%	-13%	-16%	-17%	-10%	-13%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 48
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: North America
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	0	8	594	539	103	110	130	100	80	60	NA	-10%
Workstation Shipments	0	8	594	539	103	110	130	100	80	60	NA	-10%
CPU Installed Base	0	8	348	791	1,213	1,210	1,100	890	660	410	NA	-19%
Workstation Installed Base	0	8	348	791	1,213	1,210	1,100	890	660	410	NA	-19%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	25.9	25.8	32.7	25.7	25.0	23.1	21.0	19.4	17.6	NA	-7%
Hardware-Only ASP	.0	.0	4.2	4.7	4.1	4.1	4.1	3.9	3.6	3.4	NA	-4%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	0	3	3	1	1	1	0	0	0	NA	-19%
CPU Revenue	NA	0	3	3	1	1	1	0	0	0	NA	-19%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	0	0	0	0	0	0	0	0	0	NA	-28%
Software Revenue	NA	1	3	10	7	8	8	5	3	1	NA	-28%
Bundled	NA	0	0	0	0	0	0	0	0	0	NA	-38%
Unbundled	NA	1	3	10	7	8	8	5	3	1	NA	-28%
Service Revenue	NA	0	0	1	0	0	0	0	0	0	NA	-20%
Total Revenue	0	1	6	13	8	8	8	6	3	2	NA	-27%
Increase over Prior Year	NA	NA	495%	141%	-42%	9%	-0%	-30%	-48%	-48%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 49
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Europe
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	107	266	370	1,091	942	1,300	1,690	2,070	2,390	2,780	72%	24%
Workstation Shipments	194	317	379	1,112	991	1,350	1,730	2,090	2,400	2,790	50%	23%
CPU Installed Base	167	433	839	1,871	2,765	3,900	5,270	6,810	8,680	10,960	102%	32%
Workstation Installed Base	332	648	1,070	2,125	3,027	4,170	5,530	7,040	8,910	11,160	74%	30%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	231.1	103.1	105.7	19.7	77.3	77.6	72.4	63.0	56.9	54.1	-24%	-7%
Hardware-Only ASP	273.8	235.0	46.8	26.3	25.9	22.8	19.9	17.1	14.5	13.3	-45%	-12%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	27	19	22	30	36	40	42	41	44	NA	8%
CPU Revenue	NA	16	15	17	21	25	28	30	30	33	NA	9%
Workstation Revenue	NA	3	1	2	2	4	4	3	2	1	NA	-14%
Peripheral Revenue	NA	8	3	4	6	7	8	8	9	10	NA	9%
Software Revenue	NA	11	19	34	31	42	51	65	82	98	NA	26%
Bundled	NA	7	6	4	4	7	8	8	8	9	NA	17%
Unbundled	NA	4	13	30	27	35	43	57	74	89	NA	27%
Service Revenue	NA	4	2	5	11	14	16	19	22	25	NA	19%
Total Revenue	30	42	41	62	72	92	107	125	145	166	24%	18%
Increase over Prior Year	NA	39%	-3%	50%	17%	28%	17%	16%	16%	15%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 50
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Europe
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	56	200	309	454	787	1,120	1,510	1,920	2,290	2,720	94%	28%
Workstation Shipments	56	200	309	454	787	1,120	1,510	1,920	2,290	2,720	94%	28%
CPU Installed Base	61	261	603	1,096	1,768	2,800	4,130	5,740	7,710	10,120	132%	42%
Workstation Installed Base	61	261	603	1,096	1,768	2,800	4,130	5,740	7,710	10,120	132%	42%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	78.3	93.3	97.1	45.4	70.6	66.6	62.1	58.0	54.7	53.4	-3%	-5%
Hardware-Only ASP	31.2	37.2	21.4	21.5	19.7	17.9	16.2	14.7	13.4	12.8	-11%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	11	11	10	21	26	30	34	37	42	NA	15%
CPU Revenue	NA	6	9	8	16	20	23	27	29	32	NA	15%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	5	2	2	5	6	7	8	8	10	NA	14%
Software Revenue	NA	6	12	26	27	37	46	61	79	95	NA	29%
Bundled	NA	5	6	3	4	6	6	7	8	9	NA	18%
Unbundled	NA	1	6	22	23	32	40	54	71	86	NA	30%
Service Revenue	NA	2	2	4	9	11	13	17	20	24	NA	23%
Total Revenue	4	20	24	40	57	74	90	112	136	160	91%	23%
Increase over Prior Year	NA	368%	22%	63%	42%	30%	22%	24%	22%	18%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 51
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Europe
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	52	32	46	43	88	110	120	100	60	40	14%	-15%
Workstation Shipments	138	83	55	64	136	160	160	120	70	40	-0%	-22%
CPU Installed Base	106	138	186	228	293	380	460	520	540	560	29%	14%
Workstation Installed Base	271	353	417	482	556	640	720	750	770	760	20%	6%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	453.9	333.7	373.3	153.8	317.1	358.7	329.0	306.3	284.8	272.7	-9%	-3%
Hardware-Only ASP	390.8	721.0	167.9	238.1	87.9	78.2	71.2	65.4	60.0	54.8	-31%	-9%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	15	8	10	8	10	10	7	4	2	NA	-25%
CPU Revenue	NA	10	6	7	5	5	5	3	2	1	NA	-29%
Workstation Revenue	NA	3	1	2	2	4	4	3	2	1	NA	-14%
Peripheral Revenue	NA	3	1	1	2	1	1	1	0	0	NA	-37%
Software Revenue	NA	5	6	7	3	4	4	3	3	2	NA	-4%
Bundled	NA	2	1	0	0	1	1	1	0	0	NA	2%
Unbundled	NA	3	5	7	3	3	2	2	2	2	NA	-5%
Service Revenue	NA	2	1	1	2	3	3	2	1	1	NA	-15%
Total Revenue	26	21	15	18	14	16	16	12	8	5	-14%	-18%
Increase over Prior Year	NA	-20%	-27%	17%	-22%	18%	-2%	-24%	-36%	-32%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 52
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Europe
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	0	35	15	594	67	60	60	50	40	30	NA	-15%
Workstation Shipments	0	35	15	594	67	60	60	50	40	30	NA	-15%
CPU Installed Base	0	35	50	547	704	730	680	550	420	280	NA	-17%
Workstation Installed Base	0	35	50	547	704	730	680	550	420	280	NA	-17%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	29.2	19.6	2.0	23.3	.0	.0	.0	.0	.0	NA	-100%
Hardware-Only ASP	.0	.0	4.3	4.4	4.4	3.6	3.5	3.3	3.0	3.1	NA	-7%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	1	0	2	0	0	0	0	0	0	NA	-22%
CPU Revenue	NA	0	0	2	0	0	0	0	0	0	NA	-22%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Software Revenue	NA	1	1	2	1	1	1	1	0	0	NA	-18%
Bundled	NA	0	0	0	0	0	0	0	0	0	NA	-100%
Unbundled	NA	0	1	2	1	1	1	1	0	0	NA	-18%
Service Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Total Revenue	0	1	1	4	1	1	1	1	1	0	NA	-18%
Increase over Prior Year	NA	NA	1%	190%	-70%	16%	-2%	-25%	-33%	-34%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 53
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Asia
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	125	266	330	910	1,248	1,890	2,520	2,910	3,290	3,650	78%	24%
Workstation Shipments	356	367	398	1,016	1,275	1,900	2,520	2,910	3,290	3,650	38%	23%
CPU Installed Base	153	419	793	1,727	2,934	4,700	6,950	9,320	12,090	15,320	109%	39%
Workstation Installed Base	412	779	1,239	2,296	3,467	5,190	7,340	9,630	12,300	15,470	70%	35%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	371.1	166.1	270.5	105.6	109.6	78.8	72.8	82.4	84.3	91.1	-26%	-4%
Hardware-Only ASP	263.1	124.8	63.1	35.0	18.8	16.6	14.6	13.0	11.7	10.7	-48%	-11%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	29	39	44	46	55	63	67	69	72	NA	9%
CPU Revenue	NA	18	26	34	30	35	41	43	45	47	NA	9%
Workstation Revenue	NA	8	7	6	1	2	2	2	2	2	NA	11%
Peripheral Revenue	NA	4	7	4	15	17	20	21	22	23	NA	9%
Software Revenue	NA	12	20	33	66	93	126	157	181	209	NA	26%
Bundled	NA	7	14	20	22	28	32	34	37	40	NA	13%
Unbundled	NA	5	6	13	44	66	94	123	144	169	NA	31%
Service Revenue	NA	2	4	7	17	23	29	35	39	44	NA	21%
Total Revenue	50	48	63	83	129	171	218	259	289	325	27%	20%
Increase over Prior Year	NA	-3%	30%	33%	55%	33%	28%	18%	12%	13%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 54
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Asia
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	39	185	279	746	992	1,380	1,900	2,450	2,880	3,350	124%	28%
Workstation Shipments	39	185	279	746	992	1,380	1,900	2,450	2,880	3,350	124%	28%
CPU Installed Base	39	225	552	1,334	2,208	3,500	5,210	7,270	9,780	12,840	174%	42%
Workstation Installed Base	39	225	552	1,334	2,208	3,500	5,210	7,270	9,780	12,840	174%	42%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	81.3	83.5	212.0	99.9	149.0	134.8	125.7	117.2	110.7	108.2	16%	-6%
Hardware-Only ASP	31.2	28.5	25.7	24.0	15.1	13.7	12.5	11.3	10.3	9.8	-17%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	5	22	26	39	46	54	59	62	67	NA	11%
CPU Revenue	NA	4	17	23	26	30	35	39	41	44	NA	11%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	1	5	2	14	16	19	20	21	23	NA	11%
Software Revenue	NA	4	15	25	55	79	107	137	159	186	NA	27%
Bundled	NA	3	11	17	21	26	30	33	35	39	NA	13%
Unbundled	NA	0	4	9	34	53	77	104	123	147	NA	34%
Service Revenue	NA	1	3	4	15	20	26	32	36	41	NA	22%
Total Revenue	3	14	39	55	111	145	187	227	257	294	144%	22%
Increase over Prior Year	NA	347%	178%	42%	100%	31%	29%	22%	13%	14%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 55
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Asia
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	86	76	48	60	68	90	100	120	120	100	-6%	8%
Workstation Shipments	317	178	115	165	95	100	110	120	130	100	-26%	1%
CPU Installed Base	114	190	237	305	349	410	460	520	580	640	32%	13%
Workstation Installed Base	372	550	683	874	882	900	860	820	790	800	24%	-2%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	498.8	415.9	982.9	387.7	304.3	454.5	432.4	388.9	333.3	333.3	-12%	2%
Hardware-Only ASP	389.9	275.4	213.3	244.0	62.7	52.5	47.8	44.2	40.9	37.7	-37%	-10%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	24	17	17	4	5	5	5	5	4	NA	-4%
CPU Revenue	NA	14	9	10	2	2	2	2	2	2	NA	-9%
Workstation Revenue	NA	8	7	6	1	2	2	2	2	2	NA	11%
Peripheral Revenue	NA	3	2	1	1	1	1	1	1	0	NA	-15%
Software Revenue	NA	8	4	4	8	11	15	17	19	20	NA	21%
Bundled	NA	4	3	2	0	0	0	0	0	0	NA	68%
Unbundled	NA	5	2	1	8	11	15	17	19	20	NA	21%
Service Revenue	NA	1	2	2	2	2	3	3	3	3	NA	14%
Total Revenue	47	34	23	23	14	18	22	25	27	27	-26%	15%
Increase over Prior Year	NA	-27%	-32%	0%	-40%	31%	24%	12%	8%	1%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 56
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Asia
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	0	4	3	105	188	420	520	340	280	200	NA	1%
Workstation Shipments	0	4	3	105	188	420	520	340	280	200	NA	1%
CPU Installed Base	0	4	4	88	376	790	1,280	1,530	1,720	1,830	NA	37%
Workstation Installed Base	0	4	4	88	376	790	1,280	1,530	1,720	1,830	NA	37%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	51.5	26.3	15.8	18.0	14.7	13.5	12.3	11.3	10.3	NA	-11%
Hardware-Only ASP	.0	.0	.0	2.9	3.4	3.1	3.1	2.9	2.9	2.6	NA	-5%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	0	0	1	2	4	5	3	2	1	NA	-11%
CPU Revenue	NA	0	0	1	2	4	4	2	2	1	NA	-11%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	0	0	0	0	1	1	0	0	0	NA	-8%
Software Revenue	NA	0	1	4	2	4	4	3	3	3	NA	3%
Bundled	NA	0	0	1	1	2	2	1	1	1	NA	-7%
Unbundled	NA	0	1	3	2	2	2	2	2	2	NA	6%
Service Revenue	NA	0	0	0	0	0	0	0	0	0	NA	-2%
Total Revenue	0	0	1	5	5	8	9	6	5	4	NA	-2%
Increase over Prior Year	NA	NA	141%	543%	-5%	73%	13%	-31%	-16%	-23%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 57
TITLE: History and forecast
APPLICATION: IC Layout
REGION: Rest of World
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	7	32	62	46	53	60	80	90	110	130	64%	20%
Workstation Shipments	21	38	64	45	61	70	80	100	120	140	31%	18%
CPU Installed Base	41	70	140	172	189	240	290	340	410	500	47%	21%
Workstation Installed Base	153	183	234	219	191	250	300	360	430	520	6%	22%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	440.0	184.0	109.5	117.6	113.7	108.8	104.9	98.1	96.5	95.4	-29%	-3%
Hardware-Only ASP	264.3	55.5	69.5	42.7	37.8	34.1	30.9	28.1	25.6	23.7	-39%	-9%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	3	4	2	2	2	2	3	3	3	NA	6%
CPU Revenue	NA	2	3	2	2	1	2	2	2	2	NA	4%
Workstation Revenue	NA	0	0	0	0	0	1	1	1	1	NA	18%
Peripheral Revenue	NA	1	0	0	0	0	0	0	0	0	NA	5%
Software Revenue	NA	1	0	0	1	1	2	3	4	8	NA	66%
Bundled	NA	1	0	0	0	0	0	0	0	1	NA	38%
Unbundled	NA	0	0	0	1	1	1	2	4	7	NA	70%
Service Revenue	NA	1	1	0	0	1	1	1	1	2	NA	34%
Total Revenue	3	4	5	3	3	4	5	6	9	13	-0%	31%
Increase over Prior Year	NA	26%	26%	-50%	25%	18%	23%	30%	37%	51%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 58
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Rest of World
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	0	28	44	6	45	50	60	80	90	110	212%	19%
Workstation Shipments	0	28	44	6	45	50	60	80	90	110	212%	19%
CPU Installed Base	0	28	86	98	121	170	210	260	330	410	298%	28%
Workstation Installed Base	0	28	86	98	121	170	210	260	330	410	298%	28%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	109.4	75.5	117.6	93.7	87.5	81.6	76.2	72.0	70.4	NA	-6%
Hardware-Only ASP	20.8	28.0	24.9	28.6	19.7	17.9	16.2	14.7	13.4	12.8	-1%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	1	1	0	1	1	1	1	1	2	NA	6%
CPU Revenue	NA	1	1	0	1	1	1	1	1	1	NA	6%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	0	0	0	0	0	0	0	0	0	NA	11%
Software Revenue	NA	0	0	0	0	1	1	2	4	7	NA	89%
Bundled	NA	0	0	0	0	0	0	0	0	0	NA	25%
Unbundled	NA	0	0	0	0	0	1	2	3	7	NA	100%
Service Revenue	NA	0	0	0	0	0	0	1	1	2	NA	47%
Total Revenue	0	2	2	1	2	2	3	4	6	10	256%	44%
Increase over Prior Year	NA	19700%	-20%	-67%	210%	22%	32%	44%	56%	72%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 59
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Rest of World
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	7	4	17	8	8	10	10	10	20	20	2%	21%
Workstation Shipments	20	11	19	7	15	20	20	20	20	30	-7%	15%
CPU Installed Base	40	42	54	48	37	40	50	60	70	80	-2%	17%
Workstation Installed Base	152	155	148	96	39	50	60	80	90	100	-29%	21%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	440.0	532.5	350.0	.0	341.5	313.9	289.5	268.8	249.3	232.1	-6%	-7%
Hardware-Only ASP	391.3	311.1	178.1	194.6	143.1	130.5	118.8	109.0	99.9	91.5	-22%	-9%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	1	3	2	1	1	1	1	1	2	NA	6%
CPU Revenue	NA	1	2	1	1	0	1	1	1	1	NA	0%
Workstation Revenue	NA	0	0	0	0	0	1	1	1	1	NA	18%
Peripheral Revenue	NA	0	0	0	0	0	0	0	0	0	NA	1%
Software Revenue	NA	0	0	0	0	0	1	1	1	1	NA	27%
Bundled	NA	0	0	0	0	0	0	0	0	0	NA	67%
Unbundled	NA	0	0	0	0	0	0	1	1	1	NA	19%
Service Revenue	NA	0	0	0	0	0	0	0	0	0	NA	12%
Total Revenue	3	2	4	2	2	2	2	2	3	3	-17%	11%
Increase over Prior Year	NA	-33%	65%	-50%	-15%	14%	15%	13%	8%	6%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 60
TITLE: History and Forecast
APPLICATION: IC Layout
REGION: Rest of World
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	0	0	0	31	0	0	0	0	0	0	NA	-100%
Workstation Shipments	0	0	0	31	0	0	0	0	0	0	NA	-100%
CPU Installed Base	0	0	0	26	32	30	30	20	10	0	NA	-100%
Workstation Installed Base	0	0	0	26	32	30	30	20	10	0	NA	-100%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	NA	NA
Hardware-Only ASP	.0	.0	.0	4.8	.0	.0	.0	.0	.0	.0	NA	NA
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
CPU Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Software Revenue	NA	0	0	0	0	0	0	0	0	0	NA	2%
Bundled	NA	0	0	0	0	0	0	0	0	0	NA	NA
Unbundled	NA	0	0	0	0	0	0	0	0	0	NA	2%
Service Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Total Revenue	0	0	0	0	0	0	0	0	0	0	NA	2%
Increase over Prior Year	NA	NA	NA	NA	-58%	10%	0%	0%	0%	0%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 61
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Worldwide
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	1,984	4,489	12,212	16,256	22,856	27,010	30,580	33,940	38,740	43,770	84%	14%
Workstation Shipments	3,237	6,045	13,633	18,020	24,158	28,060	31,350	34,440	39,040	43,950	65%	13%
CPU Installed Base	3,359	7,816	17,469	32,040	56,617	79,810	102,910	124,740	151,410	183,440	103%	27%
Workstation Installed Base	6,380	12,342	23,246	38,758	64,299	87,710	110,660	131,760	157,500	188,440	78%	24%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	208.7	134.7	106.4	66.0	88.9	84.0	76.3	69.4	64.3	62.1	-19%	-7%
Hardware-Only ASP	59.1	46.8	13.4	12.4	9.5	9.6	9.8	10.6	10.7	10.9	-37%	3%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	336	372	388	471	504	546	596	647	708	NA	9%
CPU Revenue	NA	203	252	259	326	349	383	424	468	518	NA	10%
Workstation Revenue	NA	69	65	66	35	42	36	30	23	16	NA	-14%
Peripheral Revenue	NA	64	55	63	110	113	126	141	157	174	NA	10%
Software Revenue	NA	124	177	245	296	363	440	537	647	771	NA	21%
Bundled	NA	111	124	115	146	172	192	211	230	253	NA	12%
Unbundled	NA	13	53	131	151	192	248	327	417	517	NA	28%
Service Revenue	NA	57	67	107	120	137	159	188	221	257	NA	16%
Total Revenue	305	523	627	735	884	1,004	1,144	1,321	1,515	1,736	30%	14%
Increase over Prior Year	NA	71%	20%	17%	20%	14%	14%	15%	15%	15%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 62
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Worldwide
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	706	2,070	3,376	4,965	6,515	8,830	12,570	19,000	26,580	34,190	74%	39%
Workstation Shipments	793	2,070	3,376	4,965	6,516	8,830	12,570	19,000	26,580	34,190	69%	39%
CPU Installed Base	1,138	3,208	7,093	12,624	17,376	25,130	35,690	51,430	74,790	105,910	98%	44%
Workstation Installed Base	1,138	3,208	7,093	12,624	17,376	25,130	35,690	51,430	74,790	105,910	98%	44%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	59.1	94.7	91.1	59.5	79.0	75.0	70.3	65.8	62.2	60.7	8%	-5%
Hardware-Only ASP	31.2	29.9	24.1	22.8	18.7	16.8	15.3	14.0	12.9	12.3	-12%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	111	155	171	248	296	364	454	542	633	NA	21%
CPU Revenue	NA	80	129	136	180	215	265	334	403	472	NA	21%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	31	26	35	68	81	99	120	139	160	NA	19%
Software Revenue	NA	65	89	129	171	241	332	447	574	712	NA	33%
Bundled	NA	65	81	74	102	129	158	187	212	240	NA	19%
Unbundled	NA	0	8	55	69	111	174	261	361	472	NA	47%
Service Revenue	NA	27	26	53	79	101	130	166	204	245	NA	25%
Total Revenue	43	205	288	353	499	637	826	1,067	1,320	1,590	84%	26%
Increase over Prior Year	NA	374%	40%	23%	41%	28%	30%	29%	24%	20%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 63
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Worldwide
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	487	663	572	590	735	790	740	680	560	440	11%	-10%
Workstation Shipments	1,653	2,219	1,993	2,354	2,036	1,840	1,510	1,180	860	620	5%	-21%
CPU Installed Base	1,430	2,061	2,529	2,865	3,243	3,700	4,010	4,170	4,220	4,220	23%	5%
Workstation Installed Base	4,451	6,587	8,306	9,583	10,924	11,600	11,770	11,190	10,310	9,220	25%	-3%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	454.0	361.6	462.2	359.0	432.8	423.3	405.5	386.0	374.8	351.6	-1%	-4%
Hardware-Only ASP	399.0	368.1	248.5	273.5	118.1	105.2	96.0	87.9	79.4	71.4	-26%	-10%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	203	168	160	142	128	103	80	58	40	NA	-22%
CPU Revenue	NA	108	79	71	76	62	49	37	26	17	NA	-25%
Workstation Revenue	NA	69	65	66	35	42	36	30	23	16	NA	-14%
Peripheral Revenue	NA	27	25	23	32	24	18	13	9	6	NA	-28%
Software Revenue	NA	38	48	48	52	45	34	23	16	12	NA	-26%
Bundled	NA	34	38	31	41	35	27	19	13	9	NA	-26%
Unbundled	NA	4	10	17	12	9	7	5	4	3	NA	-23%
Service Revenue	NA	30	38	45	34	30	23	17	12	8	NA	-25%
Total Revenue	250	274	256	253	229	202	161	120	86	60	-2%	-23%
Increase over Prior Year	NA	10%	-7%	-1%	-9%	-12%	-20%	-25%	-29%	-30%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 64
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Worldwide
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	791	1,756	8,264	10,701	15,606	17,390	17,270	14,260	11,600	9,140	111%	-10%
Workstation Shipments	791	1,756	8,264	10,701	15,606	17,390	17,270	14,260	11,600	9,140	111%	-10%
CPU Installed Base	791	2,548	7,847	16,551	35,999	50,980	63,210	69,130	72,400	73,310	160%	15%
Workstation Installed Base	791	2,548	7,847	16,551	35,999	50,980	63,210	69,130	72,400	73,310	160%	15%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	47.6	22.6	16.0	12.0	11.5	10.4	9.2	8.7	8.4	NA	-7%
Hardware-Only ASP	14.1	8.8	3.5	3.9	4.7	4.8	4.8	4.7	4.5	4.4	-24%	-1%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	22	49	57	81	81	79	62	47	36	NA	-15%
CPU Revenue	NA	16	44	52	70	72	70	53	39	28	NA	-17%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	6	4	5	10	8	9	9	8	7	NA	-6%
Software Revenue	NA	21	40	68	73	78	73	67	57	47	NA	-8%
Bundled	NA	12	6	9	3	7	7	6	5	5	NA	7%
Unbundled	NA	9	35	59	70	71	67	61	52	43	NA	-9%
Service Revenue	NA	0	4	9	6	6	6	5	4	3	NA	-12%
Total Revenue	12	43	83	129	156	165	158	133	109	86	90%	-11%
Increase over Prior Year	NA	260%	92%	56%	21%	5%	-4%	-15%	-19%	-20%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 65
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: North America
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	1,169	2,568	5,811	8,009	11,326	13,120	13,910	14,460	15,450	16,420	76%	8%
Workstation Shipments	1,960	3,476	6,239	8,866	11,718	13,390	14,050	14,520	15,460	16,430	56%	7%
CPU Installed Base	1,682	4,236	9,043	16,988	28,093	39,210	49,260	57,580	66,890	77,200	102%	22%
Workstation Installed Base	3,491	6,920	12,045	20,145	31,668	42,530	52,080	59,790	68,440	78,060	74%	20%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	281.5	117.3	86.7	58.9	87.5	79.0	71.1	65.3	61.0	59.7	-25%	-7%
Hardware-Only ASP	36.1	34.2	11.5	10.3	8.6	8.5	8.4	9.2	9.9	10.5	-30%	4%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	153	137	144	163	173	179	190	204	223	NA	6%
CPU Revenue	NA	91	99	96	125	132	138	147	157	171	NA	7%
Workstation Revenue	NA	33	21	30	9	11	7	5	3	1	NA	-32%
Peripheral Revenue	NA	28	17	19	29	30	33	38	44	50	NA	11%
Software Revenue	NA	66	56	79	101	120	146	182	216	251	NA	20%
Bundled	NA	54	27	28	38	44	49	54	59	67	NA	12%
Unbundled	NA	12	29	51	63	76	97	129	157	184	NA	24%
Service Revenue	NA	36	29	43	44	49	56	67	79	91	NA	16%
Total Revenue	181	255	216	263	308	342	382	440	499	564	14%	13%
Increase over Prior Year	NA	41%	-15%	21%	17%	11%	12%	15%	13%	13%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 66
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: North America
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	297	1,349	1,469	2,127	2,531	3,370	4,730	7,220	10,340	13,280	71%	39%
Workstation Shipments	297	1,349	1,469	2,127	2,531	3,370	4,730	7,220	10,340	13,280	71%	39%
CPU Installed Base	397	1,746	3,653	6,171	7,579	10,420	14,160	19,900	28,750	40,540	109%	40%
Workstation Installed Base	397	1,746	3,653	6,171	7,579	10,420	14,160	19,900	28,750	40,540	109%	40%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	74.8	75.1	69.0	44.3	79.8	74.5	69.5	64.9	61.3	59.9	2%	-6%
Hardware-Only ASP	31.4	28.0	22.8	21.7	18.8	17.1	15.5	14.0	12.8	12.2	-12%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	58	59	59	86	98	119	147	178	208	NA	19%
CPU Revenue	NA	42	49	48	65	74	90	112	136	159	NA	20%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	16	9	11	21	24	29	35	42	49	NA	18%
Software Revenue	NA	35	26	32	54	79	112	154	194	234	NA	34%
Bundled	NA	35	20	19	31	39	47	53	59	67	NA	17%
Unbundled	NA	0	5	13	23	40	65	101	134	167	NA	48%
Service Revenue	NA	13	12	20	30	37	48	62	76	89	NA	25%
Total Revenue	21	107	97	111	169	214	279	363	447	531	68%	26%
Increase over Prior Year	NA	398%	-9%	15%	52%	27%	30%	30%	23%	19%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 67
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: North America
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	273	287	224	195	303	300	220	160	100	50	3%	-30%
Workstation Shipments	1,065	1,195	652	1,052	696	570	350	230	110	50	-10%	-41%
CPU Installed Base	686	959	1,141	1,200	1,351	1,450	1,440	1,360	1,220	1,050	18%	-5%
Workstation Installed Base	2,495	3,643	4,143	4,357	4,926	4,780	4,270	3,580	2,770	1,910	19%	-17%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	486.1	356.4	454.1	440.4	263.6	242.3	223.5	207.5	192.4	179.1	-14%	-7%
Hardware-Only ASP	404.3	326.2	197.1	280.8	114.6	104.5	95.1	87.3	80.0	73.3	-27%	-9%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	85	58	62	41	35	22	15	8	4	NA	-38%
CPU Revenue	NA	40	30	25	24	18	11	7	3	2	NA	-41%
Workstation Revenue	NA	33	21	30	9	11	7	5	3	1	NA	-32%
Peripheral Revenue	NA	12	7	7	8	6	4	2	1	1	NA	-40%
Software Revenue	NA	18	13	15	12	8	4	2	0	0	NA	-59%
Bundled	NA	15	6	7	6	4	2	1	0	0	NA	-60%
Unbundled	NA	3	7	8	5	3	2	1	0	0	NA	-58%
Service Revenue	NA	23	16	20	11	8	5	3	1	1	NA	-45%
Total Revenue	153	126	87	97	64	51	31	19	9	4	-20%	-42%
Increase over Prior Year	NA	-18%	-31%	11%	-34%	-20%	-39%	-38%	-52%	-53%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 68
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: North America
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	598	932	4,118	5,687	8,491	9,460	8,970	7,080	5,020	3,090	94%	-18%
Workstation Shipments	598	932	4,118	5,687	8,491	9,460	8,970	7,080	5,020	3,090	94%	-18%
CPU Installed Base	598	1,530	4,249	9,617	19,164	27,340	33,650	36,310	36,920	35,600	138%	13%
Workstation Installed Base	598	1,530	4,249	9,617	19,164	27,340	33,650	36,310	36,920	35,600	138%	13%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	126.2	17.3	11.7	24.4	23.7	21.9	19.9	18.5	16.7	NA	-7%
Hardware-Only ASP	10.7	9.0	3.2	3.4	4.2	4.3	4.2	4.0	3.7	3.5	-21%	-4%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	9	20	24	37	41	38	28	19	11	NA	-21%
CPU Revenue	NA	9	20	23	36	40	37	28	18	10	NA	-22%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	1	0	0	0	1	1	1	1	1	NA	19%
Software Revenue	NA	13	17	31	35	33	31	27	22	17	NA	-13%
Bundled	NA	4	1	1	1	0	0	0	0	0	NA	-36%
Unbundled	NA	9	16	30	34	33	30	27	22	17	NA	-13%
Service Revenue	NA	0	2	3	3	3	3	2	2	1	NA	-15%
Total Revenue	6	23	33	55	75	77	72	58	43	29	85%	-17%
Increase over Prior Year	NA	253%	46%	68%	35%	3%	-7%	-19%	-26%	-32%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 69
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Europe
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	593	726	4,407	4,329	6,216	7,110	8,250	9,600	11,910	14,400	80%	18%
Workstation Shipments	891	884	4,690	4,634	6,542	7,410	8,500	9,770	12,010	14,440	65%	17%
CPU Installed Base	1,106	1,832	4,900	8,767	16,143	22,100	28,170	34,320	42,840	53,940	95%	27%
Workstation Installed Base	1,712	2,595	5,946	10,084	17,698	23,790	30,070	36,230	44,680	55,610	79%	26%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	115.5	199.3	95.2	44.3	71.4	70.9	66.8	62.4	57.5	55.1	-11%	-5%
Hardware-Only ASP	171.1	57.5	8.5	13.9	9.9	10.1	10.6	12.1	11.9	11.9	-51%	4%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	69	108	92	131	145	160	184	209	237	NA	13%
CPU Revenue	NA	41	87	66	97	106	118	138	161	186	NA	14%
Workstation Revenue	NA	7	8	13	5	10	10	9	6	3	NA	-9%
Peripheral Revenue	NA	21	13	13	29	29	32	37	42	49	NA	11%
Software Revenue	NA	22	68	100	101	124	146	171	202	233	NA	18%
Bundled	NA	21	51	32	35	41	44	49	54	59	NA	11%
Unbundled	NA	0	17	68	66	84	102	123	149	174	NA	21%
Service Revenue	NA	12	21	38	40	47	54	64	76	88	NA	17%
Total Revenue	85	100	209	229	272	316	360	419	487	559	34%	15%
Increase over Prior Year	NA	17%	110%	10%	19%	16%	14%	16%	16%	15%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 70
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Europe
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	393	310	1,375	1,783	2,016	2,590	3,630	6,010	9,000	12,110	50%	43%
Workstation Shipments	480	310	1,375	1,783	2,016	2,590	3,630	6,010	9,000	12,110	43%	43%
CPU Installed Base	719	1,029	2,407	4,369	5,867	8,060	11,000	15,910	23,850	34,920	69%	43%
Workstation Installed Base	719	1,029	2,407	4,369	5,867	8,060	11,000	15,910	23,850	34,920	69%	43%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	47.7	141.5	96.8	46.4	71.7	67.7	63.2	59.0	55.7	54.5	11%	-5%
Hardware-Only ASP	30.8	41.0	27.1	23.3	20.4	18.5	16.8	15.2	13.9	13.2	-10%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	27	66	49	81	94	111	145	183	222	NA	22%
CPU Revenue	NA	17	57	41	61	71	85	113	143	174	NA	23%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	10	9	8	20	23	27	33	40	47	NA	19%
Software Revenue	NA	13	47	64	61	83	109	140	177	214	NA	28%
Bundled	NA	13	46	28	29	34	38	44	51	58	NA	15%
Unbundled	NA	0	1	36	33	49	71	96	126	156	NA	37%
Service Revenue	NA	8	9	22	29	36	45	57	71	86	NA	24%
Total Revenue	21	48	135	135	172	213	266	342	431	521	70%	25%
Increase over Prior Year	NA	136%	179%	-0%	28%	24%	25%	29%	26%	21%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 71
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Europe
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	152	70	57	113	174	190	210	210	150	90	3%	-12%
Workstation Shipments	363	228	340	419	501	500	460	380	240	130	8%	-24%
CPU Installed Base	339	409	464	567	687	790	910	1,020	1,080	1,120	19%	10%
Workstation Installed Base	945	1,172	1,509	1,884	2,243	2,480	2,810	2,920	2,920	2,790	24%	4%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	347.3	409.7	519.2	356.9	389.9	425.5	392.5	363.0	336.4	312.6	3%	-4%
Hardware-Only ASP	380.3	608.5	513.9	278.9	127.9	114.4	104.0	95.5	87.7	80.2	-24%	-9%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	33	25	32	32	31	29	24	15	8	NA	-25%
CPU Revenue	NA	21	13	15	18	16	14	11	7	4	NA	-28%
Workstation Revenue	NA	7	8	13	5	10	10	9	6	3	NA	-9%
Peripheral Revenue	NA	6	4	4	8	6	5	4	2	1	NA	-35%
Software Revenue	NA	4	6	11	8	9	8	5	3	2	NA	-28%
Bundled	NA	4	4	3	5	6	6	4	3	1	NA	-23%
Unbundled	NA	0	2	7	3	3	2	1	1	0	NA	-40%
Service Revenue	NA	3	11	12	8	8	7	5	3	2	NA	-27%
Total Revenue	63	38	44	54	49	49	44	35	22	11	-6%	-26%
Increase over Prior Year	NA	-39%	14%	24%	-11%	0%	-10%	-20%	-37%	-49%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 72
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Europe
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	48	346	2,975	2,433	4,026	4,330	4,410	3,380	2,760	2,200	203%	-11%
Workstation Shipments	48	346	2,975	2,433	4,026	4,330	4,410	3,380	2,760	2,200	203%	-11%
CPU Installed Base	48	394	2,029	3,831	9,588	13,250	16,260	17,390	17,920	17,890	276%	13%
Workstation Installed Base	48	394	2,029	3,831	9,588	13,250	16,260	17,390	17,920	17,890	276%	13%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	849.7	14.2	9.1	11.4	11.2	10.3	9.5	8.6	8.1	NA	-7%
Hardware-Only ASP	27.9	9.0	3.9	3.5	4.3	4.4	4.4	4.2	3.9	3.7	-37%	-3%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	8	17	12	19	20	20	14	11	8	NA	-16%
CPU Revenue	NA	3	16	11	18	19	19	14	10	8	NA	-16%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	5	1	1	1	0	1	0	0	0	NA	-6%
Software Revenue	NA	5	15	26	31	32	29	26	22	17	NA	-11%
Bundled	NA	5	1	1	1	1	0	0	0	0	NA	-56%
Unbundled	NA	0	15	25	30	31	29	26	22	17	NA	-10%
Service Revenue	NA	0	1	4	2	2	2	2	1	1	NA	-12%
Total Revenue	2	13	30	40	52	54	50	42	34	26	138%	-13%
Increase over Prior Year	NA	694%	134%	34%	28%	5%	-7%	-17%	-19%	-23%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 73
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Asia
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	214	1,083	1,761	3,689	5,047	6,430	7,950	9,240	10,470	11,720	120%	18%
Workstation Shipments	359	1,550	2,443	4,253	5,598	6,870	8,280	9,450	10,610	11,810	99%	16%
CPU Installed Base	262	1,344	2,969	5,661	11,571	17,410	24,040	30,920	39,040	48,640	158%	33%
Workstation Installed Base	520	2,069	4,385	7,693	14,045	20,220	26,980	33,730	41,640	50,990	128%	29%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	522.7	138.3	154.7	104.8	106.9	99.5	87.6	77.0	71.2	68.7	-33%	-8%
Hardware-Only ASP	83.5	167.2	33.1	16.1	11.2	11.3	11.2	10.9	10.3	9.8	-39%	-3%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	110	116	145	169	178	195	209	218	229	NA	6%
CPU Revenue	NA	69	58	94	99	107	120	131	139	148	NA	8%
Workstation Revenue	NA	28	33	21	19	18	16	13	11	9	NA	-14%
Peripheral Revenue	NA	14	25	31	50	53	59	65	68	72	NA	7%
Software Revenue	NA	35	52	65	93	116	143	177	219	270	NA	24%
Bundled	NA	34	45	54	73	86	96	106	114	124	NA	11%
Unbundled	NA	1	6	11	20	30	47	71	105	147	NA	48%
Service Revenue	NA	8	16	25	35	39	46	53	61	70	NA	15%
Total Revenue	35	162	188	234	294	333	384	438	498	570	71%	14%
Increase over Prior Year	NA	367%	16%	25%	26%	13%	15%	14%	14%	14%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 74
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Asia
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	15	373	428	978	1,872	2,730	3,980	5,400	6,650	7,930	234%	33%
Workstation Shipments	15	373	428	978	1,873	2,730	3,980	5,400	6,650	7,930	234%	33%
CPU Installed Base	21	394	884	1,863	3,623	6,230	9,900	14,690	20,740	28,190	263%	51%
Workstation Installed Base	21	394	884	1,863	3,623	6,230	9,900	14,690	20,740	28,190	263%	51%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	202.0	128.3	150.5	133.3	86.4	82.6	77.1	71.9	67.9	66.3	-19%	-5%
Hardware-Only ASP	31.1	28.6	24.5	24.3	16.2	14.6	13.3	12.0	11.0	10.4	-15%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	24	27	61	79	101	128	155	172	190	NA	19%
CPU Revenue	NA	20	19	46	52	67	86	104	116	128	NA	20%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	4	7	15	27	34	42	51	56	62	NA	18%
Software Revenue	NA	16	16	33	54	77	109	150	196	251	NA	36%
Bundled	NA	16	14	27	42	56	72	88	100	112	NA	22%
Unbundled	NA	0	2	6	13	21	37	62	96	139	NA	62%
Service Revenue	NA	5	4	11	20	26	35	44	54	65	NA	27%
Total Revenue	1	48	52	104	153	204	272	349	422	506	226%	27%
Increase over Prior Year	NA	3459%	8%	102%	47%	33%	33%	28%	21%	20%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 75
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Asia
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	54	300	261	270	241	270	280	270	280	260	46%	2%
Workstation Shipments	199	767	943	833	791	710	610	480	420	350	41%	-15%
CPU Installed Base	96	396	655	943	1,147	1,380	1,550	1,650	1,760	1,860	86%	10%
Workstation Installed Base	354	1,121	2,070	2,974	3,621	4,190	4,490	4,460	4,350	4,220	79%	3%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	583.4	354.6	454.4	322.7	533.7	494.5	456.2	423.7	393.0	366.1	-2%	-7%
Hardware-Only ASP	418.7	294.2	290.6	254.5	104.8	88.3	80.5	73.9	67.8	62.1	-29%	-10%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	83	78	63	66	57	47	36	29	24	NA	-19%
CPU Revenue	NA	46	31	30	32	27	22	16	13	11	NA	-20%
Workstation Revenue	NA	28	33	21	19	18	16	13	11	9	NA	-14%
Peripheral Revenue	NA	9	14	12	14	12	9	7	5	4	NA	-22%
Software Revenue	NA	15	28	22	32	27	21	15	12	9	NA	-22%
Bundled	NA	15	27	21	29	24	19	12	9	6	NA	-26%
Unbundled	NA	0	1	2	3	3	3	3	3	3	NA	0%
Service Revenue	NA	3	11	12	14	13	10	8	6	5	NA	-19%
Total Revenue	29	107	117	97	112	97	79	58	47	38	40%	-20%
Increase over Prior Year	NA	263%	10%	-17%	16%	-14%	-19%	-26%	-19%	-20%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 76
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Asia
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	145	409	1,072	2,441	2,934	3,430	3,690	3,570	3,540	3,530	112%	4%
Workstation Shipments	145	409	1,072	2,441	2,934	3,430	3,690	3,570	3,540	3,530	112%	4%
CPU Installed Base	145	554	1,431	2,856	6,801	9,810	12,590	14,580	16,550	18,580	162%	22%
Workstation Installed Base	145	554	1,431	2,856	6,801	9,810	12,590	14,580	16,550	18,580	162%	22%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	16.0	28.8	22.6	10.3	10.1	9.3	8.5	7.9	7.1	NA	-7%
Hardware-Only ASP	23.9	.0	3.6	5.9	7.1	7.0	6.9	6.6	6.1	5.8	-26%	-4%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	4	11	22	24	19	20	18	17	16	NA	-8%
CPU Revenue	NA	3	8	18	15	12	12	11	10	9	NA	-9%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	1	4	4	9	7	8	7	7	6	NA	-8%
Software Revenue	NA	3	7	10	7	12	13	12	11	10	NA	9%
Bundled	NA	3	4	7	1	6	6	5	5	5	NA	26%
Unbundled	NA	1	3	3	5	6	7	7	6	5	NA	1%
Service Revenue	NA	0	1	2	1	1	1	1	1	1	NA	-9%
Total Revenue	4	7	19	32	28	32	33	31	29	26	63%	-1%
Increase over Prior Year	NA	83%	156%	73%	-13%	13%	6%	-6%	-9%	-8%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 77
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Rest of World
PLATFORM: All Platforms

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	8	112	233	229	268	340	470	650	900	1,230	139%	36%
Workstation Shipments	28	136	260	267	299	380	520	700	950	1,270	80%	34%
CPU Installed Base	309	405	556	624	810	1,090	1,450	1,910	2,630	3,670	27%	35%
Workstation Installed Base	657	758	871	837	887	1,170	1,540	2,010	2,740	3,780	8%	34%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	628.3	159.9	70.3	33.9	53.3	57.0	62.1	63.9	61.2	57.1	-46%	1%
Hardware-Only ASP	275.6	20.5	44.6	26.7	20.1	21.4	20.1	17.8	15.3	13.3	-48%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	4	11	6	7	8	11	13	16	19	NA	23%
CPU Revenue	NA	3	8	4	5	5	6	8	10	13	NA	22%
Workstation Revenue	NA	1	2	2	1	2	3	3	3	3	NA	26%
Peripheral Revenue	NA	1	1	1	1	1	2	2	3	3	NA	24%
Software Revenue	NA	1	2	2	2	3	4	6	10	17	NA	53%
Bundled	NA	1	1	1	1	1	2	2	3	4	NA	37%
Unbundled	NA	0	1	1	1	2	2	4	7	13	NA	60%
Service Revenue	NA	1	1	1	2	2	3	4	5	7	NA	35%
Total Revenue	5	6	14	9	10	14	18	23	31	43	21%	33%
Increase over Prior Year	NA	34%	118%	-35%	14%	31%	32%	30%	33%	39%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 78
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Rest of World
PLATFORM: Technical Workstation

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	1	37	103	76	96	140	230	370	580	870	234%	56%
Workstation Shipments	1	37	103	76	96	140	230	370	580	870	234%	56%
CPU Installed Base	1	38	148	221	307	430	630	930	1,450	2,250	347%	49%
Workstation Installed Base	1	38	148	221	307	430	630	930	1,450	2,250	347%	49%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	71.9	57.5	30.1	61.2	57.1	53.3	49.8	47.0	46.0	NA	-6%
Hardware-Only ASP	26.0	27.4	26.2	28.1	20.3	18.4	16.7	15.1	13.8	13.2	-6%	-8%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	1	3	2	3	3	5	7	9	13	NA	35%
CPU Revenue	NA	1	3	1	2	3	4	5	7	10	NA	35%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	0	0	0	1	1	1	1	2	3	NA	37%
Software Revenue	NA	1	1	1	1	1	2	4	7	13	NA	77%
Bundled	NA	1	1	1	0	1	1	1	2	3	NA	46%
Unbundled	NA	0	0	0	0	1	1	2	5	10	NA	100%
Service Revenue	NA	0	1	0	1	1	2	2	4	6	NA	48%
Total Revenue	0	2	5	3	4	6	9	13	20	32	287%	48%
Increase over Prior Year	NA	11050%	109%	-38%	55%	32%	46%	49%	54%	59%		

Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April

TABLE NUMBER: 79
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Rest of World
PLATFORM: Host-Dependent/Server

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	7	6	31	12	17	30	40	40	40	40	22%	19%
Workstation Shipments	27	30	58	50	48	70	80	90	90	90	15%	13%
CPU Installed Base	309	298	268	156	58	80	110	130	160	190	-34%	27%
Workstation Installed Base	656	651	583	368	134	150	200	230	270	300	-33%	17%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	628.3	641.3	419.0	673.3	454.2	417.5	385.0	357.5	331.6	308.7	-8%	-7%
Hardware-Only ASP	405.4	348.4	217.5	271.6	166.7	152.0	138.3	127.0	116.4	106.6	-20%	-9%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	3	7	4	3	4	5	6	6	5	NA	9%
CPU Revenue	NA	1	4	2	2	1	2	2	2	2	NA	-1%
Workstation Revenue	NA	1	2	2	1	2	3	3	3	3	NA	26%
Peripheral Revenue	NA	0	0	0	1	0	1	1	1	1	NA	-1%
Software Revenue	NA	0	0	0	0	1	1	1	1	1	NA	21%
Bundled	NA	0	0	0	0	1	1	1	1	1	NA	25%
Unbundled	NA	0	0	0	0	0	0	0	0	0	NA	0%
Service Revenue	NA	1	1	1	1	1	1	1	1	1	NA	11%
Total Revenue	5	4	8	5	4	6	7	8	8	7	-3%	11%
Increase over Prior Year	NA	-24%	119%	-41%	-9%	37%	23%	11%	-0%	-11%		

Source: Dataquest
April 1989

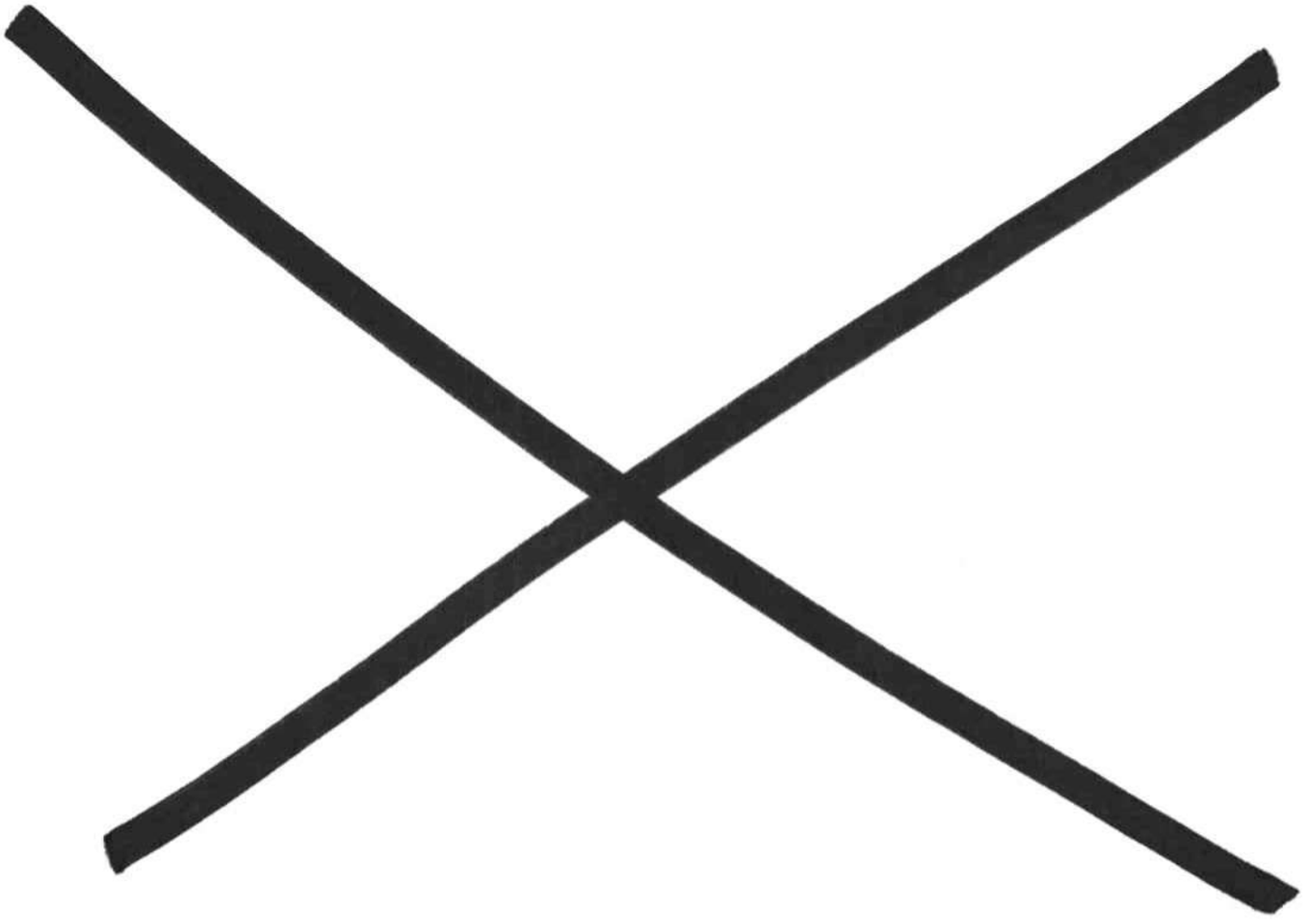
© 1989 Dataquest Incorporated April

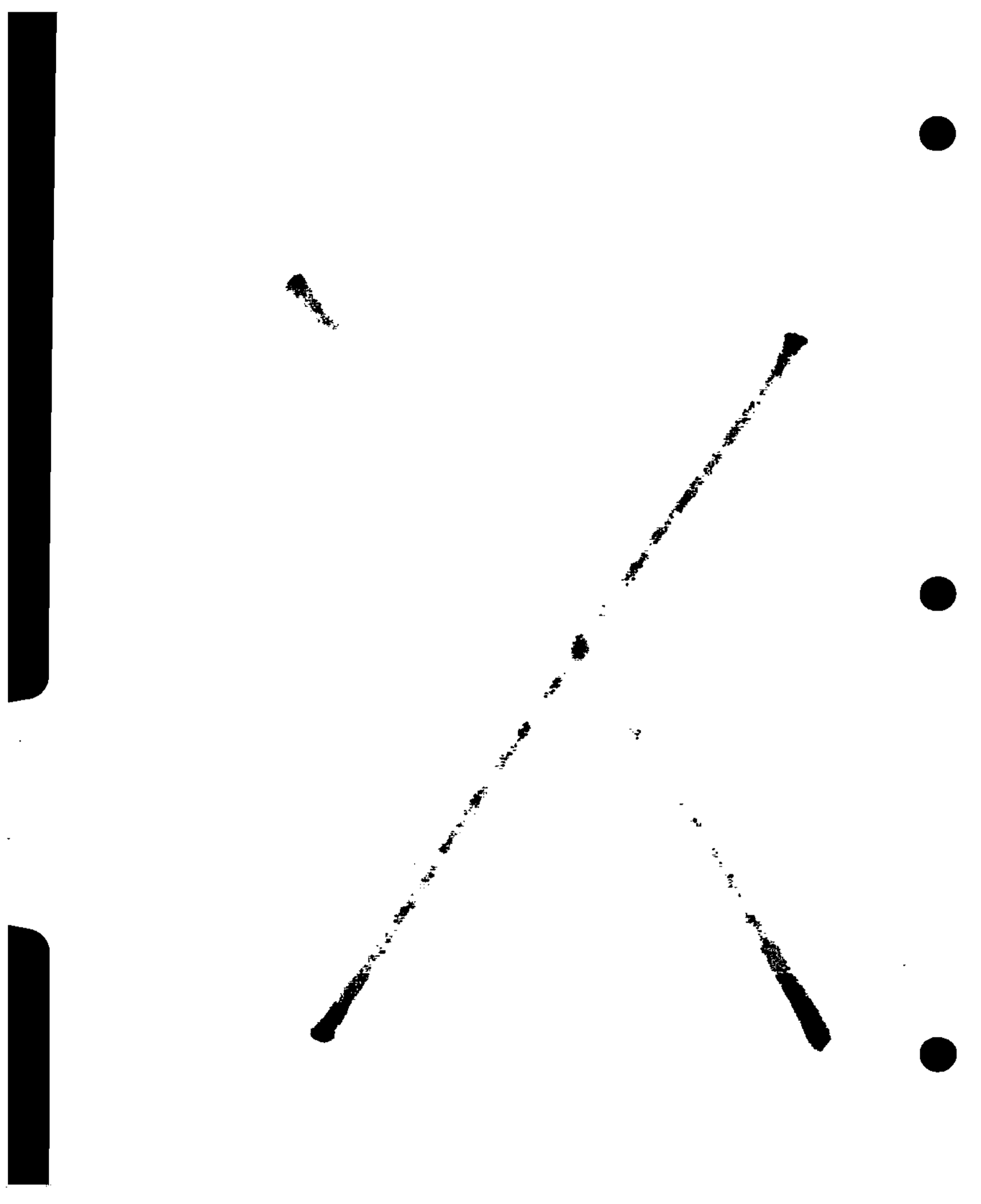
TABLE NUMBER: 80
TITLE: History and Forecast
APPLICATION: PCB Layout
REGION: Rest of World
PLATFORM: Personal Computer

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	CAGR 84-88	CAGR 88-93
UNIT SHIPMENT DATA (Workstation Shipments)												
CPU Shipments	0	69	99	140	156	180	200	230	270	320	NA	15%
Workstation Shipments	0	69	99	140	156	180	200	230	270	320	NA	15%
CPU Installed Base	0	69	139	247	445	580	720	840	1,010	1,230	NA	23%
Workstation Installed Base	0	69	139	247	445	580	720	840	1,010	1,230	NA	23%
AVERAGE SYSTEM PRICE DATA (Thousands of Dollars)												
Turnkey ASP	.0	.0	25.2	3.3	5.3	5.2	4.8	4.3	4.0	3.6	NA	-7%
Hardware-Only ASP	.0	5.1	3.2	3.6	4.0	4.0	4.0	3.8	3.5	3.3	NA	-4%
REVENUE DATA (Millions of Dollars)												
Hardware Revenue	NA	0	0	1	1	1	1	1	1	1	NA	7%
CPU Revenue	NA	0	0	1	1	1	1	1	1	1	NA	6%
Workstation Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue	NA	0	0	0	0	0	0	0	0	0	NA	NA
Software Revenue	NA	0	1	1	1	1	1	1	2	3	NA	28%
Bundled	NA	0	0	0	0	0	0	0	0	0	NA	-20%
Unbundled	NA	0	1	1	1	1	1	1	2	3	NA	29%
Service Revenue	NA	0	0	0	0	0	0	0	0	0	NA	23%
Total Revenue	0	1	1	2	2	2	2	3	3	4	NA	22%
Increase over Prior Year	NA	NA	144%	13%	8%	12%	14%	22%	28%	37%		

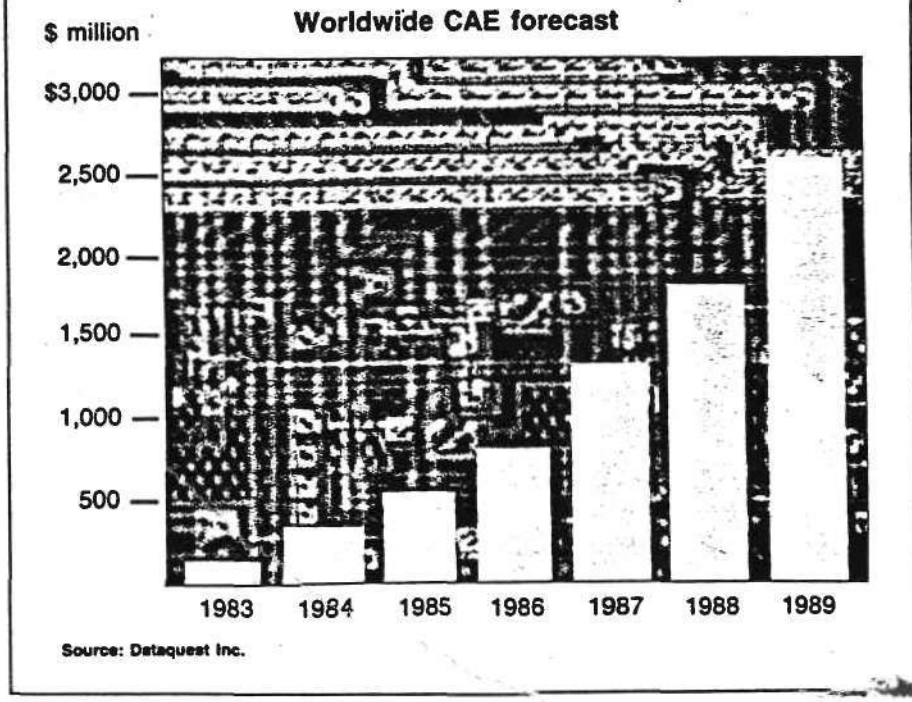
Source: Dataquest
April 1989

© 1989 Dataquest Incorporated April





On the path to multi-billion dollar maturity



to multibillion dollar maturity.

With the average CAE workstation priced in the $50,000 range, some analysts question whether the industry can break out from a customer base of a small number of savvy engineers working for large, capital-rich companies into the broader market of engineers working in smaller, budget-conscious firms. Unaccustomed to large capital expenditures for engineers, the smaller firms have thus far shied away from using CAE.

This demand for a decrease in prices has spawned a host of companies which have based their systems on comparatively inexpensive IBM personal computer (PC) hardware. One such company, Chancellor Computer Corp. in Mountain View, Calif., quotes a system price of under $21,000. "The high end of the market is saturating," claims Philip D. King, vice-president for marketing at Chancellor.

But Thomas R. Bruggere, Mentor's co-founder and president, says that price is not the sole issue here. Performance and functionality play important roles, too, insists Bruggere. "People generally will come in and say: 'What's your low-cost system?' And then they'll look at it and often buy a high-end system." But Bruggere concedes that CAE vendors must provide lower cost solutions. "What's needed is a system in the $10,000 to $20,000 price range with the same performance and functionality as the systems that are averaging about $50,000 today," says Bruggere.

Clearly, the industry is headed in the right direction. Just two years ago, the average workstation price was around $110,000, more than twice the present $50,000 figure. Gary F. Hromadko, senior technical analyst with Robertson Colman & Stephens (RC&S) in San Francisco, expects the average price to continue falling to around $40,000 by the end of this year.

But Hromadko adds that, along with trying to decrease prices, CAE vendors must also make their systems easier to use in order to reach the average engineer. "Our research," he says, "indicates that it takes a long time, even for sophisticated IC designers, to learn how to use these systems."

Even the CAE vendors admit this weakness in their products. "I agree that the systems have to be a little bit easier to use," concedes Mentor's Bruggere. "The systems today . . . are not designed for the user who is going to use the system for a couple of weeks or a month and then not come back to it for six more months and wants to be able to pick it up just like that."

Daisy's president, Aryeh Finegold, is also honest about this shortcoming. Finegold notes: "There's no question that, initially, companies focused on getting functionality, because if we didn't, customers would only say: "If you don't have a solution to my problem, then what do I care if it's easy to use?'" However, Finegold claims that the top three CAE vendors, Mentor, Daisy and Valid, are well on the way to solving the problem by implementing user-friendly systems that are similar to those used in Apple Computer Inc.'s Macintosh PC.

Another thorny topic facing CAE vendors is the issue of responsibility. If a customer uses a CAE system to design and lay out a chip, has a semiconductor house manufacture the chip and the chip doesn't work, who then takes the blame? Mentor and Gould AMI Semiconductors, a chip maker in Santa Clara, Calif., have made the first strides toward addressing this issue. As a result of the extensive development work that Mentor and AMI have done jointly, AMI says it will now accept the responsibility for a chip's performance if the chip was designed and laid out using a Mentor workstation. Users are now waiting for other semiconductor houses to follow AMI's lead.

The wait may not be short. Mentor's Bruggere says that the AMI arrangement took almost a year to iron out. Although Mentor is also working with other semiconductor houses, Bruggere says subsequent AMI-like arrangements may not be forthcoming. "It's a difficult process," he says. "There are people who spend full-time doing nothing else but interfacing with the foundries."

An alternative solution is supplied by International Microcircuits Inc. (IMI), a semiconductor house in Sunnyvale, Calif. IMI sells its own CAE software package, which runs on Daisy and Mentor workstations. According to

Dataquest
a company of
The Dun & Bradstreet Corporation

Research Newsletter

THE NEW BATTLEFIELD OF THE 1990s EDA MARKET: TOP-DOWN DESIGN

SUMMARY

In response to the increasing complexity of electronic system design, electronics manufacturers will be forced to make extensive changes to their organizations and design methodologies over the next five years. In our view, top-down design will become the preferred design methodology by 1994. As such, we believe that electronic design automation (EDA) tools supporting the top-down design paradigm will become a primary driver of the EDA market. These tools include mixed-level simulators, logic synthesis software, and test automation systems. Our research indicates that all these tools are gaining in importance and will become a staple in the designer's toolkit by 1995.

This newsletter provides the following information:

- An overview of the top-down design methodology
- Market signals of the top-down design revolution
- Gate complexity of the next generation of designs
- The impact of top-down design on the EDA market and industry
- Forecast for logic synthesis software and hardware description language (HDL)-based mixed-level simulation
- Strategies for penetrating the top-down design market

TOP-DOWN VERSUS BOTTOM-UP DESIGN

Top-down design is a species of design methodology. Together with the supporting tools, it allows engineers to perform architectural trade-offs by modeling and simulating a design first at the behavioral level and subsequently at the structural, or gate, level. Designing initially at the behavioral level permits the engineering team to determine the design's architectural viability without committing to any particular implementation. Upon selecting the optimal architecture, the design team implements a structural representation of the design that is equivalent to the behavioral representation. And with the addition of a mixed-level simulator, engineers can concurrently simulate the various levels of abstraction that model the different portions of the design.

Top-down design offers several advantages. First, it allows engineers to manage design complexity more effectively. Instead of proving the viability of the architecture at the gate level, the design team works at a higher level of abstraction. Second, it enables the design team to explore a range of architectural alternatives painlessly. Third, it permits more simulation and design verification, because behavioral models execute much faster than their gate-level equivalents.

When used in conjunction with a mixed-level simulator, top-down construction also allows the design team to simulate the *entire* system at any point in the design cycle, irrespective of the various levels of model abstraction that define the different parts design (e.g., gate, functional, behavioral). Thus, system integration and verification occur throughout the design cycle, as opposed to the end when a gate-level model is available. This enables the design team to uncover design problems throughout the design cycle.

Top-down construction contrasts sharply with bottom-up design, in which the engineer designs primarily at the structural level throughout the design cycle. In bottom-up construction, the architecture's viability is determined only by

©1990 Dataquest Incorporated April–Reproduction Prohibited
CCIS Electronic Newsletters 1990-2

0006748

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

verifying the design's operation at the structural level, which requires a complete gate-level model of the architecture. Bottom-up construction provides only a limited, if any, opportunity for architectural exploration, because the designer's focus is almost exclusively on implementation, as opposed to behavior. Making architectural changes and performing design verification at the structural level is typically time-consuming and costly. Moreover, the bottom-up approach often produces inefficient architectures that do not conform to system requirements. To make matters worse, nonconformance frequently is uncovered late in the design cycle, when it is prohibitively expensive to make major changes.

THE TOP-DOWN DESIGN REVOLUTION IS COMING

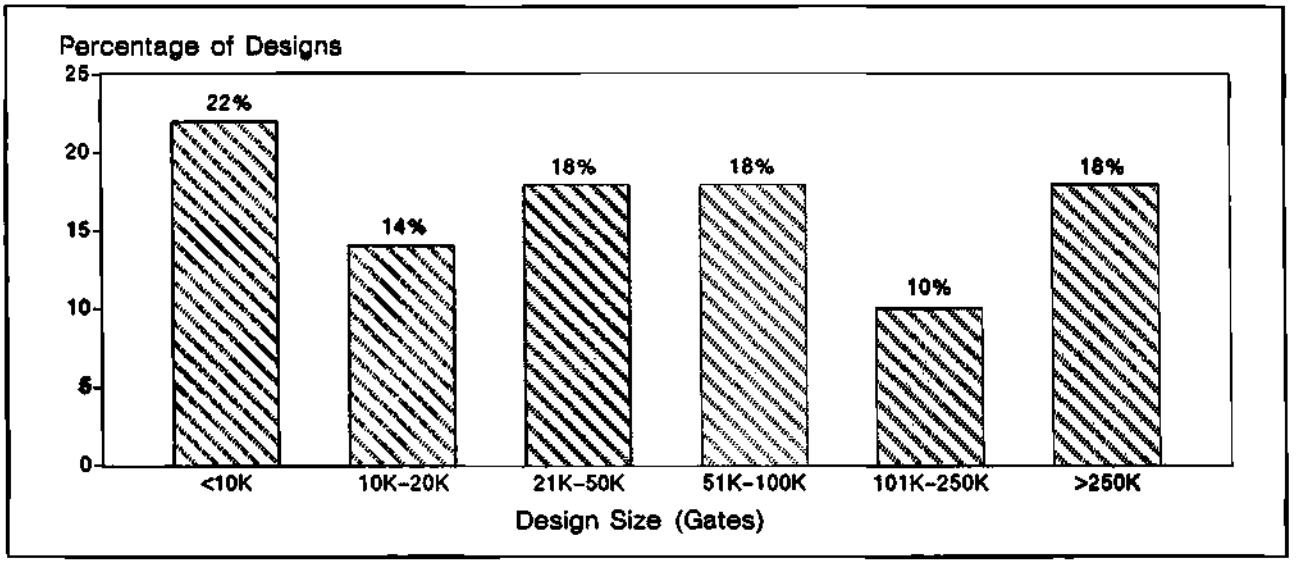
Several indicators point to the impending shift toward top-down design. For example, in 1988 a survey of design teams performing top-down design showed that 67 percent of the design cycle was devoted to structural-level design, while 33 percent was allocated to the behavioral level. Today the time spent designing at the behavioral level averages 40 percent. Another indicator derives from the market's purchasing plans—56 percent of the market preparing to adopt commercial mixed-level simulation tools plans to do so for the purpose of performing top-down design. A third indicator from Dataquest's research shows that more than 50 percent of the market believes that logic synthesis tools are an essential ingredient of the ASIC design toolkit. We believe that the combination of these signals marks the beginning of the top-down design revolution.

Increasing circuit complexity is driving system designers toward the top-down paradigm. Figure 1 shows the distribution of gate complexity for the upcoming generation of logic designs (i.e., those initiated over the next three to six months). The chart indicates that 46 percent will comprise more than 50,000 gates, and more than half of those will be greater than 100,000 gates. This compares with Figure 2, which illustrates a distribution of the largest designs performed in the past. A comparison of Figures 1 and 2 shows that the number of designs below 10,000 gates is on the decline.

MARKET PULL FOR TOP-DOWN DESIGN

The market clearly believes that an effective way to tackle design complexity is to increase the time spent designing at the behavioral and architectural levels and decrease the time spent at the structural levels. Leading-edge electronics systems manufacturers have begun using the top-down approach more earnestly over the past 12 to 18 months, but current EDA tools and interfaces still do not yield an unfettered top-down design flow. For instance, lack of behavioral-level logic synthesis precludes a smooth transition from the

FIGURE 1
Gate Complexity of Upcoming Generation of Electronic Designs



0006748-1

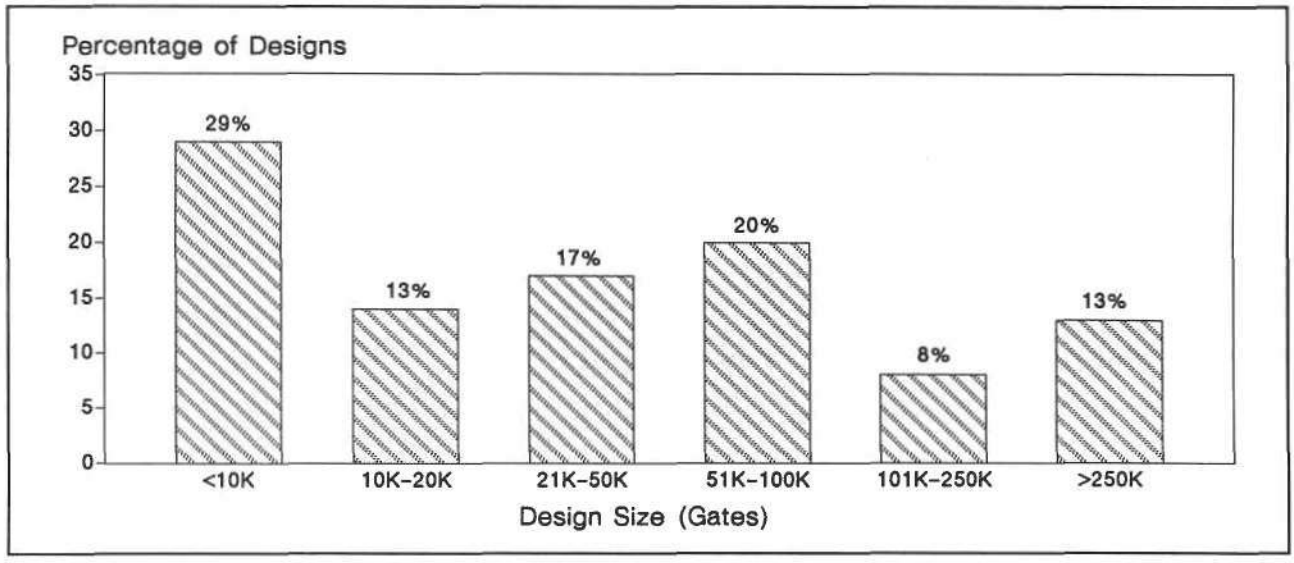
Source: Dataquest
April 1990

©1990 Dataquest Incorporated April–Reproduction Prohibited

behavioral description to the logic implementation. Design teams need a suite of EDA tools that allows them to design by developing an HDL specification that is both executable (for simulation) and synthesizable.

Despite the increasing migration toward the top-down approach, today's predominant design paradigm remains the bottom-up methodology. In fact, as Figure 3 illustrates, behavioral-level design is not done at all in 20 percent of today's designs. And in 11 percent of the designs, no more than 10 percent of the design-cycle time is spent designing at the behavioral level. Thus, in nearly one-third of today's designs, engineers are spending minimal, if any, time at the behavioral level. Further evidence of the widespread use of the bottom-up methodology can be seen in the fact that 73 percent of the users of commercial mixed-level simulators are using these tools for gate-level simulation, while only 54 percent are using them for behavioral simulation.

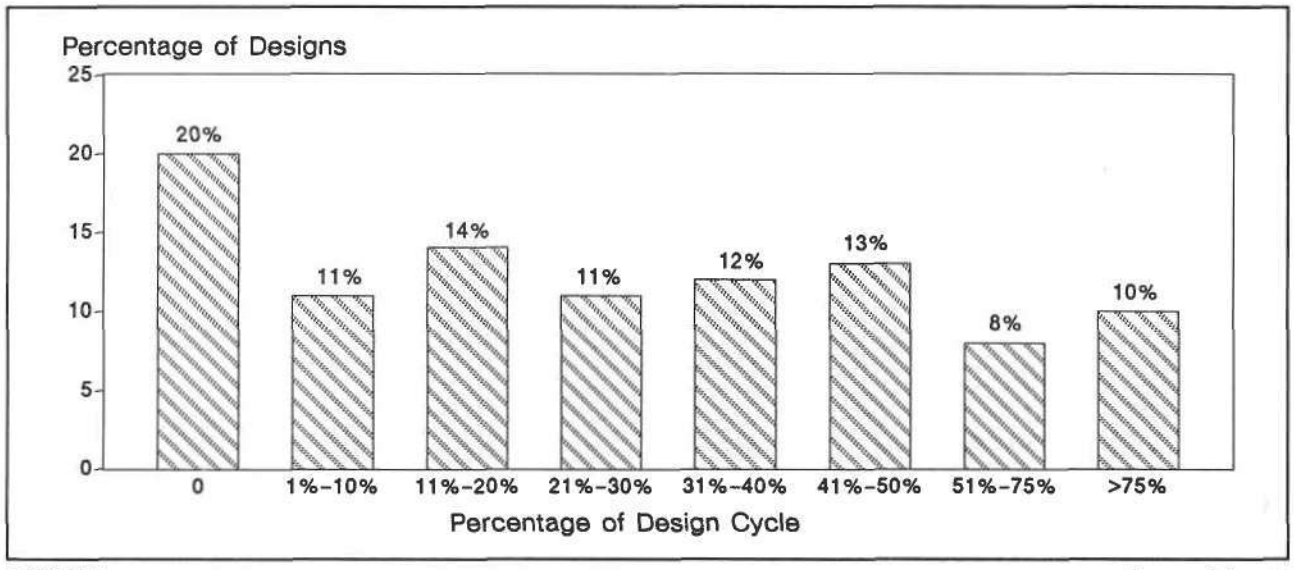
FIGURE 2
Gate Complexity of Largest Electronic Design to Date



0006748-2

Source: Dataquest
April 1990

FIGURE 3
Time Spent Designing at the Behavioral Level



0006748-3

Source: Dataquest
April 1990

©1990 Dataquest Incorporated April–Reproduction Prohibited

Dataquest believes that these percentages will change dramatically over the next three years. We anticipate that 90 percent of all designs will be implemented with at least 20 percent to 25 percent of the design cycle devoted to architectural- and behavioral-level design by 1994. Our forecast is based on the following trends:

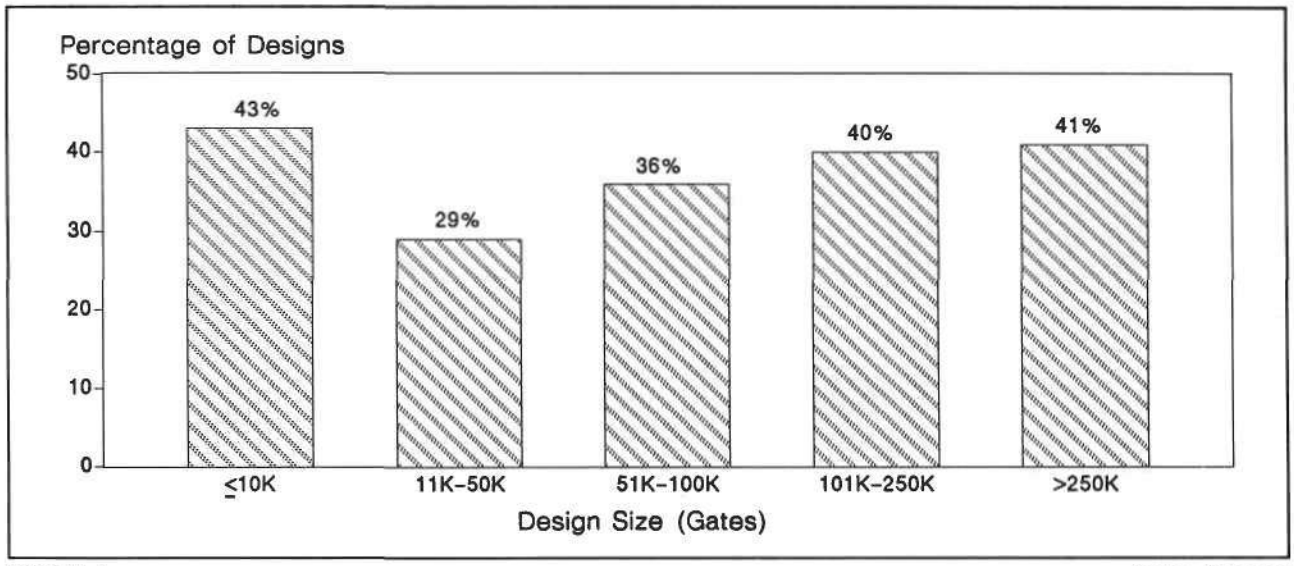
- Increasing design complexity
- Growing time-to-market pressures
- Emerging production-proven logic synthesis tools
- Improving mixed-level simulation products
- Growing penetration of hardware description languages (HDLs)
- Increasing model availability and improved modeling tools

A striking characteristic of the data in Figure 3 is its nearly normal distribution. That is, across the spectrum of design sizes, the amount of time spent at the behavioral level varies almost uniformly among the categories 10 percent to 75 percent. This wide range in times allocated to behavioral-level design can be explained by the data in Figure 4, which shows that as design complexity rises, so too does the amount of time engineers spend at the behavioral level.

Yet a seemingly anomalous data point of Figure 4 is the percentage of time spent at the behavioral level for designs of 10K or less. The 43 percent figure is larger even than the most complex designs. We believe that this percentage reflects the pressure on design teams to develop products within tight time constraints. For example, a less complex design (e.g., below 10K gates) described behaviorally can be converted into its gate-level equivalent fairly quickly and with little difficulty. There is little risk of spending too much time at the behavioral level and not leaving enough time for translation to the gate level. This contrasts with complex designs, which require more time and effort to translate from a behavioral representation to a corresponding gate level implementation. Too much time spent at the behavioral level could leave an insufficient amount of time for gate-level implementation, causing the design cycle to stretch out. In sum, we believe that designers are spending less time performing architectural trade-offs because they feel pressured to commence work on the gate-level implementation as early as possible.

This raises a question as to the optimal amount of time that design teams should allocate to behavioral-level design. Ideally, the time spent should equal the time needed to develop the most efficient architecture. Unfortunately, pressure always exists on the design team to ensure that the design is completed on time. So, engineers often jump prematurely to the gate-level implementation phase, without performing adequate architectural exploration. This, of course, typically yields a less than optimal architecture.

FIGURE 4
Behavioral-Level Design as a Function of Design Size



0006748–4

Source: Dataquest
April 1990

©1990 Dataquest Incorporated April–Reproduction Prohibited
CCIS Electronic Newsletters 1990-2

LOGIC SYNTHESIS: THE CATALYST OF TOP-DOWN DESIGN

In our view, the reason behind the premature launch into the gate-level design stems from the dearth of behavioral-logic-synthesis tools on the market. Lack of behavioral-logic-synthesis tools necessitates manual translation of the behavioral representation to the structural representation.

We believe that design teams will continue limiting the amount of time spent performing architectural trade-offs until both the behavioral synthesis tools are available and the designers are comfortable following a top-down design methodology using HDLs and logic-synthesis software. Once designers adopt behavioral synthesis tools, they will have the luxury of relying on the tools to transform the behavioral description into a gate-level implementation. This automatic translation, of course, will allow design teams to bypass the manual task of converting the behavioral-level specification into logic, permitting more time to be spent at the behavioral level exploring architectural alternatives.

A handful of leading-edge electronic manufacturers recently have begun to use internally developed behavioral synthesis tools, but the technology has yet to penetrate the mainstream. We believe that behavioral-level synthesis will gradually move into the mainstream design groups over the next five years, with 18 percent to 22 percent of all ASICs implemented with commercial synthesis tools by 1994. Indeed, we anticipate that logic synthesis will be an integral driver of the top-down design paradigm. As Figure 5 shows, Dataquest forecasts the logic synthesis market to exhibit a compounded annual growth rate (CAGR) of 68 percent from 1989 through 1994.

Commercial EDA companies currently are focusing on expanding the capabilities of their register-transfer-level (RTL) synthesis products to include synthesis of higher-level behavioral. RTL-based top-down design allows engineers to perform more architectural exploration than a pure bottom-up, gate-level design methodology but not as much as a behavioral-based top-down paradigm.

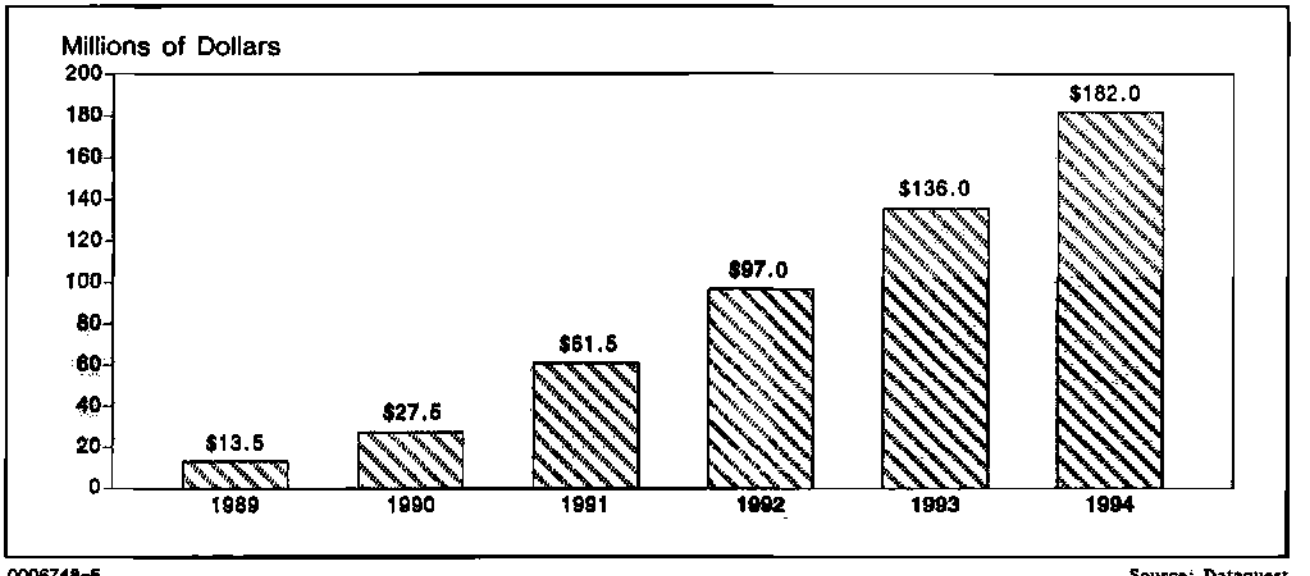
Because the current generation of synthesis products synthesize predominantly from RTL descriptions, designers wishing to use a synthesis-based top-down design methodology will most likely choose to design and simulate at both the RTL and behavioral levels, manually translate the behavioral descriptions into a combination of structural-level logic and RTL constructs, and rely on the RTL-logic-synthesis system to convert the RTL description into logic.

MARKET AND PRODUCT STRATEGY IN THE TOP-DOWN DESIGN ERA

Top-Down Design Education

Although the increasing adherence to top-down design techniques portends to have enormous impact on the EDA market, design methodology

FIGURE 5
Growth of Logic Synthesis Software Market



0006748-5

Source: Dataquest
April 1990

©1990 Dataquest Incorporated April–Reproduction Prohibited

changes will create several new challenges for EDA vendors. For example, education, training, and customer support relating to top-down design will become critical as engineers attempt to embrace the new methodology. Dataquest's research confirms that the primary reason for not adopting HDL-based top-down design is because it is perceived as being too sophisticated. This sentiment resounds across all industries, from data processing to semiconductors. Indeed, very few undergraduate electrical engineering programs offer courses in top-down design. Thus, we believe that success in the top-down design market requires education to be offered simultaneously with the new EDA environments, and the quality of education must be commensurate with the sophistication of both the top-down methodology and the tools.

Displacing the current design methodologies that electronics manufacturers use with a true top-down design approach will be among the most difficult hurdles facing EDA vendors over the next five years. We anticipate that, just as in-house proprietary tools continue to be primary competitors of commercial EDA vendors, much effort will be required to overcome the inertia embodied in existing design methodologies. Engineers will adopt commercial tools, but only after they feel comfortable with the methodology.

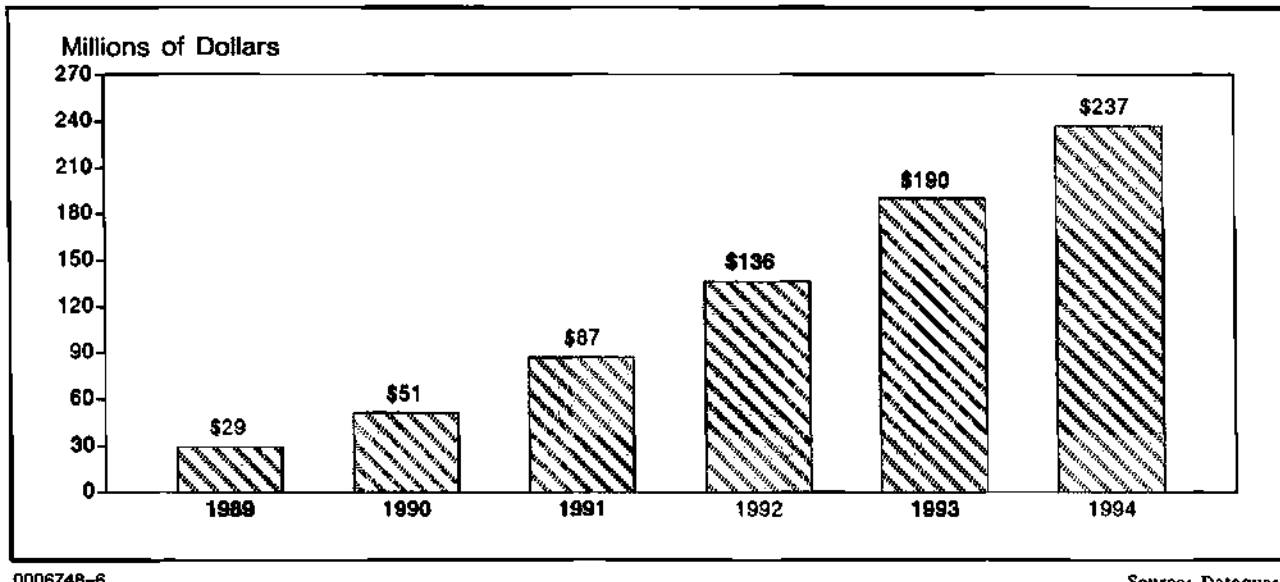
In addition, organizational changes within electronic-system manufacturers will be necessary to exploit the full value of top-down design. For example, it is unknown how much productivity improvement can be gained from the top-down paradigm. EDA vendors must be able to provide sound advice to customers regarding organizational issues relating to expected productivity gains.

Robust Behavioral Simulation

Dataquest's market research indicates that nearly all of the users of proprietary in-house digital simulators are using them equally for both behavioral- and gate-level simulation. This market segment already is convinced of the high value of top-down design and will evaluate commercial simulation products not only on their gate-level capabilities, but also on their behavioral-level capabilities. Support of VHDL will be mandatory, but other de facto standard HDLs also are likely to emerge over the next five years. As Figure 6 shows, Dataquest forecasts the HDL-based mixed-level simulation software market to experience a CAGR of 52 percent from 1989 through 1994.

Dataquest's market research indicates that industries that will be most aggressive in adopting mixed-level simulation include military/aerospace, data processing, and semiconductors. Within those industries, companies with more than 100 employees hold the most promise for EDA vendors.

FIGURE 6
Growth of HDL-Based Mixed-Level Simulation Software Market



0006748-6

Source: Dataquest
April 1990

©1990 Dataquest Incorporated April–Reproduction Prohibited
CCIS Electronic Newsletters 1990-2

Product Line Mix

Competing in the top-down design market will require an EDA vendor to provide a tightly integrated environment that includes the following product suite:

- High-performance mixed-level simulation
- HDL-based logic synthesis
- A rich set of ASIC libraries supporting the synthesis and simulation environments
- Model debugging tools
- Test-logic synthesis software
- Automatic test vector generation (ATVG) packages

Dataquest believes that these tools are central to the top-down design methodology and must become part of, or easily integrated into, the full-line supplier's product line by 1992. Our market research also indicates that compatibility with existing EDA systems is the most important requirement of a new EDA tool. Also ranking high as important requirements are the tools' execution speed, functionality, and ease of use.

DATAQUEST CONCLUSIONS

Dataquest believes that conditions are right for a shift in the design paradigm. By 1995, we expect the majority of engineers to be following a top-down approach. Factors pointing to the impending shift include the following:

- Electronic system design complexities continue to grow.
- Simulation technology is improving.
- Logic synthesis is becoming more viable.
- HDL-based design is making inroads.
- Workstations now can handle the compute requirements of most EDA applications.
- Several companies are developing test-logic synthesis and ATVG systems to round out the top-down design environment.
- A handful of universities have begun including top-down design courses within the undergraduate curriculum.

In sum, the EDA market of the 1990s will look quite different from that of the 1980s.

Ron Collett

©1990 Dataquest Incorporated April--Reproduction Prohibited

Dataquest
a company of The Dun & Bradstreet Corporation

Research Newsletter

CADENCE AND EUROPEAN SILICON STRUCTURES (ES2) JOIN FORCES

INTRODUCTION

Cadence Design Systems and European Silicon Structures (ES2) have announced the formation of a European joint-venture company known as European CAD Developments Limited (EuCAD). The company will be headquartered in the United Kingdom, with additional facilities in other European countries, initially in Paris. At this time, EuCAD is staffed by 35 people from ES2 and 10 people from Cadence.

The precise remit of the company is not being divulged, except in very general terms as to undertake research and development on the next generation of ASIC design solutions for both ES2 and Cadence. It is also known that the company will continue to develop and support ES2's Solo 1400 ASIC design system. The company will, in effect, become a technology division, concentrating its efforts on product development and marketing. Sales will be handled by Cadence and ES2. Cadence owns 51 percent of EuCAD and ES2 owns 49 percent.

Dataquest believes this venture has attractions for both parties, and in this bulletin we offer the following observations on the announcement.

THE CADENCE PERSPECTIVE

The venture offers Cadence benefits as follows:

- Cadence taps into European R&D expertise in an application area in which it has a major strategic interest.
- Partnership with a European silicon supplier leverages sales of ASIC design tools in Europe.

This is the first time Cadence has partnered a silicon supplier in this way. Dataquest believes it is a sound move for Cadence which, to date, has been relatively unsuccessful in Europe. ES2 is a European silicon foundry which supplied 380 design starts in 1989, representing some 47 percent of all cell-based European ASIC design starts in that year. It holds the number four position for European digital cell-based ASIC manufacturing revenue. Clearly, Cadence will be in a position to supply a fully validated ASIC design system, which will presumably be tightly integrated within the Cadence environment.

From Cadence's viewpoint, the company will perform the role of technology R&D center. Furthermore, EuCAD will undertake R&D with various ASIC vendors and will not be limited to ES2. Cadence already spends 27 percent of its revenue on R&D. Clearly, the company has its sights on the number one EDA software market position following its dramatic rise to number two in 1989. However, Mentor Graphics and Valid Logic remain formidable competitors in the systems marketplace.

THE ES2 PERSPECTIVE

For ES2, the advantages include:

- Access to additional international markets for both tools and silicon
- Greater returns on ES2's investment in the development of design tools
- Reduced expenditure on tools, allowing a greater focus on silicon production

ES2 specializes in small-batch, fast-turnaround, cell-based ASICs using e-beam processing. In Europe, MOS gate arrays represented the majority of design starts in 1989. Cell-based technology is not as mature but is growing faster, exhibiting 36.8 percent compound annual growth

©1990 Dataquest Europe Limited August–Reproduction Prohibited
CCIS EDA Newsletters 1990-3

0006159

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

rate in the 1988 to 1989 period, compared with 28.3 percent for gate arrays. Dataquest believes that this places ES2 in a potentially strong position in spite of the company's relatively weak financial performance at this time.

The company already has a strong relationship with Cadence, as ES2 was an OEM purchaser of Cadence's tools under the banner of Solo 2000. Historically, IC layout was the realm of the silicon manufacturer. Recent indications show an increasing number of systems houses wanting to undertake layout in-house. It is also apparent that, like it or not, silicon suppliers are recognizing that their core business is silicon—not design systems.

CONCLUSIONS

ES2 has made the strategic decision to unbundle its design and manufacturing operations. In effect, it has transferred the bulk of its software development capabilities to EuCAD and picked up a 49 percent share in return. The company can now focus on silicon, backed in part by a major EDA vendor. This will help the company's efforts to achieve profitability. Cadence has inherited a ready-made team of developers to bolster its R&D capabilities. We believe that Cadence will achieve an enhanced presence in the European EDA market as a result of EuCAD's formation, in addition to the delivery of a wider range of tools over the coming years. This is a useful strategic move for both companies.

Ron Collett
Jim Tully

©1990 Dataquest Europe Limited August–Reproduction Prohibited

Dataquest
a company of
The Dun & Bradstreet Corporation

Research Newsletter

DAC 1990: EUROPE MOUNTS ITS EDA CHALLENGE

INTRODUCTION

A glance at the exhibitor list at this year's Design Automation Conference (DAC) in Orlando, Florida reveals nine European, or strongly European-related EDA vendors. Dataquest believes that the rise of European vendors could indicate a swing toward a greater European presence in worldwide EDA software production. The companies ranged from established multinationals to small start-ups; approximately half appeared for the first time. Application areas ranged from full-line EDA vendors to niche players. Moreover, the acquisition of Calay Systems by Siemens announced on July 31, 1990 further demonstrates the present level of activity in Europe. The "Europeans" at DAC are shown in Table 1.

DATAQUEST ANALYSIS

In 1989, Europe accounted for 28 percent of worldwide EDA market revenue. Dataquest forecasts that Europe's share will grow to 30 percent by 1994, exhibiting a revenue compound annual growth rate of 19 percent. Europe will maintain its position as number two to North America but will grow at a significantly faster rate (see Figure 1). Table 2 shows the 1989 EDA vendor market share for Europe.

A key question in connection with European vendors is whether European end users will favor them in preference to non-European vendors. Possible reasons for favoring European vendors include:

- Better support from locally-based companies
- Lower-cost products due to lack of import duty payable from non-EEC countries
- Nationalism
- Easy access to marketing and software development personnel

Let us consider these points in turn:

- The only occasions where small companies tend to provide better support is in the vicinity of the vendor's home city; this is not therefore a major consideration in most cases, especially when

TABLE 1
Europeans at DAC 1990

Company	Country	Product Area
Calay Systems	West Germany	Full-line EDA
Dassault Electronique	France	Synthesis
DOSIS GmbH	West Germany	Silicon cross compiler
formula GmbH	West Germany	Mac EDA applications
Plessey Semiconductors	United Kingdom	ASIC design tools
Racal-Redac	United Kingdom	Full-line EDA
Schlumberger CAD/CAM	US/France	CAE/CAD/packaging
Swiftlogic	United Kingdom	Post-layout simulation
Win Technology	France	Data/process manager

Source: Dataquest (August 1990)

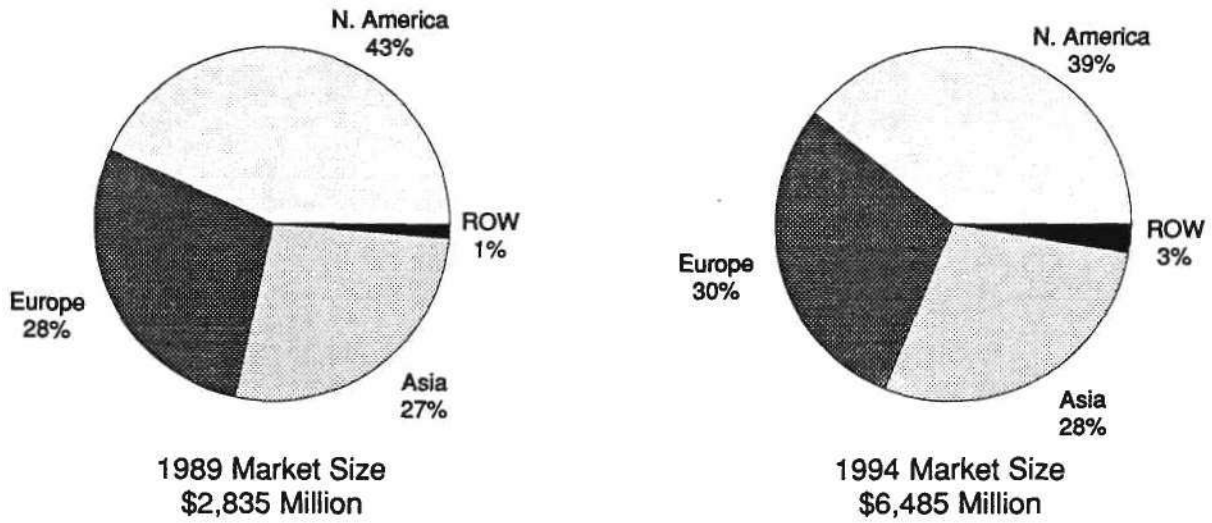
©1990 Dataquest Europe Limited August–Reproduction Prohibited

CCIS EDA Newsletters 1990-4

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

FIGURE 1
EDA Market by Region, 1989 and 1994



Source: Dataquest (August 1990)

compared with non-European full-line EDA vendors, with their comprehensive support networks.

- The effect of import duties is also relatively insignificant and can usually be absorbed by the larger vendors. In any event, price is often not a critical factor in the EDA buying decision.
- Nationalism can be a factor, but is often overstressed.
- Of much greater significance (and often mistaken for nationalism) is the perceived—and real—ability to influence the shape of the product through access to development personnel. This is a key factor. In view of this, we believe that European vendors can become successful, especially in the European marketplace, provided that they offer the right products with appropriate levels of customization available.

The financial resources, market presence and relative stability of the larger vendors reduces some of the risks for the customer. This is crucially important in EDA sales, indicating that smaller players need to form strategic partnerships with larger companies. Furthermore, the emergence of framework standards will remove many of the barriers to market entry.

VENDOR ANALYSIS

Calay Systems

Calay was aquired by AGIV Frankfurt in 1988, which integrated the company's US and European operations under a new Calay corporate headquarters near Frankfurt, Germany. However, on July 31 of this year, an agreement was reached with Siemens AG of Germany (revenue last year around $38 billion), whereby Siemens would acquire Calay at a price still to be determined. Siemens intends to develop and market Calay's products on a worldwide basis and will not use the tools purely for in-house design purposes. We believe Calay's PCB CAM tools to be attractive to Siemens, which is a highly manufacturing-oriented company. With Siemens' backing, Calay could be well-positioned to attack other full-line vendors (initially in Europe, where the company presently holds the number eight market share position in EDA software revenue).

At the show, Calay demonstrated the extended Prisma system comprising a suite of EDA tools in a recently integrated form. The tools include schematics capture, simulation (Saber and System HILO), the Framemaker documentation package, PCB layout, together with FOCUS post-processing and CAM applications (FOCUS was previously an entirely separate CAM-station product marketed as Calay ECAM). A key feature of Prisma is its common design database which permits real-time

©1990 Dataquest Europe Limited August–Reproduction Prohibited
CCIS EDA Newsletters 1990-4

TABLE 2
European 1989 EDA Market Shares

Company	Total Revenue ($M)	HW Revenue ($M)	SW Revenue ($M)	Work-stations Shipped	Total Revenue	HW Revenue	SW Revenue	Work-stations Shipped
Mentor Graphics	103.7	30.1	51.0	1,372	12.9%	8.0%	18.8%	5.5%
Digital	90.1	67.0	0.0	768	11.2%	17.7%	0.0%	3.1%
Hewlett-Packard	83.0	58.5	4.9	5,703	10.3%	15.5%	1.8%	23.0%
Dazix	55.3	21.0	22.2	551	6.9%	5.6%	8.2%	2.2%
Racal-Redac	46.0	0.2	37.8	163	5.7%	0.1%	13.9%	0.7%
Valid	43.5	10.9	23.5	475	5.4%	2.9%	8.7%	1.9%
Computervision	32.1	14.3	7.6	270	4.0%	3.8%	2.8%	1.1%
Intergraph	30.6	14.4	5.4	321	3.8%	3.8%	2.0%	1.3%
Sun	27.8	25.1	0.0	1,869	3.5%	6.6%	0.0%	7.5%
Compaq	26.4	26.4	0.0	4,402	3.3%	7.0%	0.0%	17.7%
IBM	18.4	12.8	2.8	752	2.3%	3.4%	1.0%	3.0%
Calay	13.5	4.2	6.8	134	1.7%	1.1%	2.5%	0.5%
Silicon Compiler Systems	13.0	0.0	8.7	0	1.6%	0.0%	3.2%	0.0%
Secmai	12.4	7.4	2.6	101	1.5%	2.0%	1.0%	0.4%
Cadence	10.1	0.0	8.5	0	1.3%	0.0%	3.1%	0.0%
Scientific Calculations	9.1	2.0	4.6	42	1.1%	0.5%	1.7%	0.2%
Zycad	7.9	5.5	0.2	38	1.0%	1.5%	0.1%	0.2%
LPKF	7.5	4.5	2.3	750	0.9%	1.2%	0.8%	3.0%
European Silicon Structures	7.3	1.8	5.5	40	0.9%	0.5%	2.0%	0.2%
VLSI Technology	7.2	0.4	5.7	24	0.9%	0.1%	2.1%	0.1%
Other Companies	159.8	71.3	71.2	7,045	19.9%	18.9%	26.2%	28.4%
All Companies	804.7	377.8	271.3	24,820	100.0%	100.0%	100.0%	100.0%
All US-Based Companies	677.1	349.0	190.8	22,347	84.1%	92.4%	70.3%	90.0%
All Asian-Based Companies	0.0	0.0	0.0	0	0.0%	0.0%	0.0%	0.0%
All European-Based Companies	127.6	28.8	80.5	2,473	15.9%	7.6%	29.7%	10.0%
All Hardware Companies	264.7	222.3	0.0	18,411	32.9%	58.8%	0.0%	74.2%
All Turnkey and Software Companies	540.0	155.4	271.3	6,408	67.1%	41.1%	100.0%	25.8%

Source: Dataquest (August 1990)

design changes between the CAE and CAD environments.

Calay will gain added stability following its acquisition by Siemens. The realignment of its product line and its capability for further development in view of Siemens' massive resources places the company in a position to compete aggressively with its major European competitor, Racal-Redac, especially for large customers involved in in-house manufacturing.

Dassault Electronique

A subsidiary of Dassault, the French aircraft manufacturer, Dassault Electronique is a FF 4 billion, 4,000-person company which traditionally produced turnkey electronics systems for military applications. Making its first appearance at DAC, Dassault Electronique demonstrated Frenchip, a logic synthesis tool for ASICs, originally produced for in-house use and said to be responsible for the design of over 40 complex ASICs internally. The product was originally launched in April 1990.

©1990 Dataquest Europe Limited August--Reproduction Prohibited

As a product not aligned to a specific full-line EDA vendor, Frenchip now competes directly with Synopsys following the acquisition of the other independent ASIC synthesis companies: Trimeter and Silicon Compiler Systems by Mentor Graphics; and Silc Technologies by Racal-Redac. Dassault Electronique will therefore face tough competition from the established products of Synopsys and the market presence of Mentor and Racal-Redac.

In the broader CAD/CAM industry, its sister company Dassault Systeme is better known as the developer of CATIA, the mechanical package marketed by IBM. Dassault Electronique has a stable, cash-rich parent which has proven its ability to encourage the development of advanced CAD/CAM products. Dataquest believes the key issues for Dassault Electronique are distribution, marketing and support. We believe the company may have to establish partnerships with large EDA vendors to distribute the product and to provide local support.

DOSIS GmbH

DOSIS demonstrated a silicon cross compiler, called DESIRE, which generates a new layout according to the design rules of a different process technology while ensuring compactness of the design. It can be used for updating cell libraries to a new technology, second-source conversion and minimization of redundant space in layouts. It is specifically aimed at hand-crafted silicon layout. The company sells other EDA products in Europe, including a graphic layout editor and simulation tools.

Founded in 1985, the company's corporate strategy is to transform the raw technology of university and institute research into commercial products and bring them to market. It has 35 employees and its first DAC attendance was in 1989. Target customers include captive and merchant semiconductor manufacturers. The major geographical market for DOSIS is North America at present.

University research in electronic CAD/CAM has typically been underexploited in Europe when compared with North America. However, recent collaborative ventures sponsored by the European Community, such as JESSI and ESPRIT, are attempting to change this situation.

formula GmbH

Based in Nürnburg, Germany, formula was formed in 1984 to develop PCB layout software which was supplied to other companies on an OEM basis. Its current product, RUN, is based on the Apple Macintosh platform and offers CAE and CAD applications for PCB and ASIC design. The product was introduced in October 1989. Approximately 100 copies have been sold since that time. The use of the Apple Macintosh is a significant differentiator for the company, which attended DAC for the first time. Although formula has an opportunity to capitalize on the market for Macintosh-based EDA systems, the Macintosh has yet to make any significant penetration into the EDA market.

Plessey Semiconductors

Plessey is headquartered in Swindon, England and produces CMOS, bipolar and emitter-coupled logic (ECL) arrays for analog, digital and mixed signal applications. The company demonstrated the PDS system for schematics, logic synthesis, automatic test-point generation (ATPG) and layout. Also shown, was the company's Analog ASIC Toolkit and the ERA design system for field-programmable gate arrays. All three systems were released within the past six months. Plessey's design systems are not general-purpose and are marketed specifically in connection with the company's semiconductor products. Plessey holds the number 16 position in the overall European IC market, although it has significantly higher shares in specific segments.

The ongoing development and support of EDA tools is expensive, and in this connection it is interesting to compare Plessey with another European ASIC vendor, European Silicon Structures (ES2). ES2 recently formed European CAD Developments (EuCAD) in conjunction with Cadence Design Systems with the partial intention to reduce its design system development costs. Although around ten times bigger than ES2 in revenue terms, Plessey Semiconductors will still find the ongoing development and support of its tools a significant drain on resources, and will find an increasing reluctance on the part of systems houses to invest in foundry-specific tools.

©1990 Dataquest Europe Limited August–Reproduction Prohibited
CCIS EDA Newsletters 1990-4

Racal-Redac

A division of Racal Electronics, the $3.5 billion UK electronics group, Racal-Redac has previously attended many DAC exhibitions. Redac's image in the US market has been enhanced through its acquisition of HHB Systems and Silc Technologies, and the company is aggressively attempting to complete its image transformation from a PCB layout company to an EDA full-line supplier, placing it in a favorable position to compete with its main full-line rivals—Mentor Graphics, Valid Logic and Cadence Design Systems. The company demonstrated its various tools from recent acquisitions, including simulation from HHB and synthesis from Silc Technologies.

Redac demonstrated INTELLIGEN Plus, an automatic testability and test-generation system for ASICs, and SilcSyn 2.0, an architectural design and test synthesis tool. In addition, the company announced and demonstrated Visula HPE, a high-speed PCB layout application integrated with Quantic Laboratories' Greenfield transmission line post-layout simulator. Also announced was Redac's intention to port the Visula EDA suite to IBM's RISC System/6000 platform and an agreement with Digital Equipment Corporation to join the POWERFRAME Synergy Program.

Schlumberger CAD/CAM

This US company was formed from the merger of Applicon and MDSI in 1984, but clearly has major links with Europe through the Schlumberger connection. The company showed a range of EDA tools including schematic capture, simulation, PCB layout and electronics packaging. Both VAX and Macintosh platforms are supported. Schlumberger's focus is still very heavily on mechanical CAD/CAM, where it holds the number four position in Europe (1989 mechanical software revenue).

Schlumberger has not held a strong position in EDA over the past several years. However, the company's experience in both EDA and mechanical applications place it in a favorable position to offer mixed technology applications such as electromechanical and electronic packaging (packaging was, in fact, demonstrated at the show). Schlumberger could then use its strengths and presence in the mechanical marketplace as leverage for additional EDA seats in electronic design departments of large organizations.

Swiftlogic

Swiftlogic demonstrated applications of growing significance at the show—high-speed PCB layout simulation, and transmission line and crosstalk analysis tools. EDA tools for high-speed design were a major theme at this year's DAC show. A mixed signal (analog/digital) simulator for ASICs designed as an extension to Mentor Graphics' Quicksim simulator was also shown.

Swiftlogic, a Unisys spin-off, is privately owned and is backed by venture capital and UK government regional assistance. The company has traditionally developed Mentor Graphics-compatible products and targeted these products exclusively at the Mentor user base. However, the high-speed logic products are now unbundled and can be sold into different vendors' environments. The company faces growing competition from other simulation companies, including Quad Design Technology, Quantic Laboratories and Pacific Numerix. In view of the recent agreement between Racal-Redac and Quantic Laboratories, Swiftlogic can expect to see this competition start to intensify in its European backyard.

Win Technology

Win Technology, a two-year-old, 20-person French company demonstrated Cad_Geode (pronounced "cad jee-ode"), an intelligent framework based upon an expert system. Cad_Geode is a framework that includes design data management capabilities. It controls both data and processes, allowing a company's design methodology to be described to the environment as a series of rules.

According to the company, the use of an expert system allows a more accurate and comprehensive description of these rules. This permits the user to create a tightly controlled custom-design environment across multiple disciplines (electrical, mechanical, software, etc.), forming the core of a concurrent engineering environment. As a framework, the product will encounter competition from Mentor Graphics' Falcon, Digital's Powerframe, Cadence's Design Framework and Interact Corporation's InterAct Integrator. The product presently has no distribution outside of France and although no copies have yet been sold, it has been used in a production environment in the design of the European Airbus aircraft.

Ron Collett
Jim Tully

©1990 Dataquest Europe Limited August–Reproduction Prohibited

Dataquest
a company of The Dun & Bradstreet Corporation

Research *Bulletin*

SYNOPSYS AND SIEMENS EXPAND THEIR EDA OFFERINGS WHILE HP CONTRACTS

SUMMARY

Merger and acquisition activity, which has been the hallmark of the electronic design automation (EDA) industry over the past few years, appears to continue apace as evidenced by the latest developments. Synopsys Inc. recently agreed to acquire Zycad's VHDL software simulation business, and Siemens announced its purchase of Calay Systems GmbH. Under terms of the agreement between Synopsys and Zycad, Synopsys will pay $5 million in cash, an undisclosed amount in Synopsys securities, and future royalties for full rights to Zycad's System VHDL. Siemens has disclosed plans to form a new EDA business unit by combining its in-house CAD capability with the PCB layout expertise of Calay Systems.

Meanwhile, Hewlett-Packard has decided to phase out development of the company's proprietary EDA software. Over the next two years, HP's Electronic Design Division (EDD) will make the transition away from its proprietary EDA software, but HP will continue to support the EDD products for five years thereafter.

DATAQUEST ANALYSIS

One of the clear implications arising from the merger and acquisition activity over the past few years is that the EDA market of the 1990s will be quite different from that of the 1980s. Success in the early 1990s demands that vendors provide open systems and support standards. The myriad of standards that vendors will be forced to support continued to grow in 1989, with VHDL topping the list.

Synopsys' acquisition clearly is part of the company's strategy to establish a strong foothold in the emerging VHDL-based top-down design market. Indeed, Dataquest believes that the acquisition marks a turning point in Synopsys' evolution where "Synopsys the synthesis company" is now "Synopsys the CAE company." Synopsys, which specializes in logic synthesis tools, experienced tremendous growth in 1989, with company revenue reaching approximately $10 million. The company expects to record revenue of between $20 million and $30 million in 1990. Although not immediately imminent, the company is likely to attempt further expansion into the broader EDA market if it successfully penetrates the simulation market.

Synopsys maintains that the company's commitment to being an integratable technology with a range of CAE vendors will not be adversely impacted by this deal. Zycad assessed its stance vis-à-vis the sale as a move that will allow the company to concentrate on its core hardware accelerator business. Also, the financial compensation received for the business presumably represents a welcome infusion of cash.

Meanwhile in West Germany, Siemens apparently took aim at the US-dominated EDA industry. According to Dataquest's market share estimates, Calay Systems' PCB layout software revenue of $14.2 million in 1989 made it the seventh largest company in its field, with its competition coming from such major EDA vendors as Mentor Graphics, Racal-Redac, and Valid Logic. If Siemens plans to set itself up as a major European full-line EDA supplier, it faces several major challenges, including the development of framework technology, further expansion of its product portfolio, and establishment of a robust EDA distribution channel. It also must position itself more aggressively as an EDA supplier in the marketplace.

©1990 Dataquest Incorporated September–Reproduction Prohibited
CCIS Electronic Newsletters 1990-5

0008084

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by DATAQUEST may be clients of this and/or other DATAQUEST services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securites. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

HP rationalized its move by citing the momentum of the open systems movement in the industry, as well as the company's belief that this decision will allow it to focus on its workstation and mechanical CAD businesses. Dataquest believes that the company questioned a strategy of continuing to commit the substantial R&D resources needed to maintain a competitive and viable product in the EDA marketplace. In 1987, 1988, and 1989, HP's EDA software revenue remained constant at approximately $20 million, but its market share dropped from 2.6 percent to 1.8 percent during this time period. Furthermore, the company may have recognized an inherent conflict between its workstation business and its tools business. The company's orderly retreat from the EDA application software market provides its strong Japanese client base (approximately 1,000 licenses) with adequate notice to migrate smoothly from HP's EDA products to those of other vendors. It appears unlikely at this point that HP would sell the EDD unit to another EDA vendor.

TABLE 1
EDA Industry Concentration

Year	Market Share
1986	50.0 percent
1987	50.0 percent
1988	55.2 percent
1989	60.9 percent

Source: Dataquest (September 1990)

DATAQUEST CONCLUSIONS

Dataquest believes that the recent events in the EDA industry exemplify the continuing turmoil and volatility in the EDA industry. Table 1 shows the market share captured by the top ten EDA vendors over the past four years.

The consolidation and shakeout that has been occurring this year is likely to further increase the industry's concentration.

Ron Collett
Patricia Galligan

©1990 Dataquest Incorporated September--Reproduction Prohibited
CCIS Electronic Newsletters 1990-5

Dataquest
a company of The Dun & Bradstreet Corporation

Research Newsletter

SUBMICRON PROCESS GEOMETRIES POSE NEW CHALLENGES FOR EDA VENDORS

SUMMARY

For electronic design automation (EDA) tool vendors, providing a full range of ASIC design kits is a key element to winning in the electronic systems design marketplace. It is a competitive weapon. The more ASIC libraries that an EDA vendor supports, the greater the choice of ASIC foundries the EDA vendor can offer its customer base. Indeed, ASIC libraries often are a critical benchmark used by the market when comparing EDA vendors. But as process geometries routinely fall below 1 micron, the support issues become more challenging for both EDA and ASIC vendors. Remaining competitive in the ASIC design market demands that EDA suppliers provide highly accurate models in their submicron ASIC design kits. This newsletter explores the following:

- The number of ASIC libraries supported by EDA vendors
- Third-party ASIC vendor library support
- The impact of submicron process geometries on EDA vendors
- The challenges facing EDA vendors in the ASIC library wars

ASIC DESIGN KIT WARS

Tables 1 and 2 provide a snapshot of the current ASIC library wars. Table 1 summarizes the number of ASIC libraries available to customers that use the EDA tools from these companies.

Table 2 lists the ASIC vendors with libraries supported on EDA tools from Cadence, Dazix, Mentor Graphics, Racal-Redac, Synopsys, Valid Logic, and Viewlogic.

Since the beginning of the ASIC revolution in the early 1980s, much of the success of the leading CAE vendors can be attributed to providing tool suites that support ASIC design for a myriad of ASIC foundries. In fact, this support was the primary force behind the rapid growth of Dazix, Mentor, and Valid in their early days. The EDA systems from these companies became the de facto standards for ASIC design, to the exclusion of most other competitors. Similarly, in the early days ASIC vendors recorded tremendous competitive advantage when they provided the customer with advanced EDA tools developed internally. However, over time, the market trends shifted in favor of standards, open systems, and nonproprietary tools.

The challenge for EDA vendors has always been to entice ASIC manufacturers to support their

TABLE 1
Number of ASIC Libraries Supported

Company	Number of ASIC Libraries
Cadence*	76
Dazix	169
Mentor Graphics*	200
Racal-Redac	53
Synopsys*	53
Valid Logic Systems*	139
Viewlogic Systems	50

*A small fraction of the company's library count is designated as being under development and becoming available during 1990.
Notes: PLD devices not included in these data. Approximately 40 percent of Mentor's library count comprises libraries that the company classifies as "Others." These kits have not been formally submitted to Mentor.
Source: Company Literature, Dataquest (September 1990)

©1990 Dataquest Incorporated September–Reproduction Prohibited

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

TABLE 2
Third-Party ASIC Vendor Library Support

	Cadence*	Dazix	Mentor Graphics*	Racal-Redac	Synopsys*	Valid Logic*	Viewlogic
ABB Hafo		X					
AEG			X				
AMCC	X	X	X			X	
Atmel					X		
AT&T	X		X		X	X	X
Austria Mikro Systeme			X				
California Micro Devices			X				
Custom Silicon			X				
DOD MOSIS					X		
Ericsson Components		X					
ES2			X				
Exar			X				
Fujitsu	X	X	X	X	X	X	X
GigaBit Logic		X	X				
Goldstar		X	X				
Gould Semiconductor		X	X	X		X	X
Harris		X	X	X		X	
Hitachi	X	X	X	X	X	X	X
Honeywell		X					
Hughes			X				
Intel		X	X				
International Microcircuits		X	X				
LSI Logic	X	X	X	X	X	X	X
Marconi Electronic Devices		X	X				
Matra Harris		X	X			X	
Micro Linear		X					X
Mietec		X					
Mikron			X				
Mitsubishi	X	X	X		X	X	X
Motorola	X	X	X	X	X	X	
National Semiconductor	X	X	X	X	X	X	X
NCR	X	X	X	X	X	X	X

(Continued)

0008491

©1990 Datapro Information Incorporated September—Reproduction Prohibited
CCIS Electronic Newsletters 1990-7

TABLE 2 (Continued)
Third-Party ASIC Vendor Library Support

	Cadence*	Dazix	Mentor Graphics*	Racal-Redac	Synopsys*	Valid Logic*	Viewlogic
NEC	X	X	X	X	X	X	X
Oki Semiconductor	X	X	X	X	X	X	X
Panasonic		X	X				
Philips/Signetics			X	X	X	X	
Plessey		X	X			X	X
Qudos			X				
Raytheon Semiconductor			X				
Ricoh		X	X				
Rockwell			X				
Samsung		X	X		X		X
Sanyo		X					
Seiko Epson/SMOS	X	X			X	X	X
SGS-Thomson	X	X	X	X	X	X	X
Siemens	X	X	X		X	X	
Sierra Semiconductor		X	X				
Silicon Systems			X				
Sipex		X					
Sony		X	X				
Standard Microsystems (SMC)		X		X			X
Texas Instruments	X	X	X	X	X	X	
Toshiba	X	X	X	X	X	X	X
TriQuint Semiconductor		X	X				
United Microelectronics Corp.		X					
United Silicon Structures (US2)			X				
USC/Information Sciences Institute			X				
UTMC	X	X	X		X	X	
Vertex Semiconductors			X		X		
Vitesse	X	X	X		X	X	
VLSI Technology	X	X	X	X	X	X	X
VTC			X				

*A small fraction of the company's library count is designated as being under development and will become available during 1990.
Notes: PLD devices are not included in these data. Approximately 40 percent of Mentor's library count comprises libraries that the company classifies as "Others." These kits have not been formally submitted to Mentor.
Source: Company Literature, Dataquest (September 1990)

©1990 Dataquest Incorporated September—Reproduction Prohibited
CCIS Electronic Newsletter 1990-7

tools (e.g., porting the library to the EDA vendor's design entry system and simulator and updating the software when either the fabrication process changes or the EDA tools change). But ASIC manufacturers will support only those third-party EDA vendor tools that either have gained acceptance in the marketplace or show tremendous promise toward gaining such acceptance. In short, ASIC vendors view merchant EDA tools as vehicles for leveraging and selling their silicon to the marketplace. EDA vendors, on the other hand, view ASIC libraries as value-added technology for their EDA product line, to be used as leverage in the sale of their EDA tools. In the absence of ASIC vendor support, EDA vendors are forced to absorb the development and support costs associated with offering ASIC libraries.

Although developing ASIC design kits has not required much technological innovation, it nonetheless demands attention to detail and continuous maintenance by trained engineers. Thus, for both EDA tool suppliers and ASIC vendors, the issue over whether or not to support each other's tools and processes, respectively, depends on the development and support costs versus the return on investment. In the past, the data needed to develop an ASIC library have been modest. Moreover, third-party models have not had to match the ASIC's characteristics perfectly because enough margin existed within the ASIC's timing performance to rely on good approximations of parameters. For example, piecewise linear modeling could be used to approximate the timing delays across a broad fanout range. (Of course, the ASIC foundry's internal verification tools and models, which are used to simulate a design just prior to layout, exactly match the characteristics of the devices produced by the fabrication process.)

Yet as fabrication process geometries shrink to the submicron range, what once were insignificant delays that could be ignored by third-party models become critical. Examples of parameters that potentially have a far greater impact on the design of submicron ASICs include fanout loading, slew rate, and pin-to-pin interconnect delays. In order for designers to be able to rely on ASIC design kits, the models must closely mimic characteristics of the electronic devices being produced by the fabrication process.

DATAQUEST CONCLUSIONS

Dataquest believes that a major challenge for EDA vendors over the next two years will be to provide simulation and modeling technology that enables ASIC manufacturers to easily incorporate process-specific information into the simulation models. EDA vendors also must be mindful of the fact that although ASIC vendors will clearly gravitate toward supporting the most popular third-party EDA systems, they also will favor porting their libraries first to those popular EDA systems that require the least effort. For EDA vendors, being among the first to offer a particular ASIC library can yield a significant competitive edge.

ASIC vendors that market proprietary tool sets may be tempted to delay offering updated simulation models to third-party EDA suppliers in an effort to promote their own tool sales. However, such a strategy would be shortsighted. Dataquest believes that, in the long term, it would behoove ASIC vendors to support third-party EDA suppliers with updated libraries as soon as they become available. As ASIC densities increase, the ability of ASIC vendors to develop and support leading-edge tools becomes increasingly difficult. Instead of devoting massive resources to such development in the face of focused third-party EDA suppliers, ASIC vendors are likely to realize greater success if they concentrate on more specialized software tools that continue to provide value-added benefits that are unavailable through other sources.

Ron Collett
Patricia Galligan

©1990 Dataquest Incorporated September–Reproduction Prohibited
CCIS Electronic Newsletters 1990-7

Dataquest
a company of
The Dun & Bradstreet Corporation

Research Newsletter

PCB LAYOUT INDUSTRY BRACES FOR CONSOLIDATION

SUMMARY

Dataquest believes that the PCB layout industry is ripe for consolidation similar to that which has occurred in the IC CAD industry over the past seven years. Indeed, it has already begun, as evidenced by the consolidation of ASI, Cadnetix, Calay, Daisy Systems (with perhaps Intergraph), as well as Hewlett-Packard's recently announced exit from the business. In short, the PCB layout industry is highly fragmented, with the top 12 vendors sharing 71.9 percent of the 1989 market. Moreover, there are over 50 vendors competing in a software market that totaled $313 million in 1989.

In addition to the impending consolidation, there are a range of emerging market trends that will significantly impact the industry. Suppliers able to adapt to the changing market conditions will be able to weather the impending consolidation and turmoil. Those unable to do so will be forced to merge with, or get acquired by, competitors or exit the business altogether.

This newsletter includes the following:

- PCB layout market statistics and analysis
- PCB layout market trends and issues
- Signal integrity EDA tool market analysis
- New battlegrounds in the PCB layout industry

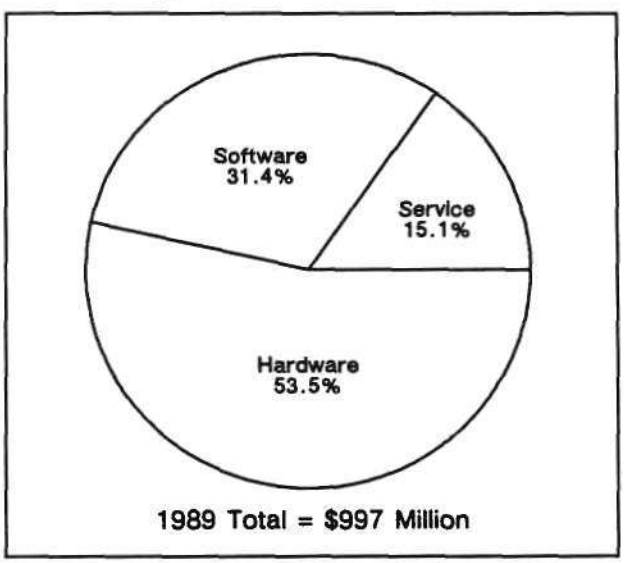
MARKET STATISTICS AND ANALYSIS

In 1989, the total PCB layout market was $997 million. This figure includes computer hardware (and peripherals when sold as part of a turnkey system), software, and maintenance revenue. Figure 1 shows the relative percentages. Figure 2 shows the PCB layout market sizes among the various geographical regions.

The worldwide PCB layout software market grew by only 2.6 percent in 1989. Dataquest's research indicates that the following reasons were behind this lackluster growth:

- Dazix's total PCB layout software revenue fell 59 percent between 1988 and 1989; Dazix's software revenue dropped 32 percent.
- Large segments of the market indicated that existing PCB layout tools did not need to be replaced.
- High switching costs associated with replacing Dazix systems made it difficult for PCB layout competitors to encroach upon the Dazix installed base.

FIGURE 1
1989 PCB Layout Market Size, by Segment

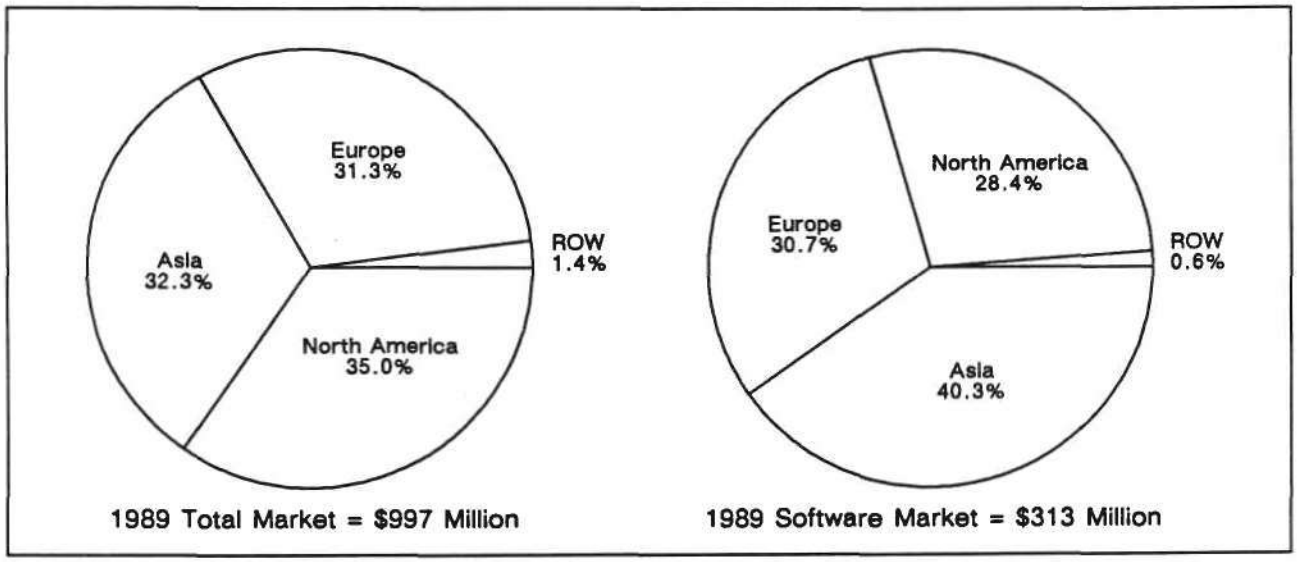


Source: Dataquest (December 1990)

©1990 Dataquest Incorporated December–Reproduction Prohibited
CCIS EDA Newsletters 1990-9
0009132

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

FIGURE 2
1989 PCB Layout Market Size, by Geographic Region



Source: Dataquest (December 1990)

- Dataquest's market research showed that users of the Cadnetix products were the most satisfied among all users of merchant PCB layout software in the market, thus making replacement even more difficult for competitors.
- Many users of PC-based PCB layout systems did not believe that the dramatic cost difference between PC-based systems and the "high-end" workstation-based PCB layout systems could be justified and thus did not replace their existing products.

Worldwide

Racal-Redac remained the market leader in the PCB layout sector with software revenue of $51 million and 15.9 percent of the worldwide market, up from 13.9 percent. Mentor Graphics captured the number two slot with its PCB layout software revenue reaching $42.3 million, giving the company 13.2 percent market share. This figure too was up from 1988, when the company had 9.3 percent market share. Zuken was the number three player with 8.9 percent market share, up from 1988 when it had 6.1 percent market share. Valid picked up significant ground in 1989, boosting its market share from 2.5 percent to 6.3 percent. This performance made Valid the fourth largest supplier of PCB layout software.

Asia

Figure 2 illustrates that Asia, accounting for 40.3 percent of the worldwide PCB layout software market, was the largest consumer of PCB layout tools in 1989. Indeed, the Asian market grew by 22.3 percent in 1989, from $103 million in 1988 to $126 million. This growth coincides with the region's dominance in consumer electronics goods. Such products have relatively short life cycles and require continuous replacement with newer, enhanced models. They also demand a great deal of up-front attention to layout and other manufacturability issues in light of the large manufacturing quantities involved. A constant demand for new and reliable PCB designs therefore exists.

Zuken, which has focused on developing PCB layout products for the analog PCB layout market, captured 23.1 percent of the software market in 1989. Racal-Redac, which has built a solid distribution channel in the Asian market, was the number two player with 10.3 percent market share. Both companies have been focusing primarily on the Japanese market, but each has begun to aggressively expand into other parts of Asia. Table 1 breaks down the 1989 Asian PCB layout market share.

Europe

Europe accounted for 30.7 percent of the PCB layout software market, a market that is being fueled by the region's strong telecommunications, consumer products, automotive, and industrial electronics industries. Although these industries remain

©1990 Dataquest Incorporated December–Reproduction Prohibited
CCIS EDA Newsletters 1990-9

TABLE 1
1989 Asian PCB Layout Market Share

Company	Software (%)	Hardware (%)	Total* (%)
Zuken	23.1	12.1	16.2
Racal-Redac	10.3	3.6	6.3
Dazix	7.8	2.8	4.8
Sharp	7.7	5.4	6.4
Fujitsu	6.2	8.6	7.6
Cadix	6.1	3.7	4.7
Valid Logic	5.5	1.5	3.1
Others	33.3	62.3	50.9
Total	100.0	100.0	100.0

Note: All figures based on revenue share.
*Total includes software, hardware, and maintenance revenue.
Source: Dataquest (December 1990)

relatively healthy, total PCB layout software sales fell by 3 percent in 1989 to $96 million.

Racal-Redac dominated the European market in 1989, capturing 28.5 percent of the market. The next closest competitor was Mentor Graphics, with 13.5 percent market share. Despite Racal-Redac's commanding position in 1989, throughout 1990 the company has been feeling significant pressure from competitors such as Mentor Graphics. Dataquest expects the competitive pressures to intensify in 1991, as most of the major EDA vendors and PCB layout suppliers have set their sights on the European market. Table 2 shows the European PCB layout market share breakdown.

North America

The North American market accounted for 28.4 percent of the worldwide PCB layout software market. Certain PCB layout markets, such as the workstation and personal computer industries, remain strong. But others, such as the defense,

TABLE 2
1989 European PCB Layout Market Share

Company	Software (%)	Hardware (%)	Total* (%)
Racal-Redac	28.5	0	11.6
Mentor Graphics	13.5	4.6	8.7
Calay	6.3	2.6	3.9
Cadam	5.5	0	2.0
Computervision	5.0	6.3	6.7
Valid	4.3	1.4	2.5
Scientific Calculations	4.1	1.2	2.6
Dazix	4.1	2.1	3.2
Others	28.7	81.8	58.8
Total	100.0	100.0	100.0

Note: All figures based on revenue share.
*Total includes hardware, software, and maintenance.
Source: Dataquest (December 1990)

©1990 Dataquest Incorporated December–Reproduction Prohibited

consumer electronics, and service bureau industries, remain soft. As a result, the North American PCB layout software market contracted by 10.9 percent in 1989, falling to $89 million. The slowdown was also due in large part to Dazix's tailspin.

Mentor Graphics was the dominant player in the PCB layout software market in 1989, capturing 26.1 percent market share. Valid Logic was the next closest player with 9.8 percent. Table 3 shows the 1989 North American market share breakdown.

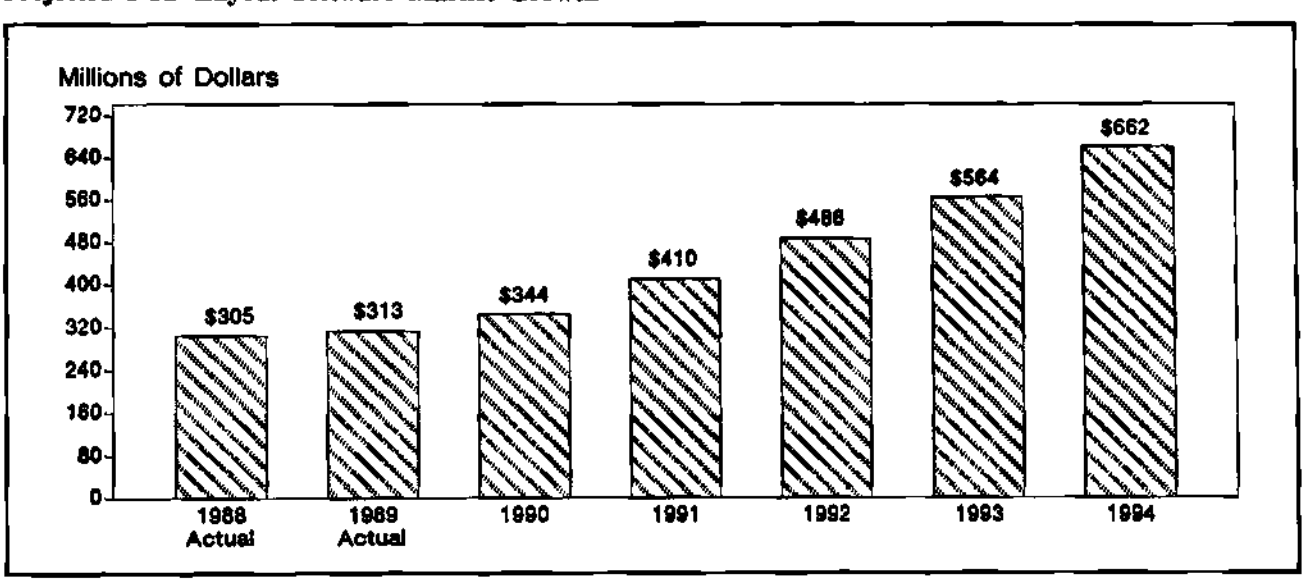
Despite the softness of the PCB layout software market in 1989, Dataquest expects the market to experience fairly healthy growth over the next five years. Figure 3 shows that PCB layout software market is expected to grow at a compound annual growth (CAGR) of 16 percent between 1989 and 1994.

TABLE 3
1989 North American PCB Layout Market Share

Company	Software (%)	Hardware (%)	Total* (%)
Mentor Graphics	26.1	7.9	13.4
Valid Logic	9.8	1.8	4.2
Racal-Redac	8.4	0.1	2.4
Intergraph	7.0	8.5	9.2
Calay	6.5	1.0	2.2
Scientific Calculations	5.8	1.0	2.6
Hewlett-Packard	4.9	17.1	13.7
Others	31.5	62.6	52.3
Total	100.0	100.0	100.0

Note: All figures based on revenue share.
*Total includes hardware, software, and maintenance revenue.
Source: Dataquest (December 1990)

FIGURE 3
Projected PCB Layout Software Market Growth



Source: Dataquest (December 1990)

©1990 Dataquest Incorporated December-Reproduction Prohibited
CCIS EDA Newsletters 1990-9

MARKET FORCES DRIVING PCB LAYOUT GROWTH

Dataquest research indicates that the following forces will help fuel growth in the CAE market over the next five years:

- Increasing industry consolidation will lend stability to the market and provide a more healthy purchasing climate.
- Major EDA vendors are strengthening their PCB layout product lines and international distribution channels (e.g., Mentor, Racal-Redac, Valid, Zuken, Cadence, Intergraph, Scientific Calculations).
- A significant number of last-generation PCB layout systems are due to be retired over the next two years.
- Large segments of the market are retiring PCB layout systems that are not tightly integrated with their CAE tools, and these systems are being replaced with those that provide tight integration.
- New packaging technologies such as multichip modules will find increasing usage over the next five years, and these multichip modules (MCMs) will demand new layout tools.
- Surface mount devices will continue to displace through-hole packages (e.g., in 1989, 79 percent of all packages were DIP; in 1990 this figure dropped to 68 percent).
- Higher system clock frequencies are demanding PCB layout systems that ensure signal integrity is not compromised.
- An increasing number of electronic system manufacturers are bringing layout in-house to gain greater control over the design cycle.
- Users of DOS-based PCB layout systems will be looking to replace these systems with UNIX-based products.

ADVANCED PACKAGING TECHNOLOGY PUTS NEW PRESSURE ON PCB LAYOUT SYSTEMS

Advances in component and device packaging, as for example surface mount technology and more recently MCMs, are giving rise to higher-density PCBs. For example, it is becoming increasingly common to find 8-plus layer, double-sided boards containing components with 256 pins and 5-mil. line widths. The closer proximity of devices on the boards leads to the imposition of more stringent component placement rules in order to minimize the electrical and magnetic interaction between components.

Dataquest's research indicates that an increasing number of electronics manufacturers believe that such placement is best carried out by the design engineer in the CAE environment. Thus, design teams are anxious to equip their logic designers with CAE systems that enable users to perform a preplacement of the board. However, Dataquest's research shows that many of the existing systems offering this capability are difficult to use, and logic designers are submitting incorrectly preplaced boards that must be completely reworked by the layout designer.

In order for the market to adopt this new level of integration, EDA suppliers must provide systems that are easy to use and do not require the logic designer to become an expert in board placement. Most of the current generation of systems do not appear to satisfy this requirement.

The increasing interest in packaging at the enclosure level has led to the formation of a new EDA market: electronic packaging. These electromechanical applications are today used primarily by aerospace and consumer electronics manufacturers to facilitate the design of the enclosure (e.g., a missile nose cone or an injection-molded telephone handset) concurrently with the PCB outline shape. Clearly, the board must be designed to fit the space available (or vice versa), taking into consideration the board outline and three-dimensional component shapes. Because constant trade-offs must be made among the enclosure's shape, the PCB outline, and component positions, greater efficiency is achieved when PCB layout is carried out in-house.

Although some vendors such as Mentor Graphics, Intergraph, Computervision, and IBM are offering self-contained packaging stations, others such as Valid Logic and Racal-Redac remain focused on the layout applications and, thus, have formed strategic partnerships with mechanical CAD vendors. Dataquest expects most EDA companies choosing to not develop packaging tools to strike strategic partnerships with mechanical CAD vendors.

HIGHER-SYSTEM CLOCK FREQUENCIES SPUR SIGNAL INTEGRITY TOOL MARKETS

When the wavelength of an electrical signal on a PCB approaches the length of the metal trace,

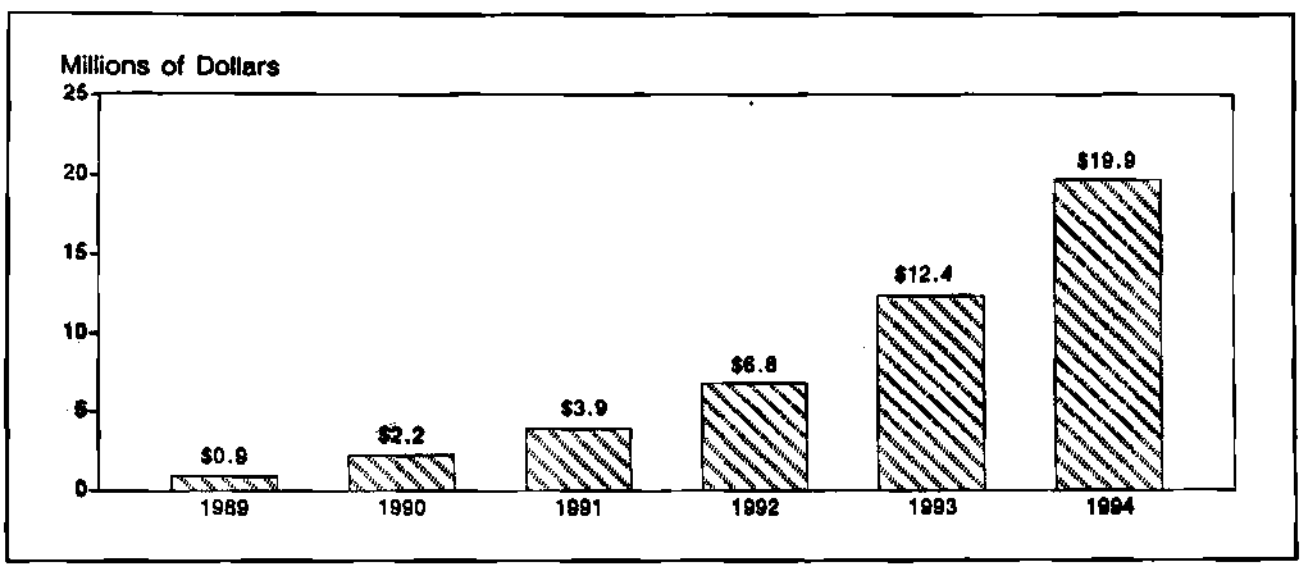
©1990 Dataquest Incorporated December–Reproduction Prohibited

the circuit behaves as an electrical transmission line and thus distorts the signal (e.g., causing reflection and degradation). In addition, when these higher frequencies are considered in combination with the reduced trace-to-trace spacing (implicit in the higher-board densities discussed earlier), the effects of crosstalk between traces will also negatively impact reliable circuit operation. It follows that there will be a significant demand for transmission line simulation and crosstalk analysis tools over the next five years. Figures 4 and 5 illustrate the projected growth of these markets.

A number of vendors are addressing this market, including market leader Quantic Laboratories, Quad Design Technology, Swift Logic, Contec, Dazix, Meta-Software, and several PC-based software vendors. Some of the large full-line EDA suppliers will provide this kind of technology to customers either by striking partnerships with any number of these niche suppliers, developing the technology internally, or acquiring the technology outright.

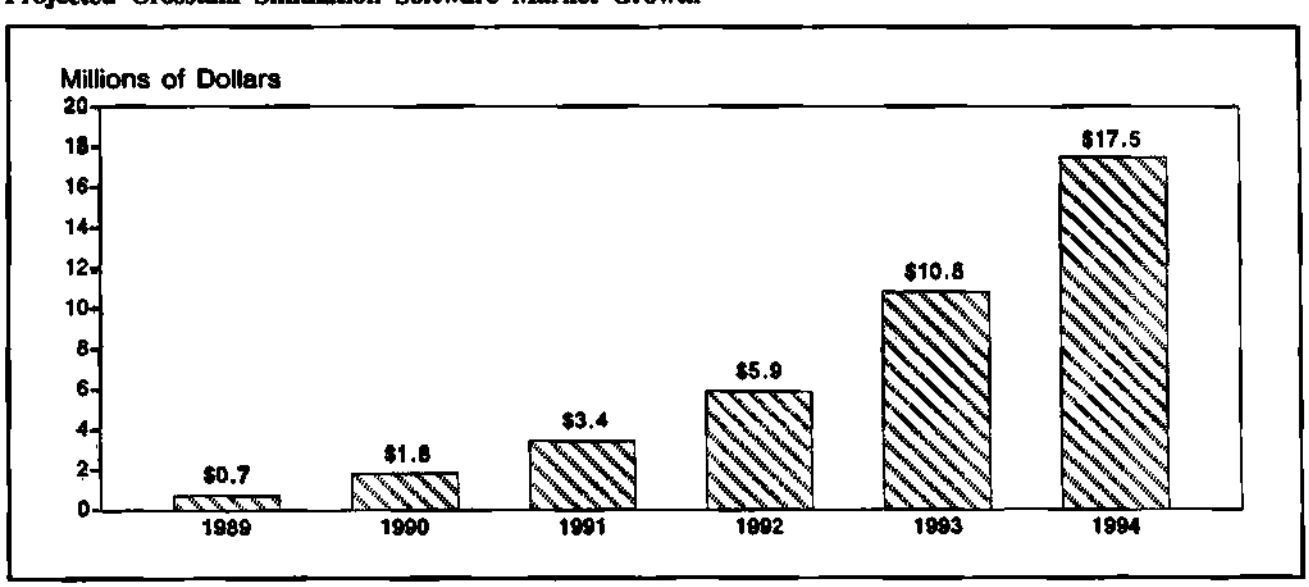
Dataquest's research indicates that few digital design engineers are familiar with transmission line

FIGURE 4
Projected Transmission Line Simulation Software Market Growth



Source: Dataquest (December 1990)

FIGURE 5
Projected Crosstalk Simulation Software Market Growth



Source: Dataquest (December 1990)

©1990 Dataquest Incorporated December–Reproduction Prohibited
CCIS EDA Newsletter 1990-9

equations and their associated parameters. Thus, success in this market will require that the tools be very easy to use. In short, the tools must "speak" the engineers' language.

THE EMERGING BATTLEGROUND IN THE PCB LAYOUT MARKET

It is clear that PCB layout manufacturers will continue to compete by improving their systems' functional capabilities, as well as by improving placement and routing performance (e.g., improving algorithms and databases, and making better use of the base compute platform). Manufacturers will also compete by providing improved integration between the design environment and the layout environment. Indeed, this has been under way for at least the past eighteen months.

But PCB layout suppliers will also have to aggressively tighten the links among layout and manufacturing. Dataquest's research indicates that many large electronics manufacturers have antiquated links among engineering, layout, manufacturing, and sales organizations. Integration includes the links with photoplotters, NC drillers, NC routers/profilers, manual assembly systems, automatic assembly machines (e.g., pick-and-place, dip inserters, axial inserters, radial inserters, and semiautomatic light-guided assembly stations), bill of material (BOM) databases, engineering charge orders (ECO) databases, automatic test equipment (ATE) systems, order entry databases, and purchasing departments.

Dataquest believes that integration among engineering, layout, manufacturing, and sales will grow in importance throughout this decade as electronics manufacturers face increasing competition in the electronics market. Tool suppliers that are able to reduce these bottlenecks (at a minimum cost) through a combination of products and services will gain significant credibility in the eyes of the market. We believe that this credibility will in turn produce increased product sales.

DATAQUEST PERSPECTIVE

The PCB layout industry is among the oldest of the EDA industries. In the 1970s, it was consolidated, with only a few major players supplying the market. In the 1980s, many new players entered the market, and the industry fragmented. Dataquest believes that the industry will undergo a severe consolidation period over the next five to seven years. We anticipate a significant number of mergers and acquisitions, with some suppliers being forced to exit the business altogether.

Ron Collett
Jim Tully

©1990 Dataquest Incorporated December–Reproduction Prohibited

Dataquest
a company of The Dun & Bradstreet Corporation

Research Newsletter

STATE OF THE EDA INDUSTRY: AN UPDATE

SUMMARY

The turmoil that has become the earmark of the EDA industry through the mid-1980s continued unabated through 1989 and 1990: more mergers and acquisitions, new players displacing onetime industry leaders, new standards emerging, the accelerating trend toward open systems, and changes in market conditions that demand revamped business models and strategies. This newsletter discusses and analyzes the following topics:

- EDA market growth in 1989
- EDA market share leaders
- EDA trends and future directions
- EDA industry structural changes
- EDA market opportunities

EDA MARKET GROWTH AND ANALYSIS

Worldwide EDA Market Growth—1989

The total EDA market grew by 12.6 percent, reaching $2.90 billion. This figure includes hardware (including peripherals when shipped as a turnkey system), software, and service for the CAE, PCB layout, and IC layout markets. The EDA software market expanded by 14.4 percent, equating to $1.06 billion. The following summarizes the 1989 growth of the individual markets making up EDA:

- The CAE market grew to $1.53 billion, which represented an increase of 21.3 percent over 1988. The software component of the CAE market reached $576 million, a 28.0 percent increase over 1988.
- The PCB layout market grew by 4.3 percent to $997 million. The software component of the PCB layout market reached $313 million, which was a 2.6 percent increase over 1988.
- The IC layout market grew to $381 million, representing a 5.0 percent increase over 1988. The software component of the IC layout market grew by 5.6 percent to $171 million.

The overall EDA market grew slightly less than Dataquest forecast in 1988. (We forecasted that the market would grow by 16.6 percent.) We believe that the slower than expected growth was due to the following factors:

- Dazix revenue dropped by approximately $40 million in 1989.
- EDA vendors were unable to fill the void left by Dazix, which was a result of the enormously high switching costs associated with exchanging Dazix tools with another vendor's products.
- The market had major concerns about the stability of other EDA companies in light of the Daisy/Cadnetix merger.
- There was a tremendous amount of confusion in the market regarding which EDA products and companies are providing the best technology—all companies positioned their products as the best available, and it is difficult for the market to separate the "wheat from the chaff."

The result of all this was that many segments of the EDA market adopted a "wait and see" attitude when it came to purchasing EDA products.

North American EDA Market Growth—1989

The North American EDA market grew by 13.1 percent, reaching $1.25 billion. This figure comprises hardware (including peripherals when

©1990 Dataquest Incorporated November–Reproduction Prohibited
0009026
CCIS Electronic Newsletters 1990-8

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

shipped as a turnkey system), software, and service for the CAE, PCB layout, and IC layout markets. The North American EDA software market expanded by 15.4 percent, equating to $456 million. The following summarizes the 1989 growth of the individual North American markets making up EDA:

- The CAE market grew to $722 million, representing an increase of 9.5 percent over 1988. The CAE software market reached $294 million, a 29.5 percent increase over 1988.
- The PCB layout market grew by 3.9 percent to $349 billion. The PCB layout software market fell to $89 million, a 13.5 percent decrease from 1988.
- The IC layout market grew to $177 million, which was a 17.2 percent increase over 1988. The IC layout software market grew by 7.5 percent to $72 million.

Dataquest believes that the following factors contributed to the growth of the North American EDA market:

- The market participants began taking a strategic view toward EDA and, thus, believe that remaining competitive in the 1990s clearly demands a significant investment in EDA technology. Fewer and fewer electronics manufacturers are questioning the necessity of sophisticated EDA tools.
- Buying was conservative in the defense industry.
- CAE software tools experienced tremendous growth because they are viewed as productivity accelerators (e.g., design entry, simulation, and logic synthesis).
- Slow growth occurred in PCB layout software because of existing tools that did not yet require replacement and the decline of Dazix's PCB layout business—the company's PCB layout revenue dropped by 50 percent in 1989.
- Slow growth occurred in IC layout software as a result of most suppliers' inability to execute their strategies and provide the right set of products to the market.

Asian EDA Market Growth—1989

The Asian EDA market grew by 17.9 percent, reaching $796 million. This figure includes hardware (when shipped as a turnkey system), software, and service for the CAE, PCB layout, and IC layout markets. The Asian EDA software market expanded by 32.0 percent, equating to $338 million. (Note: This does not include the 7.0 percent depreciation of the Japanese yen.) The following summarizes the 1989 growth of the individual Asian markets making up EDA:

- The CAE market grew to $338 million, which represented an increase of 39.7 percent over 1988. The CAE software market reached $141 million, which was a 54.9 percent increase over 1988.
- The total PCB layout market grew by 4.5 percent to $323 million. The PCB layout software market reached $126 million, for a 22.3 percent increase over 1988.
- The IC layout market grew to $136 million, representing an 8.8 percent increase over 1988. The IC layout software market grew by 14.5 percent to $71 million.

The following factors contributed to the strong growth in the Asian EDA market:

- The Asian market views merchant EDA tools as indispensable. Large electronics manufacturers recognize that they cannot remain competitive without them.
- Major EDA vendors strengthened their Asian distribution channels.
- Mergers, acquisitions, and EDA vendor stability continue to concern the market. (In the presence of this uncertainty, higher growth can be expected.)
- Strong growth occurred in EDA hardware because the market is complementing its predominantly mainframe-based environments with distributed processing (i.e., workstations).
- Strong growth in CAE was the result of the robust interactive capabilities of merchant CAE software, as well as the increasing capabilities of merchant verification tools.
- Modest growth in PCB layout was caused by a combination of Dazix's instability and the overall fragmentation of the industry, but this was somewhat offset by Zuken's growth.
- Strong growth in IC layout resulted from the pent-up demand in the semiconductor industry and the consolidation and stability of the IC layout industry.

©1990 Dataquest Incorporated November–Reproduction Prohibited
CCIS Electronic Newsletters 1990-8

European EDA Market Growth—1989

The European EDA market grew by 6.7 percent, reaching $823 million. This figure includes hardware (including peripherals when shipped as a turnkey system), software, and service for the CAE, PCB layout, and IC layout markets. The European EDA software market expanded by less than 1.0 percent, equating to $261 million. (Note: This does not include the 8 percent depreciation of the European currencies.) The following summarizes the individual European markets making up EDA:

- The CAE market grew to $449 million, which represented an increase of 16.7 percent over 1988. The software component of the market reached $137 million, a 6.2 percent increase over 1988.
- The PCB layout market grew by 3.7 percent to $312 million. The software component of the PCB layout market fell to $96 million, a 3.0 percent decrease decline compared with 1988.
- The IC layout market fell to $62 million, which was a 27.9 percent decrease compared with 1988. The IC layout software market fell by 18.2 percent to $27 million.

The following factors contributed to the growth of the European EDA market:

- Vendors that were most successful in Europe established strong distribution channels in countries with the strongest EDA markets (e.g., Germany).
- Dazix's problems translated to a decline in the European CAE market.
- Europe's quest for share in the electronic systems markets (e.g., telecommunication, aerospace, and consumer electronics) produced demand for advanced PCB layout systems.
- Europe's semiconductor industry remains weak because of strong international competition, which produced limited demand for IC layout tools; also, neither Cadence nor Mentor was able to make any significant inroads into the IC layout market.

EDA MARKET SHARE SCORECARD

Worldwide 1989 EDA Software Market Share

Table 1 shows that the leading EDA software players in 1989 were Mentor Graphics, Cadence, Valid Logic, Dazix, and Racal-Redac. As noted earlier, the total market size reached $2.84 billion, whereas software sales accounted for $1.05 billion. The top five are profiled in subsequent paragraphs.

Mentor Graphics

Mentor Graphics remained the EDA industry's market share leader with 14.6 percent of the overall market and 19.6 percent of the software market. These shares compare with 12.6 percent and 14.8 percent, respectively, in 1988.

Although Mentor Graphics experienced a very strong growth period in 1989, the company has been immersed in challenges in 1990 that have

TABLE 1
1989 Worldwide EDA Market Share Scorecard

Company	Total Percentage[1]	Software Only Percentage[2]
Mentor Graphics[3]	14.6	19.6
Cadence Design Systems	4.7	11.0
Valid Logic Systems	6.1	9.5
Dazix	5.4	6.5
Racal-Redac	3.2	6.5
Others	66.0	46.9
Total	100.0	100.0

[1]Market share based on revenue from hardware, software, and maintenance
[2]Market share based on revenue from software only
[3]Includes market share of Silicon Compiler Systems
Source: Dataquest (November 1990)

©1990 Dataquest Incorporated November–Reproduction Prohibited

caused a slowdown in both revenue and earnings. These challenges include the following:

- Completion of Mentor's Falcon framework and the associated suite of EDA application software
- Absorbing Silicon Compiler Systems
- Porting Mentor's software to the Sun platform
- Attacking new markets such as CASE and electronic packaging

Mentor plans to begin shipping the production release of its Falcon framework and tools based on Falcon in the first quarter of 1991. Shipments of its software to the Sun platform are scheduled to begin in the second quarter of 1991.

Cadence Design Systems

Cadence became the second largest EDA software vendor in 1989, surpassing both Dazix and Valid Logic. Eighty to ninety percent of the company's revenue comes from sales into the ICDA market; the remaining revenue is from sales into the systems design market (i.e., ASIC and PCB design). Indeed, further penetrating the systems design market is Cadence's greatest challenge over the next three years. Most of the company's sales into this market thus far have come from the Verilog simulation product line, which was acquired via Cadence's acquisition of Gateway Design Automation in late 1989. Cadence clearly is aware that it must provide more than simulation products to be successful in the systems design market. Indeed, the company began shipping its more complete CAE solution, called Amadeus, at the end of the third quarter of 1990. We believe that the success of Amadeus is critical to the company's future.

Valid Logic Systems

Valid Logic made significant headway in 1989, increasing its revenue by approximately 23 percent. Valid's growth in 1989 can be attributed to the following:

- It was among the few full-line EDA suppliers shipping its products on the Sun platform (which has become the platform of choice over the last two years).
- Valid's PCB layout system—Allegro—experienced strong market acceptance, which also provided "pull-through" sales of CAE products.
- Valid's product line for high-speed design was among the most complete in the industry.
- Valid offers well over 100 ASIC design kits.

Similar to Mentor Graphics, Valid has slipped somewhat in 1990, reporting losses in the first and third quarters. Moreover, the company recently announced that it would exit the workstation hardware business. Valid joins an array of other EDA companies that have altered their business models to focus exclusively on software. Valid's major challenges over the next two years include the following:

- Provide a CAE solution that is competitive with those emerging from other EDA players, including Cadence, Mentor Graphics, Racal-Redac, Synopsys, and Viewlogic.
- Provide framework technology that allows users to integrate third-party tools easily and tightly into its environment.
- Demonstrate corporate and financial stability, as well as a competitive technology migration path, to the market.

Dazix

Dazix suffered such severe damage in 1989 that it was forced to declare bankruptcy in 1990. The company's problems stemmed from its merger with Cadnetix, which put the company into severe debt. The debt caused existing and potential customers to hold off on buying any significant quantities of products until the company demonstrated financial stability—an event that never occurred. The company's revenue fell from $208 million in 1988 (including Daisy Systems, Cadnetix, HHB Systems, and SimuCAD) to $153 million in 1990, and its market share dropped from 8.8 percent to 5.4 percent.

At this point, the issue for Dazix is whether or not the company can be successfully resurrected by its recent purchaser, Intergraph. Dataquest believes that Dazix has suffered such severe image damage that even if the company solves its financial problems, it will take at least a year or two for a reorganized Dazix to pose a competitive threat to other industry leaders. For Intergraph the challenges will be formidable. If Intergraph can successfully keep the Dazix installed base (approximately 10,000) from migrating away, Intergraph will pose a significant challenge to other major EDA players.

©1990 Dataquest Incorporated November–Reproduction Prohibited

Racal-Redac

Racal-Redac has demonstrated over the past 15 months that it is expanding beyond its traditional PCB layout roots into the fast-growing CAE market. During this time period, Racal-Redac has purchased HHB Systems, an independent supplier of simulation products, and Silc Technologies, a logic synthesis company.

The combination of CAE and PCB layout products positions the company directly against Cadence, Dazix, Mentor Graphics, and Valid Logic—all of which are attacking the same market. Racal-Redac's market share fell slightly in 1989, as the company's revenue (including HHB Systems) was comparable to its 1988 figures, whereas the overall market grew by more than 13 percent. Racal holds a strong position in both Europe and Japan, but in North American it significantly lags the competition. For the company to succeed, Dataquest believes that it must establish a greater position in the North American market.

Worldwide 1989 CAE Software Market Share

Table 2 provides a comparison between 1988 and 1989 percentages of the CAE software market share captured by the top five EDA vendors. A complete listing of all vendors can be found in the CAD/CAM Industry Service's *Electronic Design Automation Applications* binder.

Table 2 shows that Mentor Graphics remained the CAE software market share leader in 1989, although the company's share dips slightly when compared with 1988. Mentor's inability to gain market share is indicative of the inroads made by the following CAE tool suppliers:

- Cadence, which acquired Gateway Design Automation, experienced very strong growth at Mentor's expense; Gateway's success can be attributed to the widespread acceptance of its logic simulators and the accompanying Verilog hardware description language.
- Viewlogic, which increased its revenue by nearly 80 percent in 1988, derived its success from the user friendliness of its products, support of both the PC and workstation platforms, and the affordability of its software products.
- Synopsys, which increased its sales from less than $1 million in 1988 to approximately $10 million in 1989, experienced growth as a result of its strong synthesis products and the limited competition it faced in the marketplace.
- Valid Logic, which increased its CAE market share several percentage points in 1989, can attribute its success to the factors outlined in the previous discussion of the company.

As Table 2 indicates, both Racal-Redac and Dazix lost market share. Racal's drop was primarily due to the severe turmoil that its CAE division (formerly HHB Systems) experienced in 1989. HHB Systems was purchased by Dazix in 1988 (as part of Cadnetix) and then sold in May 1989 to Racal-Redac.

TABLE 2
Worldwide CAE Software Market Share Scorecard

Company	1988 Percentage	1989 Percentage
Mentor Graphics[1]	21.6	20.3
Valid Logic Systems	8.6	12.1
Dazix	11.4	9.3
Cadence Design Systems	3.4	6.8
Racal-Redac	4.0	3.1
Others	51.0	48.4
Total	100.0	100.0

Note: All percentages are based on revenue share.
[1]Does not include market share from Silicon Compiler Systems, which was approximately 1.7 percent in 1988 and 1989
Source: Dataquest (November 1990)

©1990 Dataquest Incorporated November–Reproduction Prohibited

Worldwide 1989 PCB Layout Software Market Share

Table 3 provides a comparison between 1988 and 1989 percentages of the PCB layout software market share captured by the top five EDA vendors. A complete listing of all vendors can be found in the CAD/CAM Industry Service's *Electronic Design Automation Applications* binder.

As Table 3 shows, Racal-Redac continued to occupy the top position in the PCB layout market in 1989, but the company's market share remained virtually flat. Meanwhile, Mentor, Zuken, and Valid each improved its market share. Dazix's PCB layout business, on the other hand, suffered as a result of the company's financial problems.

In order for Racal-Redac to maintain its leadership position, the company will have to gain a greater position in the North American market while preserving its existing customer base in Europe. In addition, now that all of the major PCB layout vendors, as well as Cadence, have set their sights on Europe, Racal-Redac will have to be more aggressive in its effort to capture new business in Europe. Racal-Redac holds a solid position in the Japanese market and, in fact, is establishing an R&D center in Japan.

Meanwhile, Zuken, which has sold its products almost exclusively in Japan and is the market share leader there, is preparing to move into both the North American and European markets, as well as to expand more aggressively into other parts of Asia. Zuken's strength derives from the fact that its products are tailored for analog PCB boards, which are used extensively in the consumer electronics market.

Both Valid and Mentor were able to increase their market shares by capitalizing on their full-line supplier status, the strength of their PCB layout tools, and the integration of their PCB layout systems with their CAE tools. Some of their gains came at the expense of Dazix, as both companies were able to penetrate accounts that formerly were the exclusive territory of Dazix (i.e., Cadnetix).

Worldwide 1989 IC Layout Software Market Share

Table 4 provides a comparison between 1988 and 1989 percentages of the IC layout software market share captured by the top five EDA vendors. A complete listing of all vendors can be found in the CAD/CAM Industry Service's *Electronic Design Automation Applications* binder.

Table 4 illustrates the firm grip that Cadence had on the IC layout market in 1989. The company's 44.2 percent market share in 1989 represents a 16.6 percent increase over 1988. Meanwhile, Mentor Graphics moved into the number two position in early 1990 via its purchase of Silicon Compiler Systems. The combined revenue of the two companies gave Mentor Graphics 23.0 percent of the 1989 market, which is a 1.0 percent increase over 1988 (consolidating the 1988 IC layout revenue of the two companies).

Both Seiko Instruments and Valid Logic picked up some ground in 1989, but each faces major challenges over the next few years. For example, Seiko is in the midst of sorting out its future relationship with Dazix. (Seiko is Dazix's distributor in Japan.) Seiko also faces stiff competition from both Cadence and Mentor, not only in

TABLE 3
1989 Worldwide PCB Layout Software Market Share Scorecard

Company	1988 Percentage	1989 Percentage
Racal-Redac	15.8	15.9
Mentor Graphics	8.3	13.2
Zuken	6.2	8.9
Valid Logic Systems	2.5	6.3
Dazix	7.6	4.9
Others	60.6	49.2
Total	100.0	100.0

Note: All percentages are based on revenue share.
Source: Dataquest (November 1990)

©1990 Dataquest Incorporated November–Reproduction Prohibited
CCIS Electronic Newsletters 1990-8

TABLE 4
Worldwide IC Layout Software Market Share Scorecard

Company	1988 Percentage	1989 Percentage
Cadence Design Systems	28.8	44.2
Silicon Compiler Systems	13.8	13.3
Seiko Instruments	10.0	11.1
Mentor Graphics	8.2	9.6
Valid Logic Systems	2.3	6.3
Others	36.9	15.5
Total	100.0	100.0

Note: All percentages are based on revenue share.
Source: Dataquest (November 1990)

Japan, but also in North America and Europe, as Seiko has yet to mount any significant effort to penetrate these markets.

Similarly, Valid's greatest challenge over the next few years will be to defend its installed base—most of which was acquired through Valid's acquisition of GE/Calma's IC layout business—against the attacks mounted by Cadence, Mentor, and Seiko. In an effort to create a more defensible position, Valid has been steadily introducing products aimed at demonstrating the company's commitment to the business, as well as providing technology that is competitive in the industry.

EDA TRENDS AND FUTURE DIRECTIONS

Forces Driving the CAE Market

Table 5 summarizes Dataquest's CAE market forecast for software, hardware, and service.

Forces driving the CAE market to purchase EDA products include the following:

- The need to reduce the number of design iterations and, hence, improve time to market
- The desire to improve design quality (i.e., performance, functionality, reliability)
- The desire to perform more architectural exploration
- The need to improve design productivity, so that more products can be offered to the market
- The need to enhance integration of design, layout, and manufacturing

Dataquest believes that the following CAE products, technologies, and factors will fuel CAE market growth:

- Faster and more accurate verification tools (simulation and timing)
- Improved logic synthesis
- More effective design entry systems
- Model development systems
- Test automation (i.e., test logic synthesis, ATVG, etc.)
- Concurrent engineering environments
- System-level design tools (e.g., those that enable h/w-s/w trade-off analysis, architectural analysis, etc.)
- Integration of computer-aided software engineering (CASE) with CAE
- Improved workstation performance

Forces Driving the PCB Layout Market

Table 6 summarizes the projected growth of the PCB layout market in terms of software, hardware, and service.

Forces driving the PCB layout market and the need for new layout systems include the following:

- New packaging technologies (e.g., SMDs, multichip modules, etc.)
- Higher system clock frequencies
- Tighter integration between design and layout

©1990 Dataquest Incorporated November–Reproduction Prohibited
CCIS Electronic Newsletters 1990-8

- Systems manufacturers bringing layout responsibilities in-house
- Advances in automatic placement and routing technology
- Increasing PCB complexity

Forces Driving the IC Layout Market

Table 7 summarizes the projected growth of the IC layout market in terms of software, hardware, and service.

Forces driving the IC layout market and the need for IC layout design tools include the following:

- Stability in the IC CAD industry (i.e., the industry becoming highly concentrated)
- Pent-up demand for next-generation IC design tools (e.g., module development tools, three-layer metal routers, layout synthesis, etc.)
- An increasing percentage of the ASIC design market performing back-end ASIC design (i.e., floorplanning, placement and routing, design verification, etc.)

TABLE 5
Projected CAE Market Growth (Millions of Dollars)

	1989	1990	1991	1992	1993	1994	CAGR (%) 1989-1994
Software	576	708	908	1,146	1,374	1,681	24
Hardware	727	833	947	1,057	1,165	1,295	12
Service	222	263	322	391	453	539	20
Total	1,525	1,802	2,177	2,594	2,992	3,515	18

Source: Dataquest (November 1990)

TABLE 6
Projected PCB Layout Market Growth (Millions of Dollars)

	1989	1990	1991	1992	1993	1994	CAGR (%) 1989-1994
Software	313	344	410	486	564	662	16
Hardware	533	601	651	734	828	934	12
Service	152	170	194	228	265	309	15
Total	998	1,115	1,255	1,448	1,657	1,905	14

Source: Dataquest (November 1990)

TABLE 7
Projected IC Layout Market Growth (Millions of Dollars)

	1989	1990	1991	1992	1993	1994	CAGR (%) 1989-1994
Software	171	225	290	354	425	521	25
Hardware	148	160	177	190	205	229	9
Service	62	75	90	105	122	146	19
Total	381	460	557	649	752	896	19

Source: Dataquest (November 1990)

©1990 Dataquest Incorporated November–Reproduction Prohibited
CCIS Electronic Newsletters 1990-8

IMPENDING STRUCTURAL CHANGES IN THE EDA INDUSTRY

Consolidation

Dataquest believes that the EDA industry will continue to undergo significant structural changes over the next five years. For example, consolidation, which has been a hallmark of the EDA industry for the last several years, will continue. Indeed, an average of nearly one merger or acquisition per month has occurred over the past four years. Table 8 illustrates the impact that these mergers and acquisitions have had on industry concentration.

From Table 8, it can also be seen that the EDA industry remains highly fragmented as the top ten companies have captured only 64 percent of the market in 1990. The result of such fragmentation is that the industry will continue to experience consolidation via mergers, acquisitions, and shakeout.

New Players Poised for Entry

Dataquest expects an increasing number of niche product suppliers to enter the market over the next few years. One reason will be the trend toward open systems and standards, both of which lower the barriers to entry. We also expect large systems manufacturers to begin commercializing in-house EDA tools. Indeed, this has already begun (e.g., Texas Instruments, NTT, Dassault Electronique, Siemens). We also expect an increasing number of niche suppliers to spin off from large EDA companies such as Cadence, Dazix, Mentor Graphics, Valid Logic, and Racal-Redac.

A Shift in Bargaining Power

Another significant structural change occurring in the EDA industry is the shift in bargaining power between EDA customers and EDA suppliers. In short, tools developed in-house are rapidly losing ground to commercial tools in terms of functionality, user interface capabilities, integration with other tools, and performance. This situation is the result of the huge research and development investments being made by merchant tool suppliers. Dataquest estimates that the combined R&D investment of merchant EDA companies in 1989 was approximately $300 million.

As a result of the improving capabilities of the merchant tools, the market has little choice but to purchase these commercial products. We believe that most large electronics manufacturers will continue to develop tools in-house, but the focus will be on developing tools and technologies unavailable on the open market.

TABLE 8
Market Share Captured by the Top Ten EDA Vendors—1986-1990

Year	Percentage
1986	50.0
1987	50.0
1988	55.2
1989	60.9
1990 (Estimated)	64.0

Source: Dataquest (November 1990)

Changing Distribution Channels

Dataquest believes that the distribution channels used by EDA companies, which were predominantly direct in the 1970s and 1980s, will include more use of the OEM channel. We believe that large EDA companies, as well as ASIC suppliers, will become OEM purchasers of niche products to help round out their product lines.

For OEM suppliers, including both large systems manufacturers and small niche product vendors, ASIC vendors, large EDA vendors provide a much-needed distribution channel. Indeed, this scenario has already begun to take place. For example, Racal-Redac Japan recently became an OEM purchaser of NTT's ADLINES transmission line simulator. Similarly, numerous OEM deals have been struck or are in the works between large EDA vendors and small niche suppliers.

EDA MARKET OPPORTUNITIES

Dataquest believes that a significant market opportunity exists for the following kinds of products and technologies:

- Tools supporting top-down design
  - HDL-based design entry systems
  - Model debugging tools
  - Mixed-level logic simulators
  - Logic synthesis systems

©1990 Dataquest Incorporated November–Reproduction Prohibited

  - Test logic synthesis products
  - Automatic test vector generation systems
- System-level EDA design tools
  - Tools enabling hardware/software trade-off analysis
  - Tools enabling full-system verification (e.g., of software development environments with EDA)
- Tools that facilitate design partitioning, such that the design team can optimally partition a design to meet such constraints as performance, size, cost, reliability, testability, and manufacturability
- Tools that enable implementation trade-off analyses, such that the design team can make the optimal selection of ASICs, field programmable gate arrays (FPGAs), and programmable logic devices (PLDs)
- Tools supporting analog design automation
- EDA products supporting the design of high-speed electronic systems such as transmission line simulators and static timing verifiers
- Tools supporting the design of digital signal processing systems

DATAQUEST PERSPECTIVE

Dataquest believes that if the 1980s can be thought of as the EDA industry's consolidation phase, the 1990s will be a period of shakeout with several major players exiting the business or scaling down operations. We believe that the EDA industry is maturing but is still far from complete maturity—plenty of growth remains. And finally, we anticipate that the rules that guided EDA suppliers in the 1980s will be dramatically different in the 1990s, which will mean that suppliers will be forced to adopt new business strategies.

Ron Collett

©1990 Dataquest Incorporated November–Reproduction Prohibited
CCIS Electronic Newsletters 1990-8

Dataquest
a company of
The Dun & Bradstreet Corporation

Research Newsletter

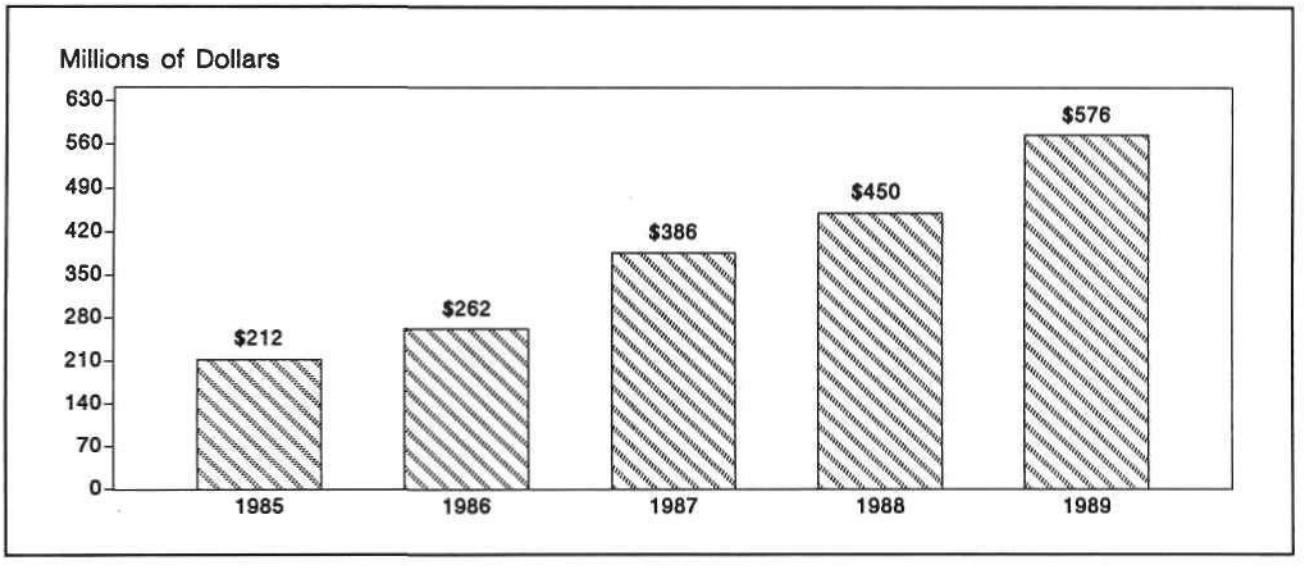
CAE: THE EDA MARKET OF GROWTH AND OPPORTUNITY IN THE 1990s

HISTORICAL GROWTH AND INSTALLED BASE

Of all of the markets comprising electronic design automation (EDA), the CAE segment has and continues to exhibit unabated vitality. Figure 1 illustrates the growth of the CAE software market from 1985 through 1989. During this period the market experienced a compound annual growth rate (CAGR) of 22 percent. Moreover, by the end of 1989 there were approximately 163,000 merchant CAE seats installed in the market. In North America, the installed base is approximately 83,000 seats; in Europe, it is approximately 49,000; and in Asia, it is about 28,000.

It is important to note that these penetration figures refer to CAE workstation penetration, not CAE software penetration. In fact, Dataquest believes that the high penetration in North America will help fuel CAE software market growth. Our conclusion is based on the fact that users of these merchant workstations wish to periodically equip their systems with new, more advanced CAE software, especially in light of the emerging framework standards that will facilitate integration. In short, the North American (and much of the European) *merchant* CAE market has been "developed" and conditioned over the past decade to use commercially available CAE tools. The situation contrasts sharply with the 1960s and 1970s, when most CAE tools in use in North America and Europe were either developed internally or time shared.

FIGURE 1
Historical Growth of the CAE Market



Source: Dataquest (December 1990)

©1990 Dataquest Incorporated December–Reproduction Prohibited
CCIS Electronic Newsletters 1990-10
0009133

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients. Individual companies reported on and analyzed by Dataquest may be clients of this and/or other Dataquest services. This information is not furnished in connection with a sale or offer to sell securities or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

MARKET PENETRATION

Dataquest research shows that market penetration of merchant CAE seats is approximately 65 percent in North America, approximately 38 percent in Europe, and approximately 12 percent in Asia. Clearly, an enormous opportunity exists in Asia, and a significant market opportunity remains in Europe. On the other hand, the remaining opportunity in North America will be costly to capture, as most merchant CAE vendors are based in North America and thus have established strong distribution channels, high brand recognition, and solid customer support infrastructures. This established presence by a myriad of suppliers will make the competition fierce.

HIGH-GROWTH MARKETS

Meanwhile, the high-growth markets in CAE include design capture, simulation, synthesis, and test automation. For example, Dataquest forecasts that the ASIC logic synthesis market will experience a CAGR of 68 percent between 1989 and 1994. In 1989, the market was approximately $13.5 million (including maintenance). We expect this figure to cross the $30.0 million mark in 1990.

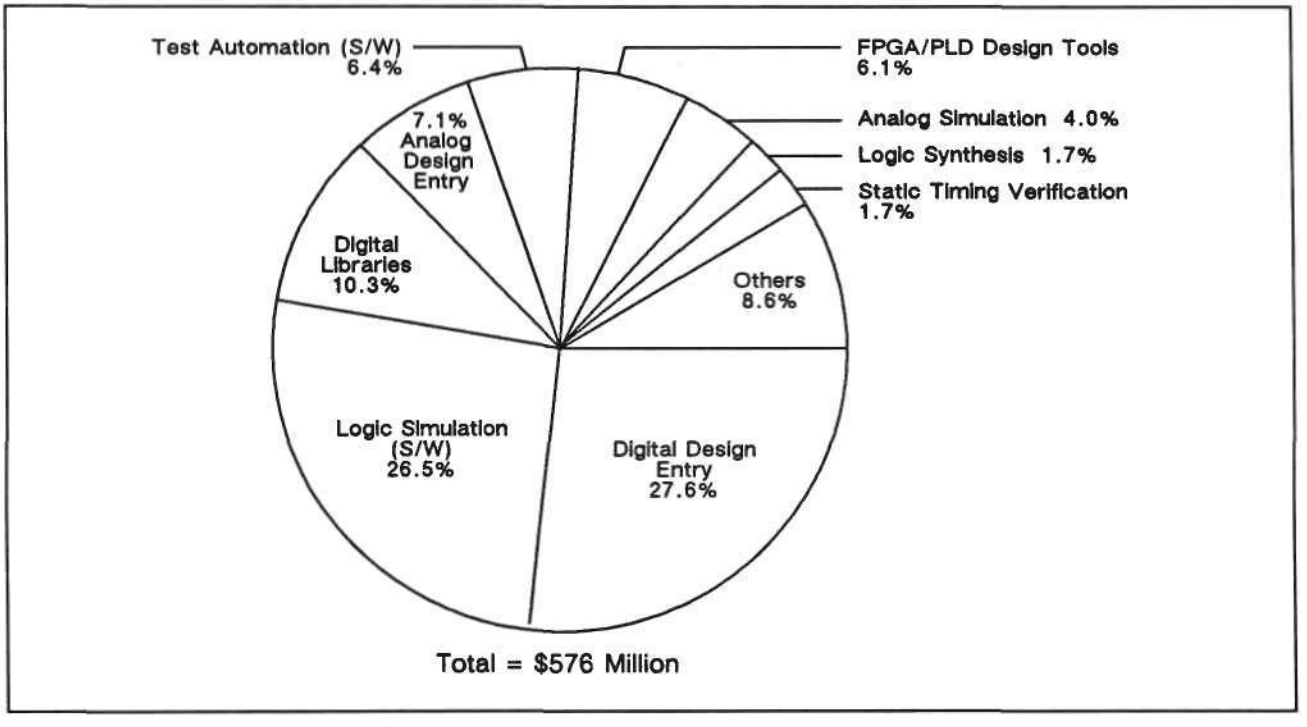
Similar growth can be seen in the HDL-based mixed-level logic simulation market, where the market was $29 million (including maintenance) in 1989. We anticipate that this market will reach approximately $50 million in 1990 and will exhibit a CAGR of 52 percent from 1989 through 1994. Other markets, such as test logic synthesis and automatic test vector generation (ATVG), will also experience very healthy growth over the forecast period.

CAE SUBMARKETS

Figure 2 shows the sizes of the various submarkets comprising the 1989 CAE software market. As the figure indicates, 64.4 percent of the market consists of digital design entry software, libraries, and logic simulation.

Figure 3 shows the split between CAE tools shipped into the ASIC design market and the PCB/System design market. Dataquest expects the PCB/System CAE market percentage to grow significantly over the forecast period, such that by 1995 its size will be within a few percentage points of the ASIC design CAE market.

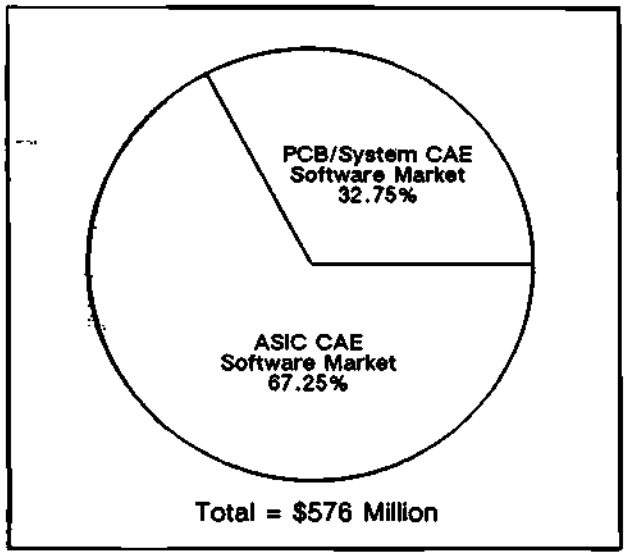
FIGURE 2
1989 Worldwide CAE Software Submarkets



Source: Dataquest (December 1990)

©1990 Dataquest Incorporated December–Reproduction Prohibited
CCIS Electronic Newsletters 1990-10

FIGURE 3
1989 Worldwide CAE Software Market, Distribution between ASIC Market and PCB/System



Source: Dataquest (December 1990)

DATAQUEST PERSPECTIVE

From the foregoing data it is clear that significant CAE market opportunities remain in Asia, Europe, and North America. Dataquest believes that much of the opportunity will be in the top-down design EDA market (for ASIC and system design). Yet success in this market can be elusive for suppliers neglecting a key market requirement: compatibility with existing CAE tools, databases, and environments. CAD managers abhor complex integration duties, and users are often suspicious of the effectiveness of integration once a data translation error occurs.

It is also clear that success in the CAE market in the 1990s will demand a balanced distribution of CAE revenue among the various worldwide geographical regions. A broad international presence lends credibility and stability to the CAE supplier in the customers' eyes. Finally, establishing a strong international presence enables the CAE supplier to penetrate the early adopter market more easily, wherever it exists.

Ron Collett

©1990 Dataquest Incorporated December–Reproduction Prohibited

Market Share

TABLE NUMBER: 1
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					---------- Market Share ----------			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	368.5	127.7	174.4	4,896	13.0%	9.6%	16.6%	5.9%
Hewlett-Packard	229.6	167.9	19.3	14,727	8.1%	12.6%	1.8%	17.7%
Digital	225.3	168.4	.0	1,920	7.9%	12.6%	.0%	2.3%
Sun	185.4	166.8	.0	14,061	6.5%	12.5%	.0%	16.9%
Valid	174.0	43.1	99.6	1,695	6.1%	3.2%	9.5%	2.0%
Dazix	153.7	57.1	68.5	1,476	5.4%	4.3%	6.5%	1.8%
Cadence	133.1	.0	115.0	0	4.7%	.0%	10.9%	.0%
Racal-Redac	93.3	9.8	70.5	377	3.3%	.7%	6.7%	.5%
Intergraph	89.6	46.8	15.8	940	3.2%	3.5%	1.5%	1.1%
Compaq	66.0	66.0	.0	11,004	2.3%	5.0%	.0%	13.2%
Computervision	62.9	26.2	19.2	468	2.2%	2.0%	1.8%	.6%
Zuken	62.6	23.6	34.5	380	2.2%	1.8%	3.3%	.5%
Fujitsu	62.4	39.4	15.7	1,397	2.2%	3.0%	1.5%	1.7%
NEC	55.7	38.2	13.0	3,039	2.0%	2.9%	1.2%	3.7%
IBM	50.3	34.7	7.9	1,925	1.8%	2.6%	.7%	2.3%
Silicon Compiler Systems	46.3	.0	31.0	0	1.6%	.0%	2.9%	.0%
Seiko Instruments--NO OEM	45.1	27.5	9.1	258	1.6%	2.1%	.9%	.3%
Zycad	31.5	22.1	.6	150	1.1%	1.7%	.1%	.2%
Scientific Calc.	26.0	5.8	13.2	120	.9%	.4%	1.3%	.1%
Calay	24.5	7.1	14.2	226	.9%	.5%	1.3%	.3%
VLSI Technology	21.3	1.3	16.8	70	.8%	.1%	1.6%	.1%
Wacom	20.9	9.0	9.8	558	.7%	.7%	.9%	.7%
Sharp	20.3	8.7	9.6	115	.7%	.7%	.9%	.1%
LSI Logic	20.0	2.0	15.0	75	.7%	.2%	1.4%	.1%
Teradyne	20.0	.0	16.1	0	.7%	.0%	1.5%	.0%
View Logic	18.3	.0	15.1	0	.6%	.0%	1.4%	.0%
EEsof	18.0	.2	16.2	5	.6%	.0%	1.5%	.0%
Autodesk	16.2	.0	16.2	0	.6%	.0%	1.5%	.0%
CADIX	15.1	6.1	7.6	105	.5%	.5%	.7%	.1%
Xilinx	15.0	.0	13.5	0	.5%	.0%	1.3%	.0%
Secmai	14.7	7.7	4.4	105	.5%	.6%	.4%	.1%
Apple Computer	14.6	12.8	.0	2,800	.5%	1.0%	.0%	3.4%
Data I/O	11.4	.0	9.7	0	.4%	.0%	.9%	.0%

(Continued)

©1990 Dataquest Incorporated August

Market Share

TABLE NUMBER: 1
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Ikos Systems	11.0	8.8	2.2	57	.4%	.7%	.2%	.1%
Silvar-Lisco	10.3	.0	6.7	0	.4%	.0%	.6%	.0%
Altera	9.0	.0	7.9	0	.3%	.0%	.8%	.0%
Hitachi	9.0	5.9	2.2	103	.3%	.4%	.2%	.1%
Synopsys	9.0	.0	7.7	0	.3%	.0%	.7%	.0%
Genrad	8.5	1.3	5.7	4	.3%	.1%	.5%	.0%
Uchida Yoko	8.4	4.2	3.4	132	.3%	.3%	.3%	.2%
CADAM	8.2	.0	7.3	3	.3%	.0%	.7%	.0%
Solbourne	8.2	7.2	.0	600	.3%	.5%	.0%	.7%
Orcad	8.1	.0	7.7	0	.3%	.0%	.7%	.0%
Toshiba--NO OEM	8.1	4.0	3.2	75	.3%	.3%	.3%	.1%
LPKF	7.5	4.5	2.3	750	.3%	.3%	.2%	.9%
European Silicon Systems	7.3	1.8	5.5	40	.3%	.1%	.5%	.0%
Logic Automation	7.2	.0	7.2	0	.3%	.0%	.7%	.0%
Mitsubishi Electric	7.2	5.3	1.2	140	.3%	.4%	.1%	.2%
Ziegler	6.1	.2	5.5	198	.2%	.0%	.5%	.2%
Test Systems Strategies	6.0	.0	5.1	0	.2%	.0%	.5%	.0%
Seattle Silicon	5.9	.0	4.4	0	.2%	.0%	.4%	.0%
BETRONEX	5.8	.0	5.8	0	.2%	.0%	.5%	.0%
Microsim	5.4	.0	5.0	0	.2%	.0%	.5%	.0%
Meta-Software	5.3	.0	5.1	0	.2%	.0%	.5%	.0%
Aucotec	5.2	2.0	2.6	578	.2%	.2%	.2%	.7%
Schlumberger (Applicon)	4.9	1.4	1.8	69	.2%	.1%	.2%	.1%
Everex Systems	4.7	4.8	.0	1,407	.2%	.4%	.0%	1.7%
ACTEL	4.5	.0	4.5	0	.2%	.0%	.4%	.0%
Tokyo Electron--NO OEM	4.4	1.5	2.0	16	.2%	.1%	.2%	.0%
CAD Software	4.2	.0	3.5	0	.1%	.0%	.3%	.0%
ABB Cade International	4.1	2.1	1.0	2	.1%	.2%	.1%	.0%
Assigraph	3.1	.0	2.4	35	.1%	.0%	.2%	.0%
EDA Systems	3.1	.0	2.4	5	.1%	.0%	.2%	.0%
Analogy	3.0	.0	2.7	0	.1%	.0%	.3%	.0%
Visionics	2.9	.1	2.2	5	.1%	.0%	.2%	.0%
ALS Design	2.9	.3	2.3	50	.1%	.0%	.2%	.1%

(Continued)

©1990 Dataquest Incorporated August

Market Share

TABLE NUMBER: 1
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Sony	2.8	2.4	.0	182	.1%	.2%	.0%	.2%
Shared Resources	2.6	.0	.3	0	.1%	.0%	.0%	.0%
National Semiconductor	2.5	1.9	.6	15	.1%	.1%	.1%	.0%
Integrated Silicon Systems	2.4	.5	1.9	22	.1%	.0%	.2%	.0%
Infinite Graphics	2.3	.0	2.3	0	.1%	.0%	.2%	.0%
Rotring EURCAD	2.2	1.2	1.0	61	.1%	.1%	.1%	.1%
Automated Images	2.2	.0	1.9	0	.1%	.0%	.2%	.0%
Micrograph	2.2	1.2	.8	54	.1%	.1%	.1%	.1%
Academi Systems	2.1	.4	1.5	23	.1%	.0%	.1%	.0%
Century Research Center	2.0	1.0	.8	12	.1%	.1%	.1%	.0%
Dell Computer	2.0	2.0	.0	504	.1%	.2%	.0%	.6%
Siemens	2.0	1.2	.6	47	.1%	.1%	.1%	.1%
Accel Technologies	2.0	.0	1.8	0	.1%	.0%	.2%	.0%
Comdisco Systems	2.0	.0	1.8	0	.1%	.0%	.2%	.0%
Electrical Eng. Software	2.0	.0	1.8	0	.1%	.0%	.2%	.0%
Motorola	2.0	.0	2.0	0	.1%	.0%	.2%	.0%
Pacific Numeric	2.0	.0	2.0	0	.1%	.0%	.2%	.0%
Omation	2.0	.0	2.0	0	.1%	.0%	.2%	.0%
Aptos	1.8	.0	1.8	0	.1%	.0%	.2%	.0%
Omron	1.8	.9	.7	50	.1%	.1%	.1%	.1%
Sophia Systems	1.7	.4	1.1	20	.1%	.0%	.1%	.0%
Royal Digital Systems	1.7	.0	1.5	0	.1%	.0%	.1%	.0%
Phase Three Logic	1.5	.0	1.4	15	.1%	.0%	.1%	.0%
Automated Systems	1.5	.0	1.2	0	.1%	.0%	.1%	.0%
Emerald Design Systems	1.5	.7	.6	23	.1%	.1%	.1%	.0%
DECAD	1.4	.1	1.0	11	.0%	.0%	.1%	.0%
EPIC Design Technology	1.4	.0	1.2	0	.0%	.0%	.1%	.0%
Massteck	1.4	.0	1.4	0	.0%	.0%	.1%	.0%
Spectrum Software	1.2	.0	1.2	0	.0%	.0%	.1%	.0%
Sycotronic AG	1.1	.0	.9	2	.0%	.0%	.1%	.0%
Silc Technologies	1.1	.0	.9	0	.0%	.0%	.1%	.0%
CAD-UL	1.1	.3	.8	40	.0%	.0%	.1%	.0%
The Great Softwestern Co.	1.1	.0	1.1	0	.0%	.0%	.1%	.0%

(Continued)

©1990 Dataquest Incorporated August

Market Share

TABLE NUMBER: 1
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					---------- Market Share ----------			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Dassault	1.1	.0	.9	0	.0%	.0%	.1%	.0%
Cadisys	1.0	.0	.0	0	.0%	.0%	.0%	.0%
Intercad	1.0	.5	.3	50	.0%	.0%	.0%	.1%
Serbi	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
NCR Microelectronics	.9	.0	.9	0	.0%	.0%	.1%	.0%
Quantic Laboratories	.9	.0	.8	0	.0%	.0%	.1%	.0%
Hitachi Zosen Info Systems	.8	.4	.3	7	.0%	.0%	.0%	.0%
ICL	.8	.5	.2	21	.0%	.0%	.0%	.0%
Douglas Electronics	.7	.0	.7	0	.0%	.0%	.1%	.0%
Westward	.7	.7	.0	38	.0%	.0%	.0%	.0%
Intermetrics	.6	.0	.6	0	.0%	.0%	.1%	.0%
Capilano Computing	.6	.0	.6	0	.0%	.0%	.1%	.0%
Quad Design Technology	.6	.0	.5	0	.0%	.0%	.1%	.0%
Vamp	.6	.0	.6	0	.0%	.0%	.1%	.0%
ALDEC	.5	.0	.5	0	.0%	.0%	.0%	.0%
PLUS Logic	.5	.0	.5	0	.0%	.0%	.0%	.0%
Tanner Research	.5	.0	.5	0	.0%	.0%	.0%	.0%
The CAD Group	.5	.0	.5	0	.0%	.0%	.0%	.0%
BV Engineering	.4	.0	.4	0	.0%	.0%	.0%	.0%
Microtel Pacific Research	.4	.0	.4	1	.0%	.0%	.0%	.0%
American Small Business Comp.	.3	.0	.3	0	.0%	.0%	.0%	.0%
Foresight Resources	.3	.0	.3	0	.0%	.0%	.0%	.0%
Logic Modeling Systems	.3	.3	.0	100	.0%	.0%	.0%	.1%
Andor	.3	.0	.3	2	.0%	.0%	.0%	.0%
Olivetti	.3	.1	.1	89	.0%	.0%	.0%	.1%
Instrumatic Espanola	.2	.0	.2	0	.0%	.0%	.0%	.0%
Microcomputer Graphics	.2	.0	.2	0	.0%	.0%	.0%	.0%
Innovative Data Design	.2	.0	.2	0	.0%	.0%	.0%	.0%
Cascade Graphics	.1	.0	.1	0	.0%	.0%	.0%	.0%
Sierra Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
A/E Microsystems	.1	.1	.0	10	.0%	.0%	.0%	.0%

(Continued)

©1990 Dataquest Incorporated August

Market Share

TABLE NUMBER: 1 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
DAT Standard Information syste	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	143.8	134.1	.8	14,618	5.1%	10.1%	.1%	17.6%
All Companies	2,840.8	1,332.1	1,052.0	83,179	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	2,320.5	1,111.2	812.6	73,738	81.7%	83.4%	77.2%	88.6%
All Asian-Based Companies	328.7	179.2	113.9	6,646	11.6%	13.5%	10.8%	8.0%
All European-Based Companies	191.5	41.7	125.5	2,796	6.7%	3.1%	11.9%	3.4%
All Hardware Companies	794.3	681.1	.0	60,899	28.0%	51.1%	.0%	73.2%
All Turnkey & SW Companies	2,046.5	650.9	1,052.0	22,280	72.0%	48.9%	100.0%	26.8%

Source: Dataquest
August 1990

©1990 Dataquest Incorporated August

Market Share

TABLE NUMBER: 2
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Mentor Graphics	368.5	127.7	174.4	4,896	19.2%	16.4%	21.6%	12.5%
Hewlett-Packard	196.7	140.8	19.3	10,281	10.3%	18.1%	2.4%	26.3%
Valid	174.0	43.1	99.6	1,220	9.1%	5.5%	12.4%	3.1%
Sun	153.9	138.4	.0	12,822	8.0%	17.8%	.0%	32.8%
Dazix	153.7	57.1	68.5	1,476	8.0%	7.3%	8.5%	3.8%
Cadence	106.4	.0	92.2	0	5.6%	.0%	11.4%	.0%
Racal-Redac	85.4	8.0	65.3	355	4.5%	1.0%	8.1%	.9%
Intergraph	73.4	38.8	13.2	786	3.8%	5.0%	1.6%	2.0%
Digital	58.2	43.0	.0	1,920	3.0%	5.5%	.0%	4.9%
Computervision	52.6	22.2	15.0	320	2.7%	2.8%	1.9%	.8%
Zuken	51.2	19.0	28.7	273	2.7%	2.4%	3.6%	.7%
Silicon Compiler Systems	46.3	.0	31.0	0	2.4%	.0%	3.9%	.0%
Seiko Instruments--NO OEM	36.7	22.0	7.3	229	1.9%	2.8%	.9%	.6%
NEC	32.6	17.0	13.0	1,509	1.7%	2.2%	1.6%	3.9%
Fujitsu	24.9	16.5	6.0	598	1.3%	2.1%	.7%	1.5%
Calay	24.5	7.1	14.2	226	1.3%	.9%	1.8%	.6%
Sharp	20.3	8.7	9.6	115	1.1%	1.1%	1.2%	.3%
Scientific Calc.	19.5	5.1	9.2	93	1.0%	.7%	1.1%	.2%
VLSI Technology	18.1	1.1	14.3	60	.9%	.1%	1.8%	.2%
LSI Logic	18.0	1.8	13.5	67	.9%	.2%	1.7%	.2%
CADIX	15.1	6.1	7.6	105	.8%	.8%	.9%	.3%
Secmai	14.5	7.6	4.3	103	.8%	1.0%	.5%	.3%
Ikos Systems	9.8	7.8	2.0	51	.5%	1.0%	.2%	.1%
Silvar-Lisco	9.3	.0	6.0	0	.5%	.0%	.7%	.0%
Uchida Yoko	8.4	4.2	3.4	132	.4%	.5%	.4%	.3%
Toshiba--NO OEM	8.1	4.0	3.2	75	.4%	.5%	.4%	.2%
Logic Automation	7.0	.0	7.0	0	.4%	.0%	.9%	.0%
Genrad	6.6	1.0	4.4	3	.3%	.1%	.5%	.0%
Solbourne	6.5	5.8	.0	480	.3%	.7%	.0%	1.2%
Teradyne	6.0	.0	4.9	0	.3%	.0%	.6%	.0%
EEsof	5.9	.1	5.4	2	.3%	.0%	.7%	.0%
Seattle Silicon	5.9	.0	4.4	0	.3%	.0%	.5%	.0%
European Silicon Systems	5.8	1.5	4.4	27	.3%	.2%	.5%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 2
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
					Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Test Systems Strategies	5.2	.0	4.4	0	.3%	.0%	.5%	.0%
Kanematsu Semiconductor	5.1	2.3	2.2	60	.3%	.3%	.3%	.2%
Mitsubishi Electric	5.0	4.2	.5	56	.3%	.5%	.1%	.1%
Synopsys	4.5	.0	3.8	0	.2%	.0%	.5%	.0%
Tokyo Electron--NO OEM	4.4	1.5	2.0	16	.2%	.2%	.2%	.0%
ABB Cade International	4.1	2.1	1.0	2	.2%	.3%	.1%	.0%
Hitachi	4.1	2.0	1.6	76	.2%	.3%	.2%	.2%
Meta-Software	3.8	.0	3.6	0	.2%	.0%	.4%	.0%
Analogy	3.0	.0	2.7	0	.2%	.0%	.3%	.0%
Schlumberger (Applicon)	2.8	.8	1.0	27	.1%	.1%	.1%	.1%
Sony	2.8	2.4	.0	182	.1%	.3%	.0%	.5%
Shared Resources	2.6	.0	.3	0	.1%	.0%	.0%	.0%
National Semiconductor	2.5	1.9	.6	15	.1%	.2%	.1%	.0%
EDA Systems	2.3	.0	1.8	0	.1%	.0%	.2%	.0%
Kyocera	2.2	.9	1.1	10	.1%	.1%	.1%	.0%
IBM	2.1	1.3	.4	19	.1%	.2%	.1%	.0%
Century Research Center	2.0	1.0	.8	12	.1%	.1%	.1%	.0%
Assigraph	2.0	.0	1.6	0	.1%	.0%	.2%	.0%
Siemens	2.0	1.2	.6	47	.1%	.2%	.1%	.1%
Comdisco Systems	2.0	.0	1.8	0	.1%	.0%	.2%	.0%
Motorola	2.0	.0	2.0	0	.1%	.0%	.2%	.0%
Pacific Numeric	1.9	.0	1.9	0	.1%	.0%	.2%	.0%
Omron	1.8	.9	.7	50	.1%	.1%	.1%	.1%
Academi Systems	1.8	.4	1.3	19	.1%	.0%	.2%	.0%
Royal Digital Systems	1.7	.0	1.5	0	.1%	.0%	.2%	.0%
Emerald Design Systems	1.5	.7	.6	23	.1%	.1%	.1%	.1%
Electrical Eng. Software	1.4	.0	1.3	0	.1%	.0%	.2%	.0%
EPIC Design Technology	1.4	.0	1.2	0	.1%	.0%	.2%	.0%
DECAD	1.3	.1	1.0	10	.1%	.0%	.1%	.0%
Integrated Silicon Systems	1.2	.2	1.0	10	.1%	.0%	.1%	.0%
Sumisho Electronics	1.2	1.0	.1	7	.1%	.1%	.0%	.0%
Data I/O	1.1	.0	1.0	0	.1%	.0%	.1%	.0%
Autodesk	1.1	.0	1.1	0	.1%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 2
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Silc Technologies	1.0	.0	.9	0	.1%	.0%	.1%	.0%
Microsim	.9	.0	.9	0	.0%	.0%	.1%	.0%
Quantic Laboratories	.9	.0	.8	0	.0%	.0%	.1%	.0%
NCR Microelectronics	.9	.0	.8	0	.0%	.0%	.1%	.0%
Hitachi Zosen Info Systems	.8	.4	.3	7	.0%	.1%	.0%	.0%
ICL	.8	.5	.2	21	.0%	.1%	.0%	.1%
Xilinx	.8	.0	.7	0	.0%	.0%	.1%	.0%
ACTEL	.7	.0	.7	0	.0%	.0%	.1%	.0%
Automated Images	.7	.0	.6	0	.0%	.0%	.1%	.0%
Intermetrics	.6	.0	.6	0	.0%	.0%	.1%	.0%
Quad Design Technology	.6	.0	.5	0	.0%	.0%	.1%	.0%
CADAM	.5	.0	.4	0	.0%	.0%	.1%	.0%
Phase Three Logic	.4	.0	.4	0	.0%	.0%	.0%	.0%
Westward	.4	.4	.0	21	.0%	.1%	.0%	.1%
Sophia Systems	.3	.1	.2	2	.0%	.0%	.0%	.0%
Logic Modeling Systems	.3	.3	.0	100	.0%	.0%	.0%	.3%
Zycad	.3	.2	.0	2	.0%	.0%	.0%	.0%
Aucotec	.3	.1	.1	29	.0%	.0%	.0%	.1%
Everex Systems	.2	.2	.0	28	.0%	.0%	.0%	.1%
Micrograph	.2	.2	.0	8	.0%	.0%	.0%	.0%
Dassault	.2	.0	.1	0	.0%	.0%	.0%	.0%
Sierra Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Microtel Pacific Research	.1	.0	.1	0	.0%	.0%	.0%	.0%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.0%
Serbi	.1	.0	.1	0	.0%	.0%	.0%	.0%
A/E Microsystems	.0	.0	.0	2	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 2 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					---------- Market Share ----------			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	119.4	32.9	71.3	802	6.2%	4.2%	8.9%	2.1%
All Companies	1,916.0	778.8	805.6	39,062	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1,554.0	639.3	627.2	34,703	81.1%	82.1%	77.9%	88.8%
All Asian-Based Companies	218.7	110.6	84.3	3,493	11.4%	14.2%	10.5%	8.9%
All European-Based Companies	143.3	29.0	94.1	867	7.5%	3.7%	11.7%	2.2%
All Hardware Companies	324.3	273.1	.0	23,364	16.9%	35.1%	.0%	59.8%
All Turnkey & SW Companies	1,591.6	505.7	805.6	15,699	83.1%	64.9%	100.0%	40.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 3
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Host/Server
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	167.1	125.3	.0	0	31.7%	36.2%	.0%	.0%
IBM	40.8	26.4	7.4	428	7.7%	7.6%	8.9%	6.2%
Sun	31.5	28.4	.0	1,239	6.0%	8.2%	.0%	18.0%
Zycad	31.2	21.8	.6	148	5.9%	6.3%	.8%	2.2%
Fujitsu	28.1	17.2	6.7	332	5.3%	5.0%	8.0%	4.8%
Cadence	26.7	.0	22.8	0	5.1%	.0%	27.3%	.0%
Intergraph	16.1	8.0	2.6	154	3.1%	2.3%	3.1%	2.2%
Zuken	11.5	4.6	5.9	107	2.2%	1.3%	7.1%	1.6%
Teradyne	10.0	.0	8.0	0	1.9%	.0%	9.6%	.0%
Hewlett-Packard	8.9	7.5	.0	455	1.7%	2.2%	.0%	6.6%
Seiko Instruments--NO OEM	8.4	5.4	1.8	29	1.6%	1.6%	2.2%	.4%
Computervision	8.2	3.9	2.4	139	1.6%	1.1%	2.9%	2.0%
Scientific Calc.	6.5	.7	4.0	27	1.2%	.2%	4.8%	.4%
Hitachi	5.0	3.9	.5	27	.9%	1.1%	.6%	.4%
Synopsys	4.5	.0	3.8	0	.9%	.0%	4.6%	.0%
VLSI Technology	3.2	.2	2.5	10	.6%	.1%	3.0%	.2%
Racal-Redac	2.5	.0	2.1	11	.5%	.0%	2.6%	.2%
Schlumberger (Applicon)	2.1	.6	.8	42	.4%	.2%	.9%	.6%
LSI Logic	2.0	.2	1.5	7	.4%	.1%	1.8%	.1%
Genrad	1.6	.3	1.1	1	.3%	.1%	1.3%	.0%
Solbourne	1.6	1.4	.0	120	.3%	.4%	.0%	1.7%
Meta-Software	1.5	.0	1.5	0	.3%	.0%	1.8%	.0%
Automated Systems	1.5	.0	1.2	0	.3%	.0%	1.5%	.0%
Mitsubishi Electric	1.4	.7	.4	5	.3%	.2%	.5%	.1%
Kanematsu Semiconductor	1.4	1.0	.3	0	.3%	.3%	.4%	.0%
Assigraph	1.1	.0	.9	35	.2%	.0%	1.0%	.5%
Silvar-Lisco	1.0	.0	.7	0	.2%	.0%	.8%	.0%
Dassault	.9	.0	.8	0	.2%	.0%	.9%	.0%
Test Systems Strategies	.8	.0	.7	0	.2%	.0%	.9%	.0%
CADAM	.7	.0	.6	3	.1%	.0%	.7%	.0%
Electrical Eng. Software	.6	.0	.5	0	.1%	.0%	.6%	.0%
EDA Systems	.6	.0	.4	1	.1%	.0%	.5%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 3 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Host/Server
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Data I/O	.6	.0	.5	0	.1%	.0%	.6%	.0%
Aucotec	.3	.1	.1	29	.1%	.0%	.1%	.4%
Logic Automation	.2	.0	.2	0	.0%	.0%	.3%	.0%
Silc Technologies	.1	.0	.1	0	.0%	.0%	.1%	.0%
Secmai	.1	.0	.1	0	.0%	.0%	.1%	.0%
DECAD	.1	.0	.0	1	.0%	.0%	.0%	.0%
A/E Microsystems	.0	.0	.0	1	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	111.3	89.7	10.7	3,592	21.1%	25.9%	12.9%	52.2%
All Companies	527.3	346.0	83.3	6,877	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	468.0	314.1	64.0	6,301	88.8%	90.8%	76.8%	91.6%
All Asian-Based Companies	54.4	31.8	15.3	499	10.3%	9.2%	18.4%	7.3%
All European-Based Companies	4.9	.1	4.0	76	.9%	.0%	4.8%	1.1%
All Hardware Companies	307.4	251.9	.0	5,338	58.3%	72.8%	.0%	77.6%
All Turnkey & SW Companies	219.9	94.1	83.3	1,538	41.7%	27.2%	100.0%	22.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 4
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Personal Computer
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compaq	66.0	66.0	.0	11,004	16.8%	32.1%	.0%	29.9%
Hewlett-Packard	24.0	19.7	.0	3,991	6.1%	9.6%	.0%	10.9%
NEC	23.1	21.2	.0	1,530	5.9%	10.3%	.0%	4.2%
Wacom	20.9	9.0	9.8	558	5.3%	4.4%	6.1%	1.5%
Autodesk	15.1	.0	15.1	0	3.8%	.0%	9.4%	.0%
Apple Computer	14.6	12.8	.0	2,800	3.7%	6.2%	.0%	7.6%
Xilinx	14.3	.0	12.8	0	3.6%	.0%	8.0%	.0%
EEsof	12.1	.1	10.9	3	3.1%	.0%	6.7%	.0%
Data I/O	9.7	.0	8.2	0	2.5%	.0%	5.1%	.0%
Fujitsu	9.4	5.8	3.0	466	2.4%	2.8%	1.9%	1.3%
Altera	9.0	.0	7.9	0	2.3%	.0%	4.9%	.0%
Orcad	8.1	.0	7.7	0	2.1%	.0%	4.7%	.0%
LPKF	7.5	4.5	2.3	750	1.9%	2.2%	1.4%	2.0%
IBM	7.3	7.0	.0	1,477	1.9%	3.4%	.0%	4.0%
CADAM	7.0	.0	6.3	0	1.8%	.0%	3.9%	.0%
Ziegler	6.1	.2	5.5	198	1.5%	.1%	3.4%	.5%
BETRONEX	5.8	.0	5.8	0	1.5%	.0%	3.6%	.0%
Aucotec	4.7	1.9	2.3	520	1.2%	.9%	1.4%	1.4%
Everex Systems	4.5	4.5	.0	1,379	1.1%	2.2%	.0%	3.8%
Microsim	4.5	.0	4.1	0	1.1%	.0%	2.6%	.0%
CAD Software	4.2	.0	3.5	0	1.1%	.0%	2.2%	.0%
Teradyne	4.0	.0	3.3	0	1.0%	.0%	2.0%	.0%
ACTEL	3.8	.0	3.8	0	1.0%	.0%	2.4%	.0%
Visionics	2.9	.1	2.2	5	.7%	.1%	1.3%	.0%
ALS Design	2.9	.3	2.3	50	.7%	.1%	1.4%	.1%
Infinite Graphics	2.3	.0	2.3	0	.6%	.0%	1.4%	.0%
Rotring EURCAD	2.2	1.2	1.0	61	.6%	.6%	.6%	.2%
Computervision	2.1	.1	1.8	9	.5%	.1%	1.1%	.0%
Dell Computer	2.0	2.0	.0	504	.5%	1.0%	.0%	1.4%
Accel Technologies	2.0	.0	1.8	0	.5%	.0%	1.1%	.0%
Micrograph	2.0	1.0	.8	46	.5%	.5%	.5%	.1%
Omation	2.0	.0	2.0	0	.5%	.0%	1.2%	.0%
Aptos	1.8	.0	1.8	0	.5%	.0%	1.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 4
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Personal Computer
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Automated Images	1.5	.0	1.3	0	.4%	.0%	.8%	.0%
European Silicon Systems	1.5	.4	1.1	13	.4%	.2%	.7%	.0%
Circuits & Systems	1.4	.0	1.4	0	.4%	.0%	.9%	.0%
Racal-Redac	1.4	.1	1.2	10	.4%	.0%	.8%	.0%
Sophia Systems	1.4	.3	.9	18	.3%	.2%	.5%	.0%
Massteck	1.4	.0	1.4	0	.3%	.0%	.8%	.0%
Ikos Systems	1.2	1.0	.2	6	.3%	.5%	.1%	.0%
Integrated Silicon Systems	1.2	.3	.9	12	.3%	.1%	.6%	.0%
Spectrum Software	1.2	.0	1.2	0	.3%	.0%	.7%	.0%
Sycotronic AG	1.1	.0	.9	2	.3%	.0%	.6%	.0%
CAD-UL	1.1	.3	.8	40	.3%	.2%	.5%	.1%
Phase Three Logic	1.1	.0	1.0	15	.3%	.0%	.6%	.0%
The Great Softwestern Co.	1.1	.0	1.1	0	.3%	.0%	.7%	.0%
Cadisys	1.0	.0	.0	0	.3%	.0%	.0%	.0%
Intercad	1.0	.5	.3	50	.3%	.2%	.2%	.1%
Serbi	1.0	.0	1.0	0	.2%	.0%	.6%	.0%
Mitsubishi Electric	.7	.5	.3	79	.2%	.2%	.2%	.2%
Douglas Electronics	.7	.0	.7	0	.2%	.0%	.4%	.0%
Capilano Computing	.6	.0	.6	0	.2%	.0%	.4%	.0%
Vamp	.6	.0	.6	0	.2%	.0%	.4%	.0%
ALDEC	.5	.0	.5	0	.1%	.0%	.3%	.0%
PLUS Logic	.5	.0	.5	0	.1%	.0%	.3%	.0%
Tanner Research	.5	.0	.5	0	.1%	.0%	.3%	.0%
The CAD Group	.5	.0	.5	0	.1%	.0%	.3%	.0%
BV Engineering	.4	.0	.4	0	.1%	.0%	.2%	.0%
Sumisho Electronics	.4	.2	.1	43	.1%	.1%	.1%	.1%
American Small Business Comp.	.3	.0	.3	0	.1%	.0%	.2%	.0%
Foresight Resources	.3	.0	.3	0	.1%	.0%	.2%	.0%
Microtel Pacific Research	.3	.0	.3	1	.1%	.0%	.2%	.0%
Academi Systems	.3	.1	.2	3	.1%	.0%	.1%	.0%
Andor	.3	.0	.3	2	.1%	.0%	.2%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 4 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Personal Computer
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Olivetti	.3	.1	.1	89	.1%	.1%	.1%	.2%
Genrad	.3	.0	.2	0	.1%	.0%	.1%	.0%
Westward	.3	.3	.0	17	.1%	.1%	.0%	.0%
EDA Systems	.2	.0	.2	4	.1%	.0%	.1%	.0%
Instrumatic Espanola	.2	.0	.2	0	.1%	.0%	.1%	.0%
Microcomputer Graphics	.2	.0	.2	0	.1%	.0%	.1%	.0%
Innovative Data Design	.2	.0	.2	0	.0%	.0%	.1%	.0%
Secmai	.2	.1	.0	2	.0%	.0%	.0%	.0%
Cascade Graphics	.1	.0	.1	0	.0%	.0%	.1%	.0%
Pacific Numeric	.1	.0	.1	0	.0%	.0%	.1%	.0%
A/E Microsystems	.1	.0	.0	7	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
DAT Standard Information syste	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	135.4	56.5	71.7	12,668	34.4%	27.5%	44.4%	34.5%
All Companies	393.5	205.5	161.3	36,765	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	298.6	157.8	121.5	32,259	75.9%	76.8%	75.3%	87.7%
All Asian-Based Companies	55.7	36.8	14.2	2,654	14.1%	17.9%	8.8%	7.2%
All European-Based Companies	39.3	10.9	25.7	1,853	10.0%	5.3%	15.9%	5.0%
All Hardware Companies	162.6	156.2	.0	32,197	41.3%	76.0%	.0%	87.6%
All Turnkey & SW Companies	230.9	49.3	161.3	4,568	58.7%	24.0%	100.0%	12.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 5
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	182.0	63.7	81.9	2,446	14.8%	11.3%	18.1%	6.1%
Sun	117.6	105.8	.0	8,817	9.6%	18.7%	.0%	22.0%
Digital	108.1	81.1	.0	922	8.8%	14.3%	.0%	2.3%
Hewlett-Packard	92.0	70.6	5.5	6,295	7.5%	12.5%	1.2%	15.7%
Valid	90.5	22.6	48.9	1,020	7.4%	4.0%	10.8%	2.5%
Cadence	74.1	.0	62.7	0	6.0%	.0%	13.9%	.0%
Dazix	67.6	27.1	27.1	645	5.5%	4.8%	6.0%	1.6%
Intergraph	54.7	30.1	9.6	574	4.5%	5.3%	2.1%	1.4%
Compaq	36.3	36.3	.0	6,052	3.0%	6.4%	.0%	15.1%
Silicon Compiler Systems	25.9	.0	17.4	0	2.1%	.0%	3.8%	.0%
Zycad	20.5	14.3	.4	98	1.7%	2.5%	.1%	.2%
Racal-Redac	18.6	.5	15.3	24	1.5%	.1%	3.4%	.1%
EEsof	18.0	.2	16.2	5	1.5%	.0%	3.6%	.0%
Computervision	17.2	6.3	5.7	86	1.4%	1.1%	1.3%	.2%
Teradyne	15.0	.0	12.1	0	1.2%	.0%	2.7%	.0%
IBM	13.8	9.6	2.1	564	1.1%	1.7%	.5%	1.4%
VLSI Technology	12.2	.7	9.6	40	1.0%	.1%	2.1%	.1%
LSI Logic	12.0	1.2	9.0	45	1.0%	.2%	2.0%	.1%
Scientific Calc.	10.4	2.3	5.3	48	.8%	.4%	1.2%	.1%
Apple Computer	10.3	9.1	.0	1,988	.8%	1.6%	.0%	5.0%
Autodesk	9.0	.0	9.0	0	.7%	.0%	2.0%	.0%
Calay	8.6	2.2	5.7	71	.7%	.4%	1.3%	.2%
Ikos Systems	7.2	5.7	1.4	57	.6%	1.0%	.3%	.1%
Solbourne	6.7	5.9	.0	492	.5%	1.0%	.0%	1.2%
Synopsys	6.3	.0	5.4	0	.5%	.0%	1.2%	.0%
Xilinx	6.0	.0	5.4	0	.5%	.0%	1.2%	.0%
Logic Automation	5.4	.0	5.4	0	.4%	.0%	1.2%	.0%
Altera	5.4	.0	4.8	0	.4%	.0%	1.1%	.0%
Everex Systems	4.3	4.3	.0	1,266	.3%	.8%	.0%	3.2%
Orcad	4.2	.0	4.0	0	.3%	.0%	.9%	.0%
Silvar-Lisco	3.9	.0	2.2	0	.3%	.0%	.5%	.0%
Genrad	3.9	.6	2.6	4	.3%	.1%	.6%	.0%
Meta-Software	3.7	.0	3.6	0	.3%	.0%	.8%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 5
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
ACTEL	3.7	.0	3.7	0	.3%	.0%	.8%	.0%
Test Systems Strategies	3.6	.0	3.1	0	.3%	.0%	.7%	.0%
Data I/O	3.4	.0	2.9	0	.3%	.0%	.6%	.0%
Seattle Silicon	3.3	.0	2.4	0	.3%	.0%	.5%	.0%
Microsim	3.2	.0	3.0	0	.3%	.0%	.7%	.0%
CAD Software	3.1	.0	2.7	0	.3%	.0%	.6%	.0%
EDA Systems	3.1	.0	2.4	5	.3%	.0%	.5%	.0%
Visionics	2.9	.1	2.2	5	.2%	.0%	.5%	.0%
Schlumberger (Applicon)	2.8	.9	1.1	47	.2%	.2%	.2%	.1%
Shared Resources	2.6	.0	.3	0	.2%	.0%	.1%	.0%
Infinite Graphics	2.3	.0	2.3	0	.2%	.0%	.5%	.0%
Automated Images	2.2	.0	1.9	0	.2%	.0%	.4%	.0%
Secmai	2.2	.3	1.7	4	.2%	.1%	.4%	.0%
Comdisco Systems	2.0	.0	1.8	0	.2%	.0%	.4%	.0%
Motorola	2.0	.0	2.0	0	.2%	.0%	.4%	.0%
Dell Computer	1.9	1.9	.0	479	.2%	.3%	.0%	1.2%
Pacific Numeric	1.8	.0	1.8	0	.1%	.0%	.4%	.0%
BETRONEX	1.6	.0	1.6	0	.1%	.0%	.4%	.0%
Omation	1.6	.0	1.6	0	.1%	.0%	.3%	.0%
Phase Three Logic	1.5	.0	1.4	15	.1%	.0%	.3%	.0%
Royal Digital Systems	1.5	.0	1.3	0	.1%	.0%	.3%	.0%
Accel Technologies	1.5	.0	1.4	0	.1%	.0%	.3%	.0%
Automated Systems	1.5	.0	1.2	0	.1%	.0%	.3%	.0%
Emerald Design Systems	1.5	.7	.6	23	.1%	.1%	.1%	.1%
Integrated Silicon Systems	1.4	.3	1.2	13	.1%	.1%	.3%	.0%
Aptos	1.4	.0	1.4	0	.1%	.0%	.3%	.0%
Circuits & Systems	1.4	.0	1.4	0	.1%	.0%	.3%	.0%
National Semiconductor	1.3	.9	.3	0	.1%	.2%	.1%	.0%
Analogy	1.2	.0	1.1	0	.1%	.0%	.2%	.0%
The Great Softwestern Co.	1.1	.0	1.1	0	.1%	.0%	.2%	.0%
Spectrum Software	1.1	.0	1.1	0	.1%	.0%	.2%	.0%
Cadisys	1.0	.0	.0	0	.1%	.0%	.0%	.0%
CADAM	1.0	.0	.9	3	.1%	.0%	.2%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 5
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Massteck	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Silc Technologies	.9	.0	.8	0	.1%	.0%	.2%	.0%
EPIC Design Technology	.9	.0	.8	0	.1%	.0%	.2%	.0%
Electrical Eng. Software	.9	.0	.8	0	.1%	.0%	.2%	.0%
NCR Microelectronics	.9	.0	.9	0	.1%	.0%	.2%	.0%
Quantic Laboratories	.9	.0	.8	0	.1%	.0%	.2%	.0%
Intermetrics	.6	.0	.6	0	.1%	.0%	.1%	.0%
Quad Design Technology	.6	.0	.5	0	.0%	.0%	.1%	.0%
Vamp	.6	.0	.6	0	.0%	.0%	.1%	.0%
Capilano Computing	.5	.0	.5	0	.0%	.0%	.1%	.0%
ALDEC	.5	.0	.5	0	.0%	.0%	.1%	.0%
PLUS Logic	.5	.0	.5	0	.0%	.0%	.1%	.0%
Tanner Research	.5	.0	.5	0	.0%	.0%	.1%	.0%
The CAD Group	.5	.0	.5	0	.0%	.0%	.1%	.0%
Douglas Electronics	.5	.0	.5	0	.0%	.0%	.1%	.0%
BV Engineering	.4	.0	.4	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.3	.0	.3	0	.0%	.0%	.1%	.0%
Foresight Resources	.3	.0	.3	0	.0%	.0%	.1%	.0%
Microtel Pacific Research	.3	.0	.3	1	.0%	.0%	.1%	.0%
Logic Modeling Systems	.2	.2	.0	70	.0%	.0%	.0%	.2%
Microcomputer Graphics	.2	.0	.2	0	.0%	.0%	.0%	.0%
Academi Systems	.2	.0	.1	0	.0%	.0%	.0%	.0%
Assigraph	.2	.0	.1	0	.0%	.0%	.0%	.0%
Innovative Data Design	.2	.0	.2	0	.0%	.0%	.0%	.0%
Cascade Graphics	.1	.0	.1	0	.0%	.0%	.0%	.0%
A/E Microsystems	.1	.1	.0	10	.0%	.0%	.0%	.0%
Sierra Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Zuken	.0	.0	.0	0	.0%	.0%	.0%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 5 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: North America
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Other Companies	170.8	69.1	86.5	8,115	13.9%	12.2%	19.2%	20.2%
All Companies	1,226.3	565.8	451.5	40,142	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1,195.0	562.7	426.9	40,043	97.4%	99.5%	94.5%	99.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	31.3	3.1	24.6	99	2.6%	.5%	5.5%	.2%
All Hardware Companies	412.1	357.5	.0	33,960	33.6%	63.2%	.0%	84.6%
All Turnkey & SW Companies	814.2	208.3	451.5	6,182	66.4%	36.8%	100.0%	15.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 6
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: North America
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Mentor Graphics	182.0	63.7	81.9	2,446	22.3%	19.4%	24.5%	13.3%
Sun	94.1	84.7	.0	7,921	11.5%	25.8%	.0%	43.0%
Valid	90.5	22.6	48.9	1,020	11.1%	6.9%	14.6%	5.5%
Hewlett-Packard	76.2	57.6	5.5	4,100	9.4%	17.6%	1.7%	22.3%
Dazix	67.6	27.1	27.1	645	8.3%	8.2%	8.1%	3.5%
Cadence	56.2	.0	47.6	0	6.9%	.0%	14.2%	.0%
Intergraph	44.9	25.1	8.1	480	5.5%	7.7%	2.4%	2.6%
Digital	27.9	21.0	.0	922	3.4%	6.4%	.0%	5.0%
Silicon Compiler Systems	25.9	.0	17.4	0	3.2%	.0%	5.2%	.0%
Racal-Redac	17.2	.5	14.1	21	2.1%	.2%	4.2%	.1%
Computervision	15.3	6.2	4.0	84	1.9%	1.9%	1.2%	.5%
LSI Logic	10.8	1.1	8.1	40	1.3%	.3%	2.4%	.2%
VLSI Technology	10.3	.6	8.2	34	1.3%	.2%	2.4%	.2%
Calay	8.6	2.2	5.7	71	1.1%	.7%	1.7%	.4%
Scientific Calc.	7.8	2.0	3.7	37	1.0%	.6%	1.1%	.2%
Ikos Systems	6.4	5.1	1.3	51	.8%	1.6%	.4%	.3%
EEsof	5.9	.1	5.4	2	.7%	.0%	1.6%	.0%
Solbourne	5.4	4.7	.0	394	.7%	1.4%	.0%	2.1%
Logic Automation	5.3	.0	5.3	0	.6%	.0%	1.6%	.0%
Teradyne	4.5	.0	3.7	0	.6%	.0%	1.1%	.0%
Silvar-Lisco	3.5	.0	2.0	0	.4%	.0%	.6%	.0%
Seattle Silicon	3.3	.0	2.4	0	.4%	.0%	.7%	.0%
Synopsys	3.2	.0	2.7	0	.4%	.0%	.8%	.0%
Test Systems Strategies	3.1	.0	2.6	0	.4%	.0%	.8%	.0%
Genrad	3.0	.5	2.0	3	.4%	.1%	.6%	.0%
Meta-Software	2.6	.0	2.5	0	.3%	.0%	.8%	.0%
Shared Resources	2.6	.0	.3	0	.3%	.0%	.1%	.0%
EDA Systems	2.3	.0	1.8	0	.3%	.0%	.5%	.0%
Secmai	2.1	.3	1.6	4	.3%	.1%	.5%	.0%
Comdisco Systems	2.0	.0	1.8	0	.2%	.0%	.5%	.0%
Motorola	2.0	.0	2.0	0	.2%	.0%	.6%	.0%
Pacific Numeric	1.7	.0	1.7	0	.2%	.0%	.5%	.0%
Royal Digital Systems	1.5	.0	1.3	0	.2%	.0%	.4%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 6
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Emerald Design Systems	1.5	.7	.6	23	.2%	.2%	.2%	.1%
National Semiconductor	1.3	.9	.3	0	.2%	.3%	.1%	.0%
Analogy	1.2	.0	1.1	0	.1%	.0%	.3%	.0%
Schlumberger (Applicon)	1.0	.3	.4	10	.1%	.1%	.1%	.1%
EPIC Design Technology	.9	.0	.8	0	.1%	.0%	.2%	.0%
Quantic Laboratories	.9	.0	.8	0	.1%	.0%	.2%	.0%
NCR Microelectronics	.9	.0	.8	0	.1%	.0%	.2%	.0%
Silc Technologies	.9	.0	.7	0	.1%	.0%	.2%	.0%
Autodesk	.8	.0	.8	0	.1%	.0%	.2%	.0%
Integrated Silicon Systems	.7	.1	.6	6	.1%	.0%	.2%	.0%
Automated Images	.7	.0	.6	0	.1%	.0%	.2%	.0%
Electrical Eng. Software	.6	.0	.6	0	.1%	.0%	.2%	.0%
Intermetrics	.6	.0	.6	0	.1%	.0%	.2%	.0%
Quad Design Technology	.6	.0	.5	0	.1%	.0%	.2%	.0%
IBM	.6	.4	.1	5	.1%	.1%	.0%	.0%
ACTEL	.6	.0	.6	0	.1%	.0%	.2%	.0%
Microsim	.6	.0	.5	0	.1%	.0%	.2%	.0%
Phase Three Logic	.4	.0	.4	0	.1%	.0%	.1%	.0%
Data I/O	.3	.0	.3	0	.0%	.0%	.1%	.0%
Xilinx	.3	.0	.3	0	.0%	.0%	.1%	.0%
CADAM	.3	.0	.2	0	.0%	.0%	.1%	.0%
Logic Modeling Systems	.2	.2	.0	70	.0%	.1%	.0%	.4%
Everex Systems	.2	.2	.0	25	.0%	.1%	.0%	.1%
Zycad	.2	.1	.0	1	.0%	.0%	.0%	.0%
Academi Systems	.2	.0	.1	0	.0%	.0%	.0%	.0%
Assigraph	.1	.0	.1	0	.0%	.0%	.0%	.0%
Sierra Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Microtel Pacific Research	.1	.0	.1	0	.0%	.0%	.0%	.0%
A/E Microsystems	.0	.0	.0	2	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 6 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	53.9	7.9	39.0	158	6.6%	2.4%	11.7%	.9%
All Companies	814.9	328.1	334.5	18,417	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	786.8	325.0	312.8	18,321	96.6%	99.1%	93.5%	99.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	28.1	3.1	21.6	96	3.4%	.9%	6.5%	.5%
All Hardware Companies	173.1	148.5	.0	12,657	21.2%	45.3%	.0%	68.7%
All Turnkey & SW Companies	641.9	179.6	334.5	5,759	78.8%	54.7%	100.0%	31.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 7
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Host/Server
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	80.2	60.2	.0	0	34.9%	41.1%	.0%	.0%
Sun	23.5	21.2	.0	896	10.2%	14.5%	.0%	32.3%
Zycad	20.3	14.2	.4	97	8.8%	9.7%	1.1%	3.5%
Cadence	17.9	.0	15.1	0	7.8%	.0%	39.2%	.0%
IBM	11.0	7.1	2.0	116	4.8%	4.9%	5.2%	4.2%
Intergraph	9.9	4.9	1.6	94	4.3%	3.4%	4.1%	3.4%
Teradyne	7.5	.0	6.0	0	3.3%	.0%	15.6%	.0%
Hewlett-Packard	3.8	3.2	.0	191	1.6%	2.2%	.0%	6.9%
Synopsys	3.2	.0	2.7	0	1.4%	.0%	7.0%	.0%
Scientific Calc.	2.6	.3	1.6	11	1.1%	.2%	4.2%	.4%
VLSI Technology	1.8	.1	1.4	6	.8%	.1%	3.7%	.2%
Schlumberger (Applicon)	1.8	.6	.7	37	.8%	.4%	1.8%	1.3%
Automated Systems	1.5	.0	1.2	0	.7%	.0%	3.2%	.0%
Racal-Redac	1.3	.0	1.1	3	.6%	.0%	2.9%	.1%
Solbourne	1.3	1.2	.0	98	.6%	.8%	.0%	3.6%
LSI Logic	1.2	.1	.9	4	.5%	.1%	2.3%	.2%
Meta-Software	1.1	.0	1.0	0	.5%	.0%	2.7%	.0%
Genrad	.8	.1	.5	1	.3%	.1%	1.3%	.0%
EDA Systems	.6	.0	.4	1	.3%	.0%	1.1%	.0%
Test Systems Strategies	.5	.0	.4	0	.2%	.0%	1.1%	.0%
Silvar-Lisco	.4	.0	.2	0	.2%	.0%	.6%	.0%
CADAM	.3	.0	.3	3	.1%	.0%	.7%	.1%
Electrical Eng. Software	.3	.0	.2	0	.1%	.0%	.6%	.0%
Computervision	.2	.1	.0	2	.1%	.0%	.1%	.1%
Data I/O	.2	.0	.2	0	.1%	.0%	.4%	.0%
Logic Automation	.2	.0	.2	0	.1%	.0%	.4%	.0%
Silc Technologies	.1	.0	.1	0	.0%	.0%	.2%	.0%
Secmai	.1	.0	.1	0	.0%	.0%	.2%	.0%
Assigraph	.1	.0	.1	0	.0%	.0%	.1%	.0%
Zuken	.0	.0	.0	0	.0%	.0%	.0%	.0%
A/E Microsystems	.0	.0	.0	1	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 7 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Host/Server
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	44.8	33.4	6.9	1,213	19.5%	22.8%	18.0%	43.8%
All Companies	230.1	146.4	38.4	2,771	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	228.6	146.4	37.2	2,768	99.3%	100.0%	96.7%	99.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.5	.0	1.2	3	.6%	.0%	3.2%	.1%
All Hardware Companies	145.4	118.9	.0	2,396	63.2%	81.2%	.0%	86.5%
All Turnkey & SW Companies	84.7	27.6	38.4	375	36.8%	18.8%	100.0%	13.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 8
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Personal Computer
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compaq	36.3	36.3	.0	6,052	20.0%	39.8%	.0%	31.9%
EEsof	12.1	.1	10.9	3	6.7%	.1%	13.8%	.0%
Hewlett-Packard	12.1	9.9	.0	2,005	6.6%	10.8%	.0%	10.6%
Apple Computer	10.3	9.1	.0	1,988	5.7%	10.0%	.0%	10.5%
Autodesk	8.2	.0	8.2	0	4.5%	.0%	10.4%	.0%
Xilinx	5.7	.0	5.1	0	3.1%	.0%	6.5%	.0%
Altera	5.4	.0	4.8	0	3.0%	.0%	6.0%	.0%
Orcad	4.2	.0	4.0	0	2.3%	.0%	5.1%	.0%
Everex Systems	4.1	4.1	.0	1,241	2.2%	4.5%	.0%	6.5%
ACTEL	3.1	.0	3.1	0	1.7%	.0%	4.0%	.0%
CAD Software	3.1	.0	2.7	0	1.7%	.0%	3.4%	.0%
Teradyne	3.0	.0	2.5	0	1.7%	.0%	3.1%	.0%
Data I/O	2.9	.0	2.5	0	1.6%	.0%	3.1%	.0%
Visionics	2.9	.1	2.2	5	1.6%	.2%	2.8%	.0%
Microsim	2.7	.0	2.5	0	1.5%	.0%	3.1%	.0%
Infinite Graphics	2.3	.0	2.3	0	1.3%	.0%	2.9%	.0%
IBM	2.2	2.1	.0	443	1.2%	2.3%	.0%	2.3%
Dell Computer	1.9	1.9	.0	479	1.1%	2.1%	.0%	2.5%
Computervision	1.7	.0	1.7	0	.9%	.0%	2.2%	.0%
BETRONEX	1.6	.0	1.6	0	.9%	.0%	2.0%	.0%
Omation	1.6	.0	1.6	0	.9%	.0%	2.0%	.0%
Automated Images	1.5	.0	1.3	0	.8%	.0%	1.7%	.0%
Accel Technologies	1.5	.0	1.4	0	.8%	.0%	1.7%	.0%
Aptos	1.4	.0	1.4	0	.8%	.0%	1.8%	.0%
Circuits & Systems	1.4	.0	1.4	0	.8%	.0%	1.8%	.0%
Phase Three Logic	1.1	.0	1.0	15	.6%	.0%	1.3%	.1%
The Great Softwestern Co.	1.1	.0	1.1	0	.6%	.0%	1.4%	.0%
Spectrum Software	1.1	.0	1.1	0	.6%	.0%	1.4%	.0%
Cadisys	1.0	.0	.0	0	.6%	.0%	.0%	.0%
Massteck	1.0	.0	1.0	0	.5%	.0%	1.2%	.0%
Ikos Systems	.8	.6	.2	6	.4%	.7%	.2%	.0%
Integrated Silicon Systems	.7	.2	.6	7	.4%	.2%	.7%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 8 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Personal Computer
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Vamp	.6	.0	.6	0	.3%	.0%	.8%	.0%
Capilano Computing	.5	.0	.5	0	.3%	.0%	.6%	.0%
ALDEC	.5	.0	.5	0	.3%	.0%	.6%	.0%
PLUS Logic	.5	.0	.5	0	.3%	.0%	.6%	.0%
Tanner Research	.5	.0	.5	0	.3%	.0%	.6%	.0%
The CAD Group	.5	.0	.5	0	.3%	.0%	.6%	.0%
Douglas Electronics	.5	.0	.5	0	.3%	.0%	.6%	.0%
BV Engineering	.4	.0	.4	0	.2%	.0%	.5%	.0%
CADAM	.4	.0	.4	0	.2%	.0%	.5%	.0%
American Small Business Comp.	.3	.0	.3	0	.2%	.0%	.4%	.0%
Foresight Resources	.3	.0	.3	0	.2%	.0%	.3%	.0%
EDA Systems	.2	.0	.2	4	.1%	.0%	.2%	.0%
Microtel Pacific Research	.2	.0	.2	1	.1%	.0%	.3%	.0%
Microcomputer Graphics	.2	.0	.2	0	.1%	.0%	.3%	.0%
Innovative Data Design	.2	.0	.2	0	.1%	.0%	.2%	.0%
Cascade Graphics	.1	.0	.1	0	.1%	.0%	.2%	.0%
Genrad	.1	.0	.1	0	.1%	.0%	.1%	.0%
Pacific Numeric	.1	.0	.1	0	.0%	.0%	.1%	.0%
Racal-Redac	.1	.0	.1	0	.0%	.0%	.1%	.0%
A/E Microsystems	.1	.0	.0	7	.0%	.0%	.0%	.0%
Academi Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	72.2	27.8	40.6	6,744	39.8%	30.5%	51.6%	35.6%
All Companies	181.4	91.2	78.6	18,954	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	179.6	91.2	76.9	18,954	99.0%	100.0%	97.8%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.8	.0	1.8	0	1.0%	.0%	2.2%	.0%
All Hardware Companies	93.7	90.2	.0	18,906	51.7%	98.8%	.0%	99.7%
All Turnkey & SW Companies	87.7	1.1	78.6	48	48.3%	1.2%	100.0%	.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 9
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	103.7	30.1	51.0	1,372	12.9%	8.0%	18.8%	5.6%
Digital	90.1	67.0	.0	768	11.2%	17.7%	.0%	3.2%
Hewlett-Packard	83.0	58.5	4.9	5,703	10.3%	15.5%	1.8%	23.4%
Dazix	55.3	21.0	22.2	551	6.9%	5.6%	8.2%	2.3%
Racal-Redac	46.0	.2	37.8	163	5.7%	.1%	13.9%	.7%
Valid	43.5	10.9	23.5	0	5.4%	2.9%	8.6%	.0%
Computervision	32.1	14.3	7.6	270	4.0%	3.8%	2.8%	1.1%
Intergraph	30.6	14.4	5.4	321	3.8%	3.8%	2.0%	1.3%
Sun	27.8	25.1	.0	1,869	3.5%	6.6%	.0%	7.7%
Compaq	26.4	26.4	.0	4,402	3.3%	7.0%	.0%	18.1%
IBM	18.4	12.8	2.8	752	2.3%	3.4%	1.0%	3.1%
Calay	13.5	4.2	6.8	134	1.7%	1.1%	2.5%	.6%
Silicon Compiler Systems	13.0	.0	8.7	.0	1.6%	.0%	3.2%	.0%
Secmai	12.4	7.4	2.6	101	1.5%	2.0%	1.0%	.4%
Cadence	10.1	.0	8.5	0	1.3%	.0%	3.1%	.0%
Scientific Calc.	9.1	2.0	4.6	42	1.1%	.5%	1.7%	.2%
Zycad	7.9	5.5	.2	38	1.0%	1.5%	.1%	.2%
LPKF	7.5	4.5	2.3	750	.9%	1.2%	.8%	3.1%
European Silicon Systems	7.3	1.8	5.5	40	.9%	.5%	2.0%	.2%
VLSI Technology	7.2	.4	5.7	24	.9%	.1%	2.1%	.1%
CADAM	6.7	.0	6.0	0	.8%	.0%	2.2%	.0%
Ziegler	6.1	.2	5.5	198	.8%	.1%	2.0%	.8%
Autodesk	5.2	.0	5.2	0	.6%	.0%	1.9%	.0%
Aucotec	5.2	2.0	2.6	578	.6%	.5%	.9%	2.4%
LSI Logic	5.0	.5	3.7	19	.6%	.1%	1.4%	.1%
Xilinx	4.5	.0	4.1	0	.6%	.0%	1.5%	.0%
ABB Cade International	4.1	2.1	1.0	2	.5%	.6%	.4%	.0%
Teradyne	4.0	.0	3.2	0	.5%	.0%	1.2%	.0%
Genrad	3.6	.6	2.4	0	.5%	.1%	.9%	.0%
Apple Computer	3.5	3.1	.0	672	.4%	.8%	.0%	2.8%
Silvar-Lisco	3.2	.0	1.8	0	.4%	.0%	.7%	.0%
BETRONEX	3.1	.0	3.1	0	.4%	.0%	1.1%	.0%
Assigraph	2.9	.0	2.3	35	.4%	.0%	.9%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 9
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
ALS Design	2.9	.3	2.3	50	.4%	.1%	.8%	.2%
Orcad	2.6	.0	2.5	0	.3%	.0%	.9%	.0%
Altera	2.3	.0	2.0	0	.3%	.0%	.7%	.0%
Rotring EURCAD	2.2	1.2	1.0	61	.3%	.3%	.4%	.3%
Micrograph	2.2	1.2	.8	54	.3%	.3%	.3%	.2%
Schlumberger (Applicon)	2.1	.5	.7	22	.3%	.1%	.3%	.1%
Academi Systems	1.9	.4	1.3	23	.2%	.1%	.5%	.1%
Siemens	1.9	1.2	.6	44	.2%	.3%	.2%	.2%
Logic Automation	1.4	.0	1.4	0	.2%	.0%	.5%	.0%
DECAD	1.4	.1	1.0	11	.2%	.0%	.4%	.0%
Microsim	1.4	.0	1.2	0	.2%	.0%	.5%	.0%
National Semiconductor	1.3	.9	.3	15	.2%	.2%	.1%	.1%
Analogy	1.2	.0	1.1	0	.1%	.0%	.4%	.0%
Test Systems Strategies	1.2	.0	1.0	0	.1%	.0%	.4%	.0%
Data I/O	1.1	.0	1.0	0	.1%	.0%	.4%	.0%
Ikos Systems	1.1	.9	.2	0	.1%	.2%	.1%	.0%
Sycotronic AG	1.1	.0	.9	2	.1%	.0%	.3%	.0%
CAD-UL	1.1	.3	.8	40	.1%	.1%	.3%	.2%
Dassault	1.1	.0	.9	0	.1%	.0%	.3%	.0%
Intercad	1.0	.5	.3	50	.1%	.1%	.1%	.2%
Serbi	1.0	.0	1.0	0	.1%	.0%	.4%	.0%
Synopsys	.9	.0	.8	0	.1%	.0%	.3%	.0%
ICL	.8	.5	.2	21	.1%	.1%	.1%	.1%
CAD Software	.8	.0	.6	0	.1%	.0%	.2%	.0%
ACTEL	.7	.0	.7	0	.1%	.0%	.3%	.0%
Westward	.7	.7	.0	38	.1%	.2%	.0%	.2%
Seattle Silicon	.6	.0	.4	0	.1%	.0%	.2%	.0%
Solbourne	.6	.5	.0	42	.1%	.1%	.0%	.2%
Accel Technologies	.4	.0	.4	0	.0%	.0%	.1%	.0%
Everex Systems	.4	.4	.0	113	.0%	.1%	.0%	.5%
Nassteck	.3	.0	.3	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 9 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Aptos	.3	.0	.3	0	.0%	.0%	.1%	.0%
Omation	.3	.0	.3	0	.0%	.0%	.1%	.0%
Electrical Eng. Software	.3	.0	.3	0	.0%	.0%	.1%	.0%
Meta-Software	.3	.0	.3	0	.0%	.0%	.1%	.0%
Olivetti	.3	.1	.1	78	.0%	.0%	.0%	.3%
Instrumatic Espanola	.2	.0	.2	0	.0%	.0%	.1%	.0%
Pacific Numeric	.2	.0	.2	0	.0%	.0%	.1%	.0%
Integrated Silicon Systems	.1	.0	.1	1	.0%	.0%	.0%	.0%
Microtel Pacific Research	.1	.0	.1	0	.0%	.0%	.0%	.0%
Douglas Electronics	.1	.0	.1	0	.0%	.0%	.0%	.0%
Dell Computer	.1	.1	.0	25	.0%	.0%	.0%	.1%
EPIC Design Technology	.1	.0	.1	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.1	.0	.1	0	.0%	.0%	.0%	.0%
Foresight Resources	.1	.0	.0	0	.0%	.0%	.0%	.0%
Logic Modeling Systems	.1	.0	.0	15	.0%	.0%	.0%	.1%
Capilano Computing	.0	.0	.0	0	.0%	.0%	.0%	.0%
Sierra Semiconductor	.0	.0	.0	0	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
DAT Standard Information syste	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	136.8	77.9	45.9	6,703	17.0%	20.6%	16.9%	27.5%
All Companies	804.7	377.8	271.3	24,345	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	677.1	349.0	190.8	21,872	84.1%	92.4%	70.3%	89.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	127.6	28.8	80.5	2,473	15.9%	7.6%	29.7%	10.2%
All Hardware Companies	264.7	222.3	.0	18,411	32.9%	58.8%	.0%	75.6%
All Turnkey & SW Companies	540.0	155.4	271.3	5,933	67.1%	41.1%	100.0%	24.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 10
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	103.7	30.1	51.0	1,372	19.9%	15.1%	24.6%	14.2%
Hewlett-Packard	69.8	47.6	4.9	3,930	13.4%	23.9%	2.3%	40.7%
Dazix	55.3	21.0	22.2	551	10.6%	10.6%	10.7%	5.7%
Racal-Redac	44.8	.2	36.7	155	8.6%	.1%	17.7%	1.6%
Valid	43.5	10.9	23.5	0	8.3%	5.5%	11.3%	.0%
Sun	27.8	25.1	.0	1,869	5.3%	12.6%	.0%	19.4%
Computervision	27.1	12.0	6.4	164	5.2%	6.0%	3.1%	1.7%
Intergraph	25.1	11.7	4.5	268	4.8%	5.8%	2.2%	2.8%
Digital	23.3	16.9	.0	768	4.5%	8.5%	.0%	8.0%
Calay	13.5	4.2	6.8	134	2.6%	2.1%	3.3%	1.4%
Silicon Compiler Systems	13.0	.0	8.7	0	2.5%	.0%	4.2%	.0%
Secmai	12.2	7.3	2.6	99	2.3%	3.7%	1.2%	1.0%
Cadence	7.3	.0	6.2	0	1.4%	.0%	3.0%	.0%
Scientific Calc.	6.8	1.8	3.2	33	1.3%	.9%	1.6%	.3%
VLSI Technology	6.2	.4	4.9	20	1.2%	.2%	2.4%	.2%
European Silicon Systems	5.8	1.5	4.4	27	1.1%	.7%	2.1%	.3%
LSI Logic	4.5	.5	3.4	17	.9%	.2%	1.6%	.2%
ABB Cade International	4.1	2.1	1.0	2	.8%	1.1%	.5%	.0%
Silvar-Lisco	2.9	.0	1.6	0	.6%	.0%	.8%	.0%
Genrad	2.8	.4	1.9	0	.5%	.2%	.9%	.0%
Assigraph	1.9	.0	1.5	0	.4%	.0%	.7%	.0%
Siemens	1.9	1.2	.6	44	.4%	.6%	.3%	.5%
Schlumberger (Applicon)	1.9	.5	.6	17	.4%	.2%	.3%	.2%
Academi Systems	1.6	.3	1.1	19	.3%	.2%	.6%	.2%
Logic Automation	1.4	.0	1.4	0	.3%	.0%	.7%	.0%
DECAD	1.3	.1	1.0	10	.3%	.0%	.5%	.1%
National Semiconductor	1.3	.9	.3	15	.2%	.5%	.2%	.2%
Analogy	1.2	.0	1.1	0	.2%	.0%	.5%	.0%
Teradyne	1.2	.0	1.0	0	.2%	.0%	.5%	.0%
Test Systems Strategies	1.0	.0	.9	0	.2%	.0%	.4%	.0%
Ikos Systems	1.0	.8	.2	0	.2%	.4%	.1%	.0%
ICL	.8	.5	.2	21	.1%	.2%	.1%	.2%
IBM	.8	.5	.1	7	.1%	.2%	.1%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 10
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: Europe
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Seattle Silicon	.6	.0	.4	0	.1%	.0%	.2%	.0%
Solbourne	.5	.4	.0	34	.1%	.2%	.0%	.3%
Synopsys	.5	.0	.4	0	.1%	.0%	.2%	.0%
Westward	.4	.4	.0	21	.1%	.2%	.0%	.2%
Aucotec	.3	.1	.1	29	.1%	.0%	.1%	.3%
Microsim	.2	.0	.2	0	.0%	.0%	.1%	.0%
Xilinx	.2	.0	.2	0	.0%	.0%	.1%	.0%
Electrical Eng. Software	.2	.0	.2	0	.0%	.0%	.1%	.0%
Micrograph	.2	.2	.0	8	.0%	.1%	.0%	.1%
Meta-Software	.2	.0	.2	0	.0%	.0%	.1%	.0%
Pacific Numeric	.2	.0	.2	0	.0%	.0%	.1%	.0%
Dassault	.2	.0	.1	0	.0%	.0%	.1%	.0%
Autodesk	.2	.0	.2	0	.0%	.0%	.1%	.0%
CADAM	.1	.0	.1	0	.0%	.0%	.1%	.0%
ACTEL	.1	.0	.1	0	.0%	.0%	.1%	.0%
Data I/O	.1	.0	.1	0	.0%	.0%	.0%	.0%
Zycad	.1	.1	.0	0	.0%	.0%	.0%	.0%
EPIC Design Technology	.1	.0	.1	0	.0%	.0%	.0%	.0%
Integrated Silicon Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%
Logic Modeling Systems	.1	.0	.0	15	.0%	.0%	.0%	.2%
Serbi	.1	.0	.1	0	.0%	.0%	.0%	.0%
Sierra Semiconductor	.0	.0	.0	0	.0%	.0%	.0%	.0%
Everex Systems	.0	.0	.0	2	.0%	.0%	.0%	.0%
Microtel Pacific Research	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 10 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: Europe
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Other Companies	38.8	14.1	19.3	245	7.4%	7.1%	9.3%	2.5%
All Companies	522.1	199.2	207.0	9,653	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	433.1	181.2	151.0	9,084	82.9%	91.0%	72.9%	94.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	89.0	17.9	56.1	569	17.1%	9.0%	27.1%	5.9%
All Hardware Companies	94.1	75.3	.0	5,993	18.0%	37.8%	.0%	62.1%
All Turnkey & SW Companies	428.0	123.8	207.0	3,660	82.0%	62.2%	100.0%	37.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 11
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Host/Server
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	66.8	50.2	.0	0	41.2%	43.9%	.0%	.0%
IBM	14.7	9.5	2.7	154	9.1%	8.3%	17.0%	6.8%
Zycad	7.8	5.5	.2	37	4.8%	4.8%	1.0%	1.6%
Intergraph	5.5	2.8	.9	53	3.4%	2.4%	5.6%	2.3%
Computervision	4.6	2.2	1.1	97	2.9%	1.9%	7.0%	4.3%
Hewlett-Packard	3.8	3.2	.0	191	2.3%	2.8%	.0%	8.4%
Cadence	2.8	.0	2.3	0	1.7%	.0%	14.8%	.0%
Scientific Calc.	2.3	.3	1.4	9	1.4%	.2%	8.9%	.4%
Teradyne	2.0	.0	1.6	0	1.2%	.0%	10.1%	.0%
Racal-Redac	1.2	.0	1.0	8	.7%	.0%	6.4%	.4%
VLSI Technology	1.1	.1	.9	4	.7%	.1%	5.4%	.2%
Assigraph	1.0	.0	.8	35	.6%	.0%	5.2%	1.5%
Dassault	.9	.0	.8	0	.5%	.0%	4.9%	.0%
Genrad	.7	.1	.5	0	.4%	.1%	3.0%	.0%
LSI Logic	.5	.1	.4	2	.3%	.0%	2.3%	.1%
Synopsys	.5	.0	.4	0	.3%	.0%	2.4%	.0%
Silvar-Lisco	.3	.0	.2	0	.2%	.0%	1.1%	.0%
Aucotec	.3	.1	.1	29	.2%	.1%	.8%	1.3%
Schlumberger (Applicon)	.3	.1	.1	5	.2%	.1%	.4%	.2%
Test Systems Strategies	.2	.0	.1	0	.1%	.0%	.9%	.0%
CADAM	.2	.0	.1	0	.1%	.0%	.9%	.0%
Solbourne	.1	.1	.0	8	.1%	.1%	.0%	.4%
Electrical Eng. Software	.1	.0	.1	0	.1%	.0%	.5%	.0%
Meta-Software	.1	.0	.1	0	.0%	.0%	.4%	.0%
DECAD	.1	.0	.0	1	.0%	.0%	.3%	.0%
Data I/O	.1	.0	.1	0	.0%	.0%	.3%	.0%
Logic Automation	.0	.0	.0	0	.0%	.0%	.3%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 11 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Host/Server
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	47.2	40.4	2.2	1,701	29.1%	35.4%	13.7%	74.9%
All Companies	162.0	114.2	15.8	2,269	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	158.6	114.1	13.0	2,196	97.9%	99.9%	82.5%	96.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	3.5	.1	2.8	73	2.1%	.1%	17.5%	3.2%
All Hardware Companies	115.0	93.7	.0	1,836	71.0%	82.0%	.0%	80.9%
All Turnkey & SW Companies	47.0	20.6	15.8	433	29.0%	18.0%	100.0%	19.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 12
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Personal Computer
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compaq	26.4	26.4	.0	4,402	21.9%	41.0%	.0%	35.4%
Hewlett-Packard	9.5	7.8	.0	1,581	7.9%	12.1%	.0%	12.7%
LPKF	7.5	4.5	2.3	750	6.2%	7.0%	4.6%	6.0%
CADAM	6.4	.0	5.7	0	5.3%	.0%	11.7%	.0%
Ziegler	6.1	.2	5.5	198	5.0%	.3%	11.3%	1.6%
Autodesk	5.1	.0	5.1	0	4.2%	.0%	10.4%	.0%
Aucotec	4.7	1.9	2.[illegible]	520	3.9%	2.9%	4.8%	4.2%
Xilinx	4.3	.0	3.9	0	3.5%	.0%	7.9%	.0%
Apple Computer	3.5	3.1	.0	672	2.9%	4.7%	.0%	5.4%
BETRONEX	3.1	.0	3.1	0	2.5%	.0%	6.3%	.0%
IBM	2.9	2.8	.0	591	2.4%	4.3%	.0%	4.8%
ALS Design	2.9	.3	2.3	50	2.4%	.4%	4.7%	.4%
Orcad	2.6	.0	2.5	0	2.1%	.0%	5.0%	.0%
Altera	2.3	.0	2.0	0	1.9%	.0%	4.1%	.0%
Rotring EURCAD	2.2	1.2	1.0	61	1.8%	1.9%	2.0%	.5%
Micrograph	2.0	1.0	.8	46	1.6%	1.6%	1.5%	.4%
European Silicon Systems	1.5	.4	1.1	13	1.2%	.5%	2.2%	.1%
Microsim	1.1	.0	1.0	0	.9%	.0%	2.1%	.0%
Sycotronic AG	1.1	.0	.9	2	.9%	.0%	1.8%	.0%
CAD-UL	1.1	.3	.8	40	.9%	.5%	1.6%	.3%
Intercad	1.0	.5	.3	50	.8%	.8%	.6%	.4%
Data I/O	1.0	.0	.8	0	.8%	.0%	1.7%	.0%
Serbi	.9	.0	.9	0	.8%	.0%	1.9%	.0%
Teradyne	.8	.0	.7	0	.7%	.0%	1.4%	.0%
CAD Software	.8	.0	.6	0	.6%	.0%	1.3%	.0%
ACTEL	.6	.0	.6	0	.5%	.0%	1.3%	.0%
Accel Technologies	.4	.0	.4	0	.3%	.0%	.7%	.0%
Everex Systems	.4	.4	.0	110	.3%	.6%	.0%	.9%
Massteck	.3	.0	.3	0	.3%	.0%	.7%	.0%
Computervision	.3	.1	.0	9	.3%	.2%	.1%	.1%
Aptos	.3	.0	.3	0	.3%	.0%	.6%	.0%
Omation	.3	.0	.3	0	.3%	.0%	.6%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 12 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Personal Computer
REGION: Europe
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Academi Systems	.3	.1	.2	3	.2%	.1%	.4%	.0%
Olivetti	.3	.1	.1	78	.2%	.1%	.3%	.6%
Westward	.3	.3	.0	17	.2%	.4%	.0%	.1%
Instrumatic Espanola	.2	.0	.2	0	.2%	.0%	.4%	.0%
Secmai	.2	.1	.0	2	.1%	.2%	.0%	.0%
Ikos Systems	.1	.1	.0	0	.1%	.2%	.0%	.0%
Douglas Electronics	.1	.0	.1	0	.1%	.0%	.2%	.0%
Genrad	.1	.0	.1	0	.1%	.0%	.1%	.0%
Dell Computer	.1	.1	.0	25	.1%	.2%	.0%	.2%
Microtel Pacific Research	.1	.0	.1	0	.1%	.0%	.2%	.0%
Racal-Redac	.1	.0	.1	0	.1%	.0%	.1%	.0%
Integrated Silicon Systems	.1	.0	.1	1	.0%	.0%	.1%	.0%
American Small Business Comp.	.1	.0	.1	0	.0%	.0%	.1%	.0%
Foresight Resources	.1	.0	.0	0	.0%	.0%	.1%	.0%
Capilano Computing	.0	.0	.0	0	.0%	.0%	.1%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
DAT Standard Information syste	.0	.0	.0	0	.0%	.0%	.0%	.0%
Pacific Numeric	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	50.8	23.4	24.5	4,758	42.2%	36.3%	50.4%	38.3%
All Companies	120.6	64.4	48.6	12,423	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	85.5	53.6	26.9	10,592	70.9%	83.3%	55.3%	85.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	35.1	10.8	21.7	1,831	29.1%	16.7%	44.7%	14.7%
All Hardware Companies	55.6	53.4	.0	10,583	46.1%	82.9%	.0%	85.2%
All Turnkey & SW Companies	65.0	11.0	48.5	1,840	53.9%	17.1%	100.0%	14.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 13
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	82.7	33.9	41.4	1,078	10.8%	9.4%	12.9%	6.6%
Zuken	62.6	23.6	34.5	380	8.1%	6.5%	10.7%	2.3%
Fujitsu	61.2	38.7	15.4	1,370	8.0%	10.7%	4.8%	8.3%
NEC	55.7	38.2	13.0	3,039	7.2%	10.6%	4.1%	18.5%
Hewlett-Packard	49.9	35.2	8.7	2,417	6.5%	9.8%	2.7%	14.7%
Cadence	48.9	.0	43.8	0	6.4%	.0%	13.6%	.0%
Seiko Instruments--NO OEM	45.1	27.5	9.1	258	5.9%	7.6%	2.8%	1.6%
Valid	40.0	9.6	27.2	200	5.2%	2.7%	8.5%	1.2%
Sun	34.1	30.7	.0	2,940	4.4%	8.5%	.0%	17.9%
Dazix	30.7	9.0	19.2	280	4.0%	2.5%	6.0%	1.7%
Racal-Redac	24.5	7.2	15.6	190	3.2%	2.0%	4.9%	1.2%
Wacom	20.9	9.0	9.8	558	2.7%	2.5%	3.0%	3.4%
Sharp	20.3	8.7	9.6	115	2.6%	2.4%	3.0%	.7%
Digital	20.3	15.2	.0	173	2.6%	4.2%	.0%	1.1%
IBM	16.5	11.2	2.7	522	2.1%	3.1%	.8%	3.2%
CADIX	15.1	6.1	7.6	105	2.0%	1.7%	2.4%	.6%
Computervision	13.0	5.4	5.7	110	1.7%	1.5%	1.8%	.7%
Hitachi	9.0	5.9	2.2	103	1.2%	1.6%	.7%	.6%
Uchida Yoko	8.4	4.2	3.4	132	1.1%	1.2%	1.0%	.8%
Toshiba--NO OEM	8.1	4.0	3.2	75	1.0%	1.1%	1.0%	.5%
Mitsubishi Electric	7.2	5.3	1.2	140	.9%	1.5%	.4%	.9%
Kanematsu Semiconductor	6.5	3.3	2.5	60	.8%	.9%	.8%	.4%
Scientific Calc.	6.5	1.4	3.3	30	.8%	.4%	1.0%	.2%
Silicon Compiler Systems	6.5	.0	4.3	0	.8%	.0%	1.3%	.0%
Data I/O	6.3	.0	5.3	0	.8%	.0%	1.7%	.0%
Tokyo Electron--NO OEM	4.4	1.5	2.0	16	.6%	.4%	.6%	.1%
Xilinx	3.8	.0	3.4	0	.5%	.0%	1.1%	.0%
Intergraph	3.4	1.8	.6	35	.4%	.5%	.2%	.2%
Silvar-Lisco	3.2	.0	2.7	0	.4%	.0%	.8%	.0%
Zycad	3.2	2.2	.1	15	.4%	.6%	.0%	.1%
Sony	2.8	2.4	.0	182	.4%	.7%	.0%	1.1%
Calay	2.5	.6	1.7	20	.3%	.2%	.5%	.1%
Ikos Systems	2.2	1.8	.4	0	.3%	.5%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 13
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Kyocera	2.2	.9	1.1	10	.3%	.2%	.3%	.1%
Seattle Silicon	2.1	.0	1.6	0	.3%	.0%	.5%	.0%
Century Research Center	2.0	1.0	.8	12	.3%	.3%	.3%	.1%
LSI Logic	2.0	.2	1.5	8	.3%	.1%	.5%	.0%
VLSI Technology	1.9	.1	1.5	6	.2%	.0%	.5%	.0%
Autodesk	1.9	.0	1.9	0	.2%	.0%	.6%	.0%
Omron	1.8	.9	.7	50	.2%	.2%	.2%	.3%
Synopsys	1.8	.0	1.5	0	.2%	.0%	.5%	.0%
Sophia Systems	1.7	.4	1.1	20	.2%	.1%	.3%	.1%
Sumisho Electronics	1.6	1.2	.3	50	.2%	.3%	.1%	.3%
Altera	1.4	.0	1.2	0	.2%	.0%	.4%	.0%
Compaq	1.3	1.3	.0	220	.2%	.4%	.0%	1.3%
Meta-Software	1.3	.0	1.3	0	.2%	.0%	.4%	.0%
Test Systems Strategies	1.2	.0	1.0	0	.2%	.0%	.3%	.0%
Orcad	1.1	.0	1.0	0	.1%	.0%	.3%	.0%
BETRONEX	.9	.0	.9	0	.1%	.0%	.3%	.0%
Genrad	.9	.1	.6	0	.1%	.0%	.2%	.0%
Hitachi Zosen Info Systems	.8	.4	.3	7	.1%	.1%	.1%	.0%
Microsim	.8	.0	.8	0	.1%	.0%	.2%	.0%
Electrical Eng. Software	.8	.0	.7	0	.1%	.0%	.2%	.0%
Teradyne	.8	.0	.6	0	.1%	.0%	.2%	.0%
Solbourne	.7	.7	.0	54	.1%	.2%	.0%	.3%
Integrated Silicon Systems	.7	.1	.6	7	.1%	.0%	.2%	.0%
Analogy	.6	.0	.5	0	.1%	.0%	.2%	.0%
Apple Computer	.6	.5	.0	112	.1%	.1%	.0%	.7%
CADAM	.5	.0	.4	0	.1%	.0%	.1%	.0%
EPIC Design Technology	.4	.0	.4	0	.1%	.0%	.1%	.0%
Logic Automation	.4	.0	.4	0	.0%	.0%	.1%	.0%
Andor	.3	.0	.3	2	.0%	.0%	.1%	.0%
CAD Software	.2	.0	.2	0	.0%	.0%	.1%	.0%
Silc Technologies	.2	.0	.1	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 13 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Douglas Electronics	.1	.0	.1	0	.0%	.0%	.0%	.0%
Accel Technologies	.1	.0	.1	0	.0%	.0%	.0%	.0%
Siemens	.1	.1	.0	2	.0%	.0%	.0%	.0%
Everex Systems	.1	.1	.0	28	.0%	.0%	.0%	.2%
Omation	.1	.0	.1	0	.0%	.0%	.0%	.0%
Aptos	.1	.0	.1	0	.0%	.0%	.0%	.0%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.0%
ACTEL	.1	.0	.1	0	.0%	.0%	.0%	.0%
Logic Modeling Systems	.1	.0	.0	15	.0%	.0%	.0%	.1%
Capilano Computing	.0	.0	.0	0	.0%	.0%	.0%	.0%
Massteck	.0	.0	.0	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	50.0	25.5	19.9	1,792	6.5%	7.0%	6.2%	10.9%
All Companies	769.1	361.3	321.5	16,449	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	413.6	175.0	189.7	9,617	53.8%	48.4%	59.0%	58.5%
All Asian-Based Companies	327.5	178.4	113.6	6,619	42.6%	49.4%	35.3%	40.2%
All European-Based Companies	28.0	7.9	18.2	213	3.6%	2.2%	5.7%	1.3%
All Hardware Companies	92.7	79.9	.0	6,865	12.1%	22.1%	.0%	41.7%
All Turnkey & SW Companies	676.4	281.4	321.5	9,584	87.9%	77.9%	100.0%	58.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 14
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	82.7	33.9	41.4	1,078	14.7%	14.0%	15.8%	10.5%
Zuken	51.2	19.0	28.7	273	9.1%	7.9%	11.0%	2.7%
Hewlett-Packard	46.6	32.5	8.7	1,993	8.3%	13.5%	3.3%	19.4%
Cadence	42.9	.0	38.5	0	7.6%	.0%	14.7%	.0%
Valid	40.0	9.6	27.2	200	7.1%	4.0%	10.4%	2.0%
Seiko Instruments--NO OEM	36.7	22.0	7.3	229	6.5%	9.1%	2.8%	2.2%
NEC	32.6	17.0	13.0	1,509	5.8%	7.0%	5.0%	14.7%
Dazix	30.7	9.0	19.2	280	5.5%	3.7%	7.4%	2.7%
Sun	27.3	24.5	.0	2,641	4.8%	10.2%	.0%	25.8%
Fujitsu	24.5	16.1	5.9	586	4.3%	6.7%	2.3%	5.7%
Racal-Redac	23.3	7.2	14.5	180	4.1%	3.0%	5.6%	1.8%
Sharp	20.3	8.7	9.6	115	3.6%	3.6%	3.7%	1.1%
CADIX	15.1	6.1	7.6	105	2.7%	2.5%	2.9%	1.0%
Computervision	9.6	3.8	4.5	69	1.7%	1.6%	1.7%	.7%
Uchida Yoko	8.4	4.2	3.4	132	1.5%	1.7%	1.3%	1.3%
Toshiba--NO OEM	8.1	4.0	3.2	75	1.4%	1.7%	1.2%	.7%
Silicon Compiler Systems	6.5	.0	4.3	0	1.2%	.0%	1.7%	.0%
Digital	5.2	3.9	.0	173	.9%	1.6%	.0%	1.7%
Kanematsu Semiconductor	5.1	2.3	2.2	60	.9%	1.0%	.9%	.6%
Mitsubishi Electric	5.0	4.2	.5	56	.9%	1.7%	.2%	.5%
Scientific Calc.	4.9	1.3	2.3	23	.9%	.5%	.9%	.2%
Tokyo Electron--NO OEM	4.4	1.5	2.0	16	.8%	.6%	.8%	.2%
Hitachi	4.1	2.0	1.6	76	.7%	.8%	.6%	.7%
Silvar-Lisco	2.9	.0	2.4	0	.5%	.0%	.9%	.0%
Sony	2.8	2.4	.0	182	.5%	1.0%	.0%	1.8%
Intergraph	2.7	1.6	.5	29	.5%	.6%	.2%	.3%
Calay	2.5	.6	1.7	20	.4%	.3%	.6%	.2%
Kyocera	2.2	.9	1.1	10	.4%	.4%	.4%	.1%
Seattle Silicon	2.1	.0	1.6	0	.4%	.0%	.6%	.0%
Century Research Center	2.0	1.0	.8	12	.4%	.4%	.3%	.1%
Ikos Systems	2.0	1.6	.4	0	.3%	.7%	.1%	.0%
LSI Logic	1.8	.2	1.4	7	.3%	.1%	.5%	.1%
Omron	1.8	.9	.7	50	.3%	.4%	.3%	.5%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 14
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
VLSI Technology	1.6	.1	1.5	5	.3%	.0%	.5%	.1%
Sumisho Electronics	1.2	1.0	.1	7	.2%	.4%	.0%	.1%
Test Systems Strategies	1.0	.0	.9	0	.2%	.0%	.3%	.0%
Meta-Software	.9	.0	.9	0	.2%	.0%	.3%	.0%
Synopsys	.9	.0	.8	0	.2%	.0%	.3%	.0%
Hitachi Zosen Info Systems	.8	.4	.3	7	.1%	.2%	.1%	.1%
IBM	.7	.5	.2	7	.1%	.2%	.1%	.1%
Genrad	.7	.1	.4	0	.1%	.0%	.2%	.0%
Data I/O	.6	.0	.5	0	.1%	.0%	.2%	.0%
Analogy	.6	.0	.5	0	.1%	.0%	.2%	.0%
Solbourne	.6	.5	.0	43	.1%	.2%	.0%	.4%
Electrical Eng. Software	.6	.0	.5	0	.1%	.0%	.2%	.0%
EPIC Design Technology	.4	.0	.4	0	.1%	.0%	.1%	.0%
Integrated Silicon Systems	.4	.1	.3	3	.1%	.0%	.1%	.0%
Logic Automation	.4	.0	.4	0	.1%	.0%	.1%	.0%
Sophia Systems	.3	.1	.2	2	.1%	.0%	.1%	.0%
Teradyne	.2	.0	.2	0	.0%	.0%	.1%	.0%
Xilinx	.2	.0	.2	0	.0%	.0%	.1%	.0%
Autodesk	.2	.0	.2	0	.0%	.0%	.1%	.0%
Silc Technologies	.2	.0	.1	0	.0%	.0%	.0%	.0%
Microsim	.1	.0	.1	0	.0%	.0%	.0%	.0%
CADAM	.1	.0	.1	0	.0%	.0%	.0%	.0%
Siemens	.1	.1	.0	2	.0%	.0%	.0%	.0%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.0%
Logic Modeling Systems	.1	.0	.0	15	.0%	.0%	.0%	.1%
Zycad	.0	.0	.0	0	.0%	.0%	.0%	.0%
ACTEL	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 14 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	25.7	10.4	12.4	399	4.6%	4.3%	4.7%	3.9%
All Companies	563.2	241.2	261.3	10,250	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	319.1	123.1	160.9	6,566	56.7%	51.0%	61.6%	64.1%
All Asian-Based Companies	218.2	110.3	84.2	3,481	38.7%	45.7%	32.2%	34.0%
All European-Based Companies	25.9	7.9	16.2	202	4.6%	3.3%	6.2%	2.0%
All Hardware Companies	48.1	41.6	.0	4,033	8.5%	17.2%	.0%	39.3%
All Turnkey & SW Companies	515.1	199.6	261.3	6,217	91.5%	82.8%	100.0%	60.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 15
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Host/Server
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Fujitsu	27.5	16.9	6.6	326	22.8%	22.8%	23.0%	21.4%
Digital	15.1	11.3	.0	0	12.5%	15.2%	.0%	.0%
IBM	13.9	9.0	2.5	146	11.5%	12.2%	8.9%	9.5%
Zuken	11.4	4.6	5.9	107	9.5%	6.2%	20.6%	7.0%
Seiko Instruments--NO OEM	8.4	5.4	1.8	29	7.0%	7.4%	6.3%	1.9%
Sun	6.8	6.1	.0	299	5.7%	8.3%	.0%	19.6%
Cadence	6.0	.0	5.4	0	4.9%	.0%	18.9%	.0%
Hitachi	5.0	3.9	.5	27	4.1%	5.3%	1.9%	1.7%
Computervision	3.4	1.6	1.3	41	2.8%	2.2%	4.4%	2.7%
Zycad	3.1	2.2	.1	15	2.6%	2.9%	.2%	1.0%
Scientific Calc.	1.6	.2	1.0	7	1.3%	.2%	3.5%	.4%
Mitsubishi Electric	1.4	.7	.4	5	1.2%	.9%	1.5%	.3%
Kanematsu Semiconductor	1.4	1.0	.3	0	1.2%	1.3%	1.1%	.0%
Hewlett-Packard	1.2	1.0	.0	59	1.0%	1.3%	.0%	3.8%
Synopsys	.9	.0	.8	0	.7%	.0%	2.7%	.0%
Intergraph	.6	.3	.1	6	.5%	.4%	.3%	.4%
Teradyne	.4	.0	.3	0	.3%	.0%	1.1%	.0%
Meta-Software	.4	.0	.4	0	.3%	.0%	1.3%	.0%
Silvar-Lisco	.3	.0	.3	0	.3%	.0%	.9%	.0%
Data I/O	.3	.0	.3	0	.3%	.0%	.9%	.0%
VLSI Technology	.3	.0	.2	1	.2%	.0%	.8%	.1%
Electrical Eng. Software	.2	.0	.2	0	.2%	.0%	.8%	.0%
LSI Logic	.2	.0	.2	1	.2%	.0%	.5%	.0%
Test Systems Strategies	.2	.0	.1	0	.1%	.0%	.5%	.0%
CADAM	.2	.0	.1	0	.1%	.0%	.5%	.0%
Genrad	.2	.0	.1	0	.1%	.0%	.4%	.0%
Solbourne	.1	.1	.0	11	.1%	.2%	.0%	.7%
Silc Technologies	.0	.0	.0	0	.0%	.0%	.0%	.0%
Logic Automation	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 15 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Host/Server
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Other Companies	13.6	10.7	1.6	449	11.3%	14.5%	5.7%	29.4%
All Companies	120.9	74.0	28.5	1,526	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	67.1	42.5	13.3	1,033	55.5%	57.4%	46.7%	67.7%
All Asian-Based Companies	53.8	31.5	15.2	493	44.5%	42.6%	53.3%	32.3%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	34.9	29.2	.0	817	28.9%	39.4%	.0%	53.6%
All Turnkey & SW Companies	86.0	44.8	28.5	709	71.1%	60.6%	100.0%	46.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 16
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Personal Computer
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
Company	Revenue	Revenue	Revenue	Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
NEC	23.1	21.2	.0	1,530	27.1%	46.0%	.0%	32.7%
Wacom	20.9	9.0	9.8	558	24.5%	19.4%	30.9%	11.9%
Fujitsu	9.2	5.7	3.0	458	10.8%	12.3%	9.3%	9.8%
Data I/O	5.3	.0	4.5	0	6.3%	.0%	14.3%	.0%
Xilinx	3.6	.0	3.2	0	4.2%	.0%	10.1%	.0%
Hewlett-Packard	2.2	1.8	.0	366	2.6%	3.9%	.0%	7.8%
IBM	1.8	1.7	.0	369	2.2%	3.8%	.0%	7.9%
Autodesk	1.7	.0	1.7	0	2.0%	.0%	5.4%	.0%
Sophia Systems	1.4	.3	.9	18	1.6%	.7%	2.8%	.4%
Altera	1.4	.0	1.2	0	1.6%	.0%	3.8%	.0%
Compaq	1.3	1.3	.0	220	1.6%	2.9%	.0%	4.7%
Racal-Redac	1.2	.1	1.1	10	1.4%	.1%	3.4%	.2%
Orcad	1.1	.0	1.0	0	1.3%	.0%	3.2%	.0%
BETRONEX	.9	.0	.9	0	1.1%	.0%	2.9%	.0%
Mitsubishi Electric	.7	.5	.3	79	.8%	1.0%	.9%	1.7%
Microsim	.7	.0	.6	0	.8%	.0%	2.0%	.0%
Apple Computer	.6	.5	.0	112	.7%	1.1%	.0%	2.4%
Sumisho Electronics	.4	.2	.1	43	.5%	.5%	.4%	.9%
Integrated Silicon Systems	.4	.1	.3	4	.4%	.2%	.9%	.1%
Andor	.3	.0	.3	2	.4%	.1%	.8%	.0%
Ikos Systems	.2	.2	.1	0	.3%	.4%	.2%	.0%
CAD Software	.2	.0	.2	0	.2%	.0%	.6%	.0%
CADAM	.2	.0	.2	0	.2%	.0%	.6%	.0%
Teradyne	.2	.0	.1	0	.2%	.0%	.4%	.0%
Douglas Electronics	.1	.0	.1	0	.2%	.0%	.4%	.0%
Accel Technologies	.1	.0	.1	0	.1%	.0%	.3%	.0%
Everex Systems	.1	.1	.0	28	.1%	.2%	.0%	.6%
Omation	.1	.0	.1	0	.1%	.0%	.3%	.0%
Aptos	.1	.0	.1	0	.1%	.0%	.2%	.0%
ACTEL	.0	.0	.0	0	.0%	.0%	.1%	.0%
Capilano Computing	.0	.0	.0	0	.0%	.0%	.1%	.0%
Genrad	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 16 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Personal Computer
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Masssteck	.0	.0	.0	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	10.7	4.3	5.9	943	12.6%	9.4%	18.6%	20.2%
All Companies	85.1	46.1	31.7	4,673	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	27.4	9.4	15.6	2,018	32.3%	20.4%	49.0%	43.2%
All Asian-Based Companies	55.5	36.7	14.2	2,645	65.2%	79.5%	44.7%	56.6%
All European-Based Companies	2.1	.1	2.0	10	2.5%	.1%	6.3%	.2%
All Hardware Companies	9.7	9.1	.0	2,014	11.4%	19.8%	.0%	43.1%
All Turnkey & SW Companies	75.4	37.0	31.7	2,659	88.6%	80.2%	100.0%	56.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 17
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	6.8	5.1	.0	58	18.5%	19.9%	.0%	3.3%
Sun	5.8	5.2	.0	435	15.9%	20.5%	.0%	24.6%
Hewlett-Packard	4.6	3.5	.3	312	12.5%	13.8%	4.8%	17.6%
Compaq	2.0	2.0	.0	330	5.4%	7.8%	.0%	18.7%
IBM	1.6	1.2	.2	87	4.5%	4.6%	4.0%	4.9%
Fujitsu	1.2	.8	.3	27	3.2%	3.0%	5.2%	1.5%
LSI Logic	1.0	.1	.7	4	2.7%	.4%	12.7%	.2%
Silicon Compiler Systems	.9	.0	.6	0	2.5%	.0%	10.7%	.0%
Intergraph	.9	.5	.2	10	2.5%	2.0%	2.9%	.5%
Xilinx	.8	.0	.7	0	2.0%	.0%	11.5%	.0%
Computervision	.6	.2	.2	3	1.7%	.9%	3.4%	.2%
Data I/O	.6	.0	.5	0	1.6%	.0%	8.3%	.0%
Ikos Systems	.6	.4	.1	0	1.5%	1.7%	1.9%	.0%
Secmai	.2	.0	.2	0	.6%	.1%	3.1%	.0%
Teradyne	.2	.0	.2	0	.5%	.0%	2.8%	.0%
BETRONEX	.2	.0	.2	0	.5%	.0%	2.9%	.0%
Genrad	.2	.0	.1	0	.5%	.1%	1.9%	.0%
Orcad	.2	.0	.2	0	.5%	.0%	2.6%	.0%
Royal Digital Systems	.2	.0	.2	0	.5%	.0%	2.6%	.0%
Autodesk	.2	.0	.2	0	.4%	.0%	2.8%	.0%
Solbourne	.2	.1	.0	12	.4%	.5%	.0%	.7%
Apple Computer	.1	.1	.0	28	.4%	.5%	.0%	1.6%
Integrated Silicon Systems	.1	.0	.1	1	.3%	.1%	1.7%	.1%
Racal-Redac	.1	.1	.0	0	.3%	.4%	.0%	.0%
Spectrum Software	.1	.0	.1	0	.3%	.0%	1.9%	.0%
CAD Software	.1	.0	.1	0	.2%	.0%	1.2%	.0%
ACTEL	.1	.0	.1	0	.1%	.0%	.9%	.0%
CADAM	.0	.0	.0	0	.1%	.0%	.3%	.0%
Capilano Computing	.0	.0	.0	0	.1%	.0%	.5%	.0%
Massteck	.0	.0	.0	0	.1%	.0%	.5%	.0%
Olivetti	.0	.0	.0	12	.1%	.1%	.2%	.7%
Sycotronic AG	.0	.0	.0	0	.1%	.0%	.3%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 17 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
CAD-UL	.0	.0	.0	0	.0%	.0%	.2%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.2%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.2%	.0%
Other Companies	8.5	6.6	1.3	452	23.1%	25.7%	22.5%	25.6%
All Companies	36.6	25.5	5.8	1,769	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	34.9	24.6	5.1	1,731	95.2%	96.4%	88.0%	97.8%
All Asian-Based Companies	1.2	.8	.3	27	3.2%	3.0%	5.2%	1.5%
All European-Based Companies	.6	.1	.4	12	1.6%	.5%	6.9%	.7%
All Hardware Companies	24.8	21.4	.0	1,664	67.7%	84.1%	.0%	94.1%
All Turnkey & SW Companies	11.8	4.1	5.8	105	32.3%	15.9%	100.0%	5.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 18
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Sun	4.7	4.2	.0	391	29.5%	40.4%	.0%	52.6%
Hewlett-Packard	4.1	3.1	.3	258	25.8%	30.0%	10.0%	34.7%
Digital	1.8	1.3	.0	58	11.1%	12.7%	.0%	7.8%
Silicon Compiler Systems	.9	.0	.6	0	5.9%	.0%	22.1%	.0%
LSI Logic	.9	.1	.7	3	5.7%	.9%	23.8%	.5%
Intergraph	.8	.4	.1	8	4.8%	4.1%	5.0%	1.1%
Computervision	.6	.2	.1	3	3.6%	2.2%	5.0%	.4%
Ikos Systems	.5	.4	.1	0	3.1%	3.8%	3.6%	.0%
Fujitsu	.5	.3	.1	11	3.0%	3.1%	4.3%	1.5%
Secmai	.2	.0	.2	0	1.3%	.2%	6.0%	.0%
Royal Digital Systems	.2	.0	.2	0	1.1%	.0%	5.3%	.0%
Genrad	.1	.0	.1	0	.8%	.2%	3.2%	.0%
Solbourne	.1	.1	.0	10	.8%	1.2%	.0%	1.3%
Racal-Redac	.1	.1	.0	0	.7%	.9%	.0%	.0%
Data I/O	.1	.0	.1	0	.4%	.0%	1.8%	.0%
IBM	.1	.0	.0	1	.4%	.4%	.4%	.1%
Integrated Silicon Systems	.1	.0	.1	0	.4%	.1%	1.8%	.1%
Teradyne	.1	.0	.1	0	.4%	.0%	1.8%	.0%
Xilinx	.0	.0	.0	0	.3%	.0%	1.1%	.0%
ACTEL	.0	.0	.0	0	.1%	.0%	.4%	.0%
Autodesk	.0	.0	.0	0	.1%	.0%	.4%	.0%
CADAM	.0	.0	.0	0	.1%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 18 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Technical Workstation
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	1.1	.4	.6	0	6.8%	4.3%	20.3%	.1%
All Companies	15.8	10.4	2.8	743	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	15.0	9.9	2.5	732	95.0%	95.8%	89.7%	98.5%
All Asian-Based Companies	.5	.3	.1	11	3.0%	3.1%	4.3%	1.5%
All European-Based Companies	.3	.1	.2	0	2.0%	1.1%	6.0%	.0%
All Hardware Companies	9.0	7.7	.0	680	57.3%	74.7%	.0%	91.6%
All Turnkey & SW Companies	6.7	2.6	2.8	63	42.7%	25.3%	100.0%	8.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 19
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Host/Server
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	5.0	3.8	.0	0	34.9%	32.9%	.0%	.0%
IBM	1.2	.8	.2	13	8.5%	6.9%	37.9%	4.1%
Sun	1.2	1.0	.0	44	8.2%	9.1%	.0%	14.2%
Fujitsu	.5	.3	.1	6	3.7%	2.9%	20.7%	2.0%
Hewlett-Packard	.3	.2	.0	14	1.9%	1.9%	.0%	4.4%
Intergraph	.2	.1	.0	2	1.2%	.7%	5.2%	.5%
LSI Logic	.1	.0	.1	0	.7%	.1%	12.1%	.1%
Teradyne	.1	.0	.1	0	.7%	.0%	13.8%	.0%
Data I/O	.0	.0	.0	0	.2%	.0%	3.4%	.0%
Genrad	.0	.0	.0	0	.2%	.1%	3.4%	.0%
Solbourne	.0	.0	.0	2	.2%	.2%	.0%	.8%
CADAM	.0	.0	.0	0	.1%	.0%	1.7%	.1%
Secmai	.0	.0	.0	0	.1%	.0%	1.7%	.0%
Other Companies	5.7	5.2	.0	229	39.7%	45.3%	5.2%	73.7%
All Companies	14.3	11.4	.6	310	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	13.8	11.1	.5	304	96.2%	97.1%	77.6%	98.0%
All Asian-Based Companies	.5	.3	.1	6	3.7%	2.9%	20.7%	2.0%
All European-Based Companies	.0	.0	.0	0	.1%	.0%	1.7%	.0%
All Hardware Companies	12.1	10.2	.0	289	84.7%	89.3%	.0%	93.1%
All Turnkey & SW Companies	2.2	1.2	.6	21	15.3%	10.7%	100.0%	6.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 20
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Personal Computer
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Compaq	2.0	2.0	.0	330	30.5%	53.2%	.0%	46.2%
Xilinx	.7	.0	.6	0	10.9%	.0%	26.4%	.0%
Data I/O	.5	.0	.4	0	7.4%	.0%	16.9%	.0%
IBM	.4	.3	.0	74	5.5%	9.1%	.0%	10.3%
Hewlett-Packard	.3	.2	.0	40	3.8%	5.1%	.0%	5.6%
Fujitsu	.2	.1	.1	9	2.8%	3.2%	2.5%	1.2%
BETRONEX	.2	.0	.2	0	2.6%	.0%	7.0%	.0%
Orcad	.2	.0	.2	0	2.6%	.0%	6.2%	.0%
Autodesk	.2	.0	.2	0	2.3%	.0%	6.2%	.0%
Apple Computer	.1	.1	.0	28	2.2%	3.2%	.0%	3.9%
Spectrum Software	.1	.0	.1	0	1.7%	.0%	4.5%	.0%
CAD Software	.1	.0	.1	0	1.2%	.0%	2.9%	.0%
Computervision	.1	.0	.1	0	.9%	.0%	2.5%	.0%
Ikos Systems	.1	.1	.0	0	.9%	1.3%	.4%	.0%
Integrated Silicon Systems	.1	.0	.1	1	.9%	.3%	2.1%	.1%
ACTEL	.0	.0	.0	0	.6%	.0%	1.7%	.0%
Teradyne	.0	.0	.0	0	.6%	.0%	1.2%	.0%
Capilano Computing	.0	.0	.0	0	.5%	.0%	1.2%	.0%
Massteck	.0	.0	.0	0	.5%	.0%	1.2%	.0%
Olivetti	.0	.0	.0	12	.5%	.5%	.4%	1.6%
Sycotronic AG	.0	.0	.0	0	.5%	.0%	.8%	.0%
CAD-UL	.0	.0	.0	0	.2%	.3%	.4%	.0%
CADAM	.0	.0	.0	0	.2%	.0%	.4%	.0%
Foresight Resources	.0	.0	.0	0	.2%	.0%	.4%	.0%
Genrad	.0	.0	.0	0	.2%	.0%	.0%	.0%
Serbi	.0	.0	.0	0	.2%	.0%	.4%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 20 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: Personal Computer
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	1.7	1.0	.7	223	26.2%	25.5%	29.3%	31.2%
All Companies	6.5	3.7	2.4	715	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	6.1	3.6	2.1	695	93.4%	96.0%	88.4%	97.1%
All Asian-Based Companies	.2	.1	.1	9	2.8%	3.2%	2.5%	1.2%
All European-Based Companies	.3	.0	.2	12	3.8%	.8%	9.1%	1.6%
All Hardware Companies	3.6	3.5	.0	694	55.5%	94.4%	.0%	97.1%
All Turnkey & SW Companies	2.9	.2	2.4	21	44.5%	5.6%	100.0%	2.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 21
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Mentor Graphics	242.7	86.0	115.4	3,220	17.4%	14.1%	20.2%	8.1%
Dazix	122.9	47.6	52.7	1,185	8.8%	7.8%	9.2%	3.0%
Valid	121.8	30.2	68.6	1,237	8.7%	4.9%	12.0%	3.1%
Hewlett-Packard	110.5	83.1	10.8	6,939	7.9%	13.6%	1.9%	17.5%
Digital	90.1	67.6	.0	768	6.5%	11.1%	.0%	1.9%
Sun	82.9	74.6	.0	6,152	5.9%	12.2%	.0%	15.5%
Cadence	45.0	.0	38.8	0	3.2%	.0%	6.8%	.0%
Intergraph	32.1	17.6	5.7	337	2.3%	2.9%	1.0%	.8%
Zycad	31.5	22.1	.6	150	2.3%	3.6%	.1%	.4%
Compaq	29.5	29.5	.0	4,923	2.1%	4.8%	.0%	12.4%
Racal-Redac	26.7	2.9	20.2	81	1.9%	.5%	3.5%	.2%
NEC	26.5	17.7	6.7	1,424	1.9%	2.9%	1.2%	3.6%
Fujitsu	24.9	14.2	7.9	559	1.8%	2.3%	1.4%	1.4%
Wacom	20.9	9.0	9.8	199	1.5%	1.5%	1.7%	.5%
Teradyne	20.0	.0	16.1	0	1.4%	.0%	2.8%	.0%
View Logic	18.3	.0	15.1	0	1.3%	.0%	2.6%	.0%
EEsof	18.0	.2	16.2	5	1.3%	.0%	2.8%	.0%
Computervision	18.0	7.5	4.9	122	1.3%	1.2%	.9%	.3%
LSI Logic	17.8	1.8	13.3	67	1.3%	.3%	2.3%	.2%
Xilinx	15.0	.0	13.5	0	1.1%	.0%	2.4%	.0%
Autodesk	14.2	.0	14.2	0	1.0%	.0%	2.5%	.0%
VLSI Technology	12.8	.8	10.1	42	.9%	.1%	1.8%	.1%
Silicon Compiler Systems	12.0	.0	8.1	0	.9%	.0%	1.4%	.0%
Data I/O	11.4	.0	9.7	0	.8%	.0%	1.7%	.0%
Ikos Systems	11.0	8.8	2.2	57	.8%	1.4%	.4%	.1%
Zuken	10.6	4.0	6.0	57	.8%	.6%	1.0%	.1%
Altera	9.0	.0	7.9	0	.6%	.0%	1.4%	.0%
Synopsys	9.0	.0	7.7	0	.6%	.0%	1.3%	.0%
Genrad	8.5	1.3	5.7	4	.6%	.2%	1.0%	.0%
Logic Automation	7.2	.0	7.2	0	.5%	.0%	1.3%	.0%
Apple Computer	6.2	5.5	.0	1,200	.4%	.9%	.0%	3.0%
Solbourne	6.1	5.4	.0	450	.4%	.9%	.0%	1.1%
Test Systems Strategies	6.0	.0	5.1	0	.4%	.0%	.9%	.0%

(Continued)

©1990 Dataquest Incorporated August

Market Share

TABLE NUMBER: 21
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Orcad	5.8	.0	5.5	0	.4%	.0%	1.0%	.0%
Microsim	5.4	.0	5.0	0	.4%	.0%	.9%	.0%
Meta-Software	5.3	.0	5.1	0	.4%	.0%	.9%	.0%
Aucotec	5.2	2.0	2.6	578	.4%	.3%	.4%	1.5%
ACTEL	4.5	.0	4.5	0	.3%	.0%	.8%	.0%
IBM	3.7	3.5	.0	739	.3%	.6%	.0%	1.9%
EDA Systems	3.1	.0	2.4	5	.2%	.0%	.4%	.0%
Ziegler	3.1	.1	2.8	99	.2%	.0%	.5%	.2%
Analogy	3.0	.0	2.7	0	.2%	.0%	.5%	.0%
Silvar-Lisco	2.8	.0	1.8	0	.2%	.0%	.3%	.0%
Everex Systems	2.5	2.5	.0	728	.2%	.4%	.0%	1.8%
Infinite Graphics	2.3	.0	2.3	0	.2%	.0%	.4%	.0%
Rotring EURCAD	2.2	1.2	1.0	61	.2%	.2%	.2%	.2%
Automated Images	2.2	.0	1.9	0	.2%	.0%	.3%	.0%
Assigraph	2.0	.0	1.6	24	.1%	.0%	.3%	.1%
Comdisco Systems	2.0	.0	1.8	0	.1%	.0%	.3%	.0%
Electrical Eng. Software	2.0	.0	1.8	0	.1%	.0%	.3%	.0%
Motorola	2.0	.0	2.0	0	.1%	.0%	.4%	.0%
Omation	2.0	.0	2.0	0	.1%	.0%	.3%	.0%
Tokyo Electron--NO OEM	1.7	.6	.8	6	.1%	.1%	.1%	.0%
Phase Three Logic	1.5	.0	1.4	15	.1%	.0%	.2%	.0%
Micrograph	1.4	.8	.5	36	.1%	.1%	.1%	.1%
ALS Design	1.4	.1	1.1	25	.1%	.0%	.2%	.1%
EPIC Design Technology	1.4	.0	1.2	0	.1%	.0%	.2%	.0%
Sophia Systems	1.4	.3	.9	16	.1%	.1%	.2%	.0%
Secasi	1.3	.7	.4	10	.1%	.1%	.1%	.0%
National Semiconductor	1.3	.9	.3	8	.1%	.2%	.1%	.0%
Spectrum Software	1.2	.0	1.2	0	.1%	.0%	.2%	.0%
Seattle Silicon	1.2	.0	.9	0	.1%	.0%	.2%	.0%
Silc Technologies	1.1	.0	.9	0	.1%	.0%	.2%	.0%
Dell Computer	1.1	1.1	.0	271	.1%	.2%	.0%	.7%
Dassault	1.1	.0	.9	0	.1%	.0%	.2%	.0%
Century Research Center	1.0	.5	.4	6	.1%	.1%	.1%	.0%

(Continued)

©1990 Dataquest Incorporated August

Market Share

TABLE NUMBER: 21
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Intercad	1.0	.5	.3	50	.1%	.1%	.1%	.1%
Serbi	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Sony	1.0	.8	.0	63	.1%	.1%	.0%	.2%
NCR Microelectronics	.9	.0	.9	0	.1%	.0%	.2%	.0%
Quantic Laboratories	.9	.0	.8	0	.1%	.0%	.1%	.0%
Visionics	.8	.0	.6	1	.1%	.0%	.1%	.0%
Scientific Calc.	.8	.2	.4	4	.1%	.0%	.1%	.0%
Toshiba--NO OEM	.7	.4	.3	7	.1%	.1%	.1%	.0%
Douglas Electronics	.7	.0	.7	0	.1%	.0%	.1%	.0%
Royal Digital Systems	.7	.0	.6	0	.0%	.0%	.1%	.0%
Westward	.7	.7	.0	38	.0%	.1%	.0%	.1%
Intermetrics	.6	.0	.6	0	.0%	.0%	.1%	.0%
Capilano Computing	.6	.0	.6	0	.0%	.0%	.1%	.0%
Quad Design Technology	.6	.0	.5	0	.0%	.0%	.1%	.0%
ALDEC	.5	.0	.5	0	.0%	.0%	.1%	.0%
PLUS Logic	.5	.0	.5	0	.0%	.0%	.1%	.0%
The CAD Group	.5	.0	.5	0	.0%	.0%	.1%	.0%
CAD Software	.5	.0	.4	0	.0%	.0%	.1%	.0%
Accel Technologies	.4	.0	.4	0	.0%	.0%	.1%	.0%
BV Engineering	.4	.0	.4	0	.0%	.0%	.1%	.0%
Logic Modeling Systems	.3	.3	.0	100	.0%	.0%	.0%	.3%
Foresight Resources	.3	.0	.2	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.2	.0	.2	0	.0%	.0%	.0%	.0%
Microcomputer Graphics	.2	.0	.2	0	.0%	.0%	.0%	.0%
Vamp	.2	.0	.2	0	.0%	.0%	.0%	.0%
Tanner Research	.2	.0	.1	0	.0%	.0%	.0%	.0%
Cascade Graphics	.1	.0	.1	0	.0%	.0%	.0%	.0%
A/E Microsystems	.1	.1	.0	10	.0%	.0%	.0%	.0%
Academi Systems	.1	.0	.1	1	.0%	.0%	.0%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
DAT Standard Information syste	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

©1990 Dataquest Incorporated August

Market Share

TABLE NUMBER: 21 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					---------- Market Share ----------			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Sycotronic AG	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	61.6	57.1	1.4	7,569	4.4%	9.3%	.2%	19.1%
All Companies	1,395.6	611.5	570.2	39,645	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1,259.6	555.0	505.0	36,305	90.3%	90.8%	88.6%	91.6%
All Asian-Based Companies	88.7	47.4	32.7	2,336	6.4%	7.8%	5.7%	5.9%
All European-Based Companies	47.3	9.1	32.5	1,004	3.4%	1.5%	5.7%	2.5%
All Hardware Companies	345.0	299.2	.0	28,519	24.7%	48.9%	.0%	71.9%
All Turnkey & SW Companies	1,050.6	312.3	570.2	11,125	75.3%	51.1%	100.0%	28.1%

Source: Dataquest
August 1990

©1990 Dataquest Incorporated August

Market Share

TABLE NUMBER: 22
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Technical Workstation
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	242.7	86.0	115.4	3,220	25.4%	22.4%	27.9%	16.1%
Dazix	122.9	47.6	52.7	1,185	12.9%	12.4%	12.7%	5.9%
Valid	121.8	30.2	68.6	905	12.8%	7.9%	16.6%	4.5%
Hewlett-Packard	100.8	75.1	10.8	5,930	10.6%	19.6%	2.6%	29.6%
Sun	71.9	64.7	.0	5,716	7.5%	16.9%	.0%	28.6%
Cadence	37.9	.0	32.8	0	4.0%	.0%	7.9%	.0%
Intergraph	26.3	14.7	4.7	282	2.8%	3.8%	1.1%	1.4%
Digital	23.3	17.5	.0	768	2.4%	4.5%	.0%	3.8%
Racal-Redac	19.6	1.8	15.2	68	2.1%	.5%	3.7%	.3%
NEC	16.7	8.7	6.7	773	1.7%	2.3%	1.6%	3.9%
LSI Logic	16.0	1.6	12.0	60	1.7%	.4%	2.9%	.3%
Computervision	15.7	6.8	3.9	91	1.6%	1.8%	.9%	.5%
Silicon Compiler Systems	12.0	.0	8.1	. 0	1.3%	.0%	1.9%	.0%
VLSI Technology	10.9	.7	8.6	36	1.1%	.2%	2.1%	.2%
Zuken	10.6	4.0	6.0	57	1.1%	1.0%	1.4%	.3%
Fujitsu	10.0	6.0	3.0	239	1.0%	1.6%	.7%	1.2%
Ikos Systems	9.8	7.8	2.0	51	1.0%	2.0%	.5%	.3%
Logic Automation	7.0	.0	7.0	0	.7%	.0%	1.7%	.0%
Genrad	6.6	1.0	4.4	3	.7%	.3%	1.1%	.0%
Teradyne	6.0	.0	4.9	0	.6%	.0%	1.2%	.0%
EEsof	5.9	.1	5.4	2	.6%	.0%	1.3%	.0%
Test Systems Strategies	5.2	.0	4.4	0	.5%	.0%	1.1%	.0%
Solbourne	4.9	4.3	.0	360	.5%	1.1%	.0%	1.8%
Synopsys	4.5	.0	3.8	0	.5%	.0%	.9%	.0%
Meta-Software	3.8	.0	3.6	0	.4%	.0%	.9%	.0%
Analogy	3.0	.0	2.7	0	.3%	.0%	.6%	.0%
Silvar-Lisco	2.5	.0	1.6	0	.3%	.0%	.4%	.0%
EDA Systems	2.3	.0	1.8	0	.2%	.0%	.4%	.0%
Comdisco Systems	2.0	.0	1.8	0	.2%	.0%	.4%	.0%
Motorola	2.0	.0	2.0	0	.2%	.0%	.5%	.0%
Tokyo Electron--NO OEM	1.7	.6	.8	6	.2%	.2%	.2%	.0%
Electrical Eng. Software	1.4	.0	1.3	0	.1%	.0%	.3%	.0%
EPIC Design Technology	1.4	.0	1.2	0	.1%	.0%	.3%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 22
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Technical Workstation
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Secmai	1.3	.7	.4	9	.1%	.2%	.1%	.0%
Assigraph	1.3	.0	1.0	0	.1%	.0%	.2%	.0%
National Semiconductor	1.3	.9	.3	8	.1%	.2%	.1%	.0%
Seattle Silicon	1.2	.0	.9	0	.1%	.0%	.2%	.0%
Data I/O	1.1	.0	1.0	0	.1%	.0%	.2%	.0%
Century Research Center	1.0	.5	.4	6	.1%	.1%	.1%	.0%
Silc Technologies	1.0	.0	.9	0	.1%	.0%	.2%	.0%
Autodesk	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Sony	1.0	.8	.0	63	.1%	.2%	.0%	.3%
Microsim	.9	.0	.9	0	.1%	.0%	.2%	.0%
Quantic Laboratories	.9	.0	.8	0	.1%	.0%	.2%	.0%
NCR Microelectronics	.9	.0	.8	0	.1%	.0%	.2%	.0%
Xilinx	.8	.0	.7	0	.1%	.0%	.2%	.0%
Toshiba--NO OEM	.7	.4	.3	7	.1%	.1%	.1%	.0%
Kanematsu Semiconductor	.7	.3	.3	8	.1%	.1%	.1%	.0%
ACTEL	.7	.0	.7	0	.1%	.0%	.2%	.0%
Royal Digital Systems	.7	.0	.6	0	.1%	.0%	.1%	.0%
Automated Images	.7	.0	.6	0	.1%	.0%	.1%	.0%
Intermetrics	.6	.0	.6	0	.1%	.0%	.1%	.0%
Quad Design Technology	.6	.0	.5	0	.1%	.0%	.1%	.0%
Scientific Calc.	.6	.2	.3	3	.1%	.0%	.1%	.0%
Phase Three Logic	.4	.0	.4	0	.0%	.0%	.1%	.0%
Sumisho Electronics	.4	.3	.0	2	.0%	.1%	.0%	.0%
Westward	.4	.4	.0	21	.0%	.1%	.0%	.1%
Logic Modeling Systems	.3	.3	.0	100	.0%	.1%	.0%	.5%
Zycad	.3	.2	.0	2	.0%	.1%	.0%	.0%
Aucotec	.3	.1	.1	29	.0%	.0%	.0%	.1%
Sophia Systems	.3	.1	.2	2	.0%	.0%	.0%	.0%
Dassault	.2	.0	.1	0	.0%	.0%	.0%	.0%
Micrograph	.1	.1	.0	5	.0%	.0%	.0%	.0%
Everex Systems	.1	.1	.0	14	.0%	.0%	.0%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 22 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Technical Workstation
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Academi Systems	.1	.0	.1	1	.0%	.0%	.0%	.0%
Serbi	.1	.0	.1	0	.0%	.0%	.0%	.0%
A/E Microsystems	.0	.0	.0	2	.0%	.0%	.0%	.0%
Other Companies	64.8	12.8	46.0	299	6.8%	3.3%	11.1%	1.5%
All Companies	954.5	383.8	414.1	20,021	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	889.2	359.7	379.3	18,735	93.2%	93.7%	91.7%	93.6%
All Asian-Based Companies	42.0	21.0	17.3	1,153	4.4%	5.5%	4.2%	5.8%
All European-Based Companies	23.3	3.1	17.0	133	2.4%	.8%	4.1%	.7%
All Hardware Companies	153.2	131.1	.0	11,570	16.1%	34.2%	.0%	57.8%
All Turnkey & SW Companies	801.3	252.7	414.1	8,451	83.9%	65.8%	100.0%	42.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 23
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Host/Server
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	66.8	50.2	.0	0	32.6%	38.8%	.0%	.0%
Zycad	31.2	21.8	.6	148	15.2%	16.9%	1.8%	6.1%
Fujitsu	11.2	6.2	3.3	133	5.5%	4.8%	9.6%	5.4%
Sun	11.0	9.9	.0	435	5.4%	7.7%	.0%	17.8%
Teradyne	10.0	.0	8.0	0	4.9%	.0%	22.9%	.0%
Cadence	7.1	.0	6.0	0	3.4%	.0%	17.2%	.0%
Intergraph	5.8	2.9	.9	55	2.8%	2.2%	2.7%	2.3%
Hewlett-Packard	5.2	4.4	.0	264	2.5%	3.4%	.0%	10.8%
Synopsys	4.5	.0	3.8	0	2.2%	.0%	11.0%	.0%
Racal-Redac	2.5	.0	2.1	11	1.2%	.0%	6.1%	.5%
VLSI Technology	1.9	.1	1.5	6	.9%	.1%	4.3%	.3%
LSI Logic	1.8	.2	1.3	7	.9%	.1%	3.8%	.3%
Genrad	1.6	.3	1.1	1	.8%	.2%	3.2%	.0%
Meta-Software	1.5	.0	1.5	0	.8%	.0%	4.2%	.0%
Computervision	1.5	.7	.4	29	.7%	.5%	1.0%	1.2%
Solbourne	1.2	1.1	.0	90	.6%	.8%	.0%	3.7%
Dassault	.9	.0	.8	0	.4%	.0%	2.2%	.0%
Test Systems Strategies	.8	.0	.7	0	.4%	.0%	2.0%	.0%
Assigraph	.8	.0	.6	24	.4%	.0%	1.7%	1.0%
Kanematsu Semiconductor	.7	.5	.2	0	.4%	.4%	.4%	.0%
Electrical Eng. Software	.6	.0	.5	0	.3%	.0%	1.5%	.0%
EDA Systems	.6	.0	.4	1	.3%	.0%	1.2%	.0%
Data I/O	.6	.0	.5	0	.3%	.0%	1.4%	.0%
Silvar-Lisco	.3	.0	.2	0	.1%	.0%	.5%	.0%
Aucotec	.3	.1	.1	29	.1%	.1%	.3%	1.2%
Logic Automation	.2	.0	.2	0	.1%	.0%	.6%	.0%
Scientific Calc.	.2	.0	.1	1	.1%	.0%	.4%	.0%
Silc Technologies	.1	.0	.1	0	.1%	.0%	.3%	.0%
A/E Microsystems	.0	.0	.0	1	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 23 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Host/Server
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	45.9	32.0	9.1	1,259	22.4%	24.7%	26.1%	51.6%
All Companies	205.0	129.4	34.9	2,440	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	189.4	123.1	28.0	2,243	92.4%	95.1%	80.0%	91.9%
All Asian-Based Companies	11.2	6.2	3.3	133	5.5%	4.8%	9.6%	5.4%
All European-Based Companies	4.4	.1	3.6	65	2.2%	.1%	10.4%	2.6%
All Hardware Companies	119.0	97.1	.0	1,993	58.0%	75.1%	.0%	81.7%
All Turnkey & SW Companies	86.0	32.3	34.9	447	42.0%	24.9%	100.0%	18.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 24
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Personal Computer
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compaq	29.5	29.5	.0	4,923	12.7%	30.4%	.0%	29.2%
Wacom	20.9	9.0	9.8	199	9.0%	9.2%	8.3%	1.2%
Xilinx	14.3	.0	12.8	0	6.1%	.0%	10.8%	.0%
Autodesk	13.2	.0	13.2	0	5.7%	.0%	11.2%	.0%
EEsof	12.1	.1	10.9	3	5.2%	.1%	9.2%	.0%
NEC	9.8	9.0	.0	651	4.2%	9.3%	.0%	3.9%
Data I/O	9.7	.0	8.2	0	4.2%	.0%	6.9%	.0%
Altera	9.0	.0	7.9	0	3.9%	.0%	6.7%	.0%
Apple Computer	6.2	5.5	.0	1,200	2.7%	5.6%	.0%	7.1%
Orcad	5.8	.0	5.5	0	2.5%	.0%	4.6%	.0%
Aucotec	4.7	1.9	2.3	520	2.0%	1.9%	2.0%	3.1%
Hewlett-Packard	4.5	3.7	.0	745	1.9%	3.8%	.0%	4.4%
Microsim	4.5	.0	4.1	.0	1.9%	.0%	3.5%	.0%
Teradyne	4.0	.0	3.3	0	1.7%	.0%	2.8%	.0%
ACTEL	3.8	.0	3.8	0	1.7%	.0%	3.2%	.0%
Fujitsu	3.7	2.0	1.5	187	1.6%	2.1%	1.3%	1.1%
IBM	3.7	3.5	.0	739	1.6%	3.6%	.0%	4.4%
Ziegler	3.1	.1	2.8	99	1.3%	.1%	2.4%	.6%
Everex Systems	2.3	2.4	.0	713	1.0%	2.4%	.0%	4.2%
Infinite Graphics	2.3	.0	2.3	0	1.0%	.0%	1.9%	.0%
Rotring EURCAD	2.2	1.2	1.0	61	1.0%	1.3%	.8%	.4%
Omation	2.0	.0	2.0	0	.8%	.0%	1.6%	.0%
Automated Images	1.5	.0	1.3	0	.7%	.0%	1.1%	.0%
ALS Design	1.4	.1	1.1	25	.6%	.1%	1.0%	.1%
Circuits & Systems	1.4	.0	1.4	0	.6%	.0%	1.2%	.0%
Micrograph	1.3	.7	.5	31	.6%	.7%	.4%	.2%
Ikos Systems	1.2	1.0	.2	6	.5%	1.0%	.2%	.0%
Spectrum Software	1.2	.0	1.2	0	.5%	.0%	1.0%	.0%
Phase Three Logic	1.1	.0	1.0	15	.5%	.0%	.8%	.1%
Sophia Systems	1.1	.3	.7	14	.5%	.3%	.6%	.1%
Dell Computer	1.1	1.1	.0	271	.5%	1.1%	.0%	1.6%
Intercad	1.0	.5	.3	50	.4%	.5%	.3%	.3%
Serbi	1.0	.0	1.0	0	.4%	.0%	.8%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 24
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Personal Computer
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Visionics	.8	.0	.6	1	.3%	.0%	.5%	.0%
Computervision	.8	.0	.7	2	.3%	.0%	.6%	.0%
Douglas Electronics	.7	.0	.7	0	.3%	.0%	.6%	.0%
Capilano Computing	.6	.0	.6	0	.3%	.0%	.5%	.0%
ALDEC	.5	.0	.5	0	.2%	.0%	.4%	.0%
PLUS Logic	.5	.0	.5	0	.2%	.0%	.4%	.0%
The CAD Group	.5	.0	.5	0	.2%	.0%	.4%	.0%
CAD Software	.5	.0	.4	0	.2%	.0%	.4%	.0%
Accel Technologies	.4	.0	.4	0	.2%	.0%	.3%	.0%
BV Engineering	.4	.0	.4	0	.2%	.0%	.3%	.0%
Sumisho Electronics	.4	.2	.1	43	.2%	.2%	.1%	.3%
Racal-Redac	.4	.0	.4	2	.2%	.0%	.3%	.0%
Genrad	.3	.0	.2	0	.1%	.0%	.1%	.0%
Westward	.3	.3	.0	17	.1%	.3%	.0%	.1%
Foresight Resources	.3	.0	.2	0	.1%	.0%	.2%	.0%
EDA Systems	.2	.0	.2	4	.1%	.0%	.1%	.0%
American Small Business Comp.	.2	.0	.2	0	.1%	.0%	.2%	.0%
Microcomputer Graphics	.2	.0	.2	0	.1%	.0%	.2%	.0%
Vamp	.2	.0	.2	0	.1%	.0%	.1%	.0%
Tanner Research	.2	.0	.1	0	.1%	.0%	.1%	.0%
Cascade Graphics	.1	.0	.1	0	.1%	.0%	.1%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
A/E Microsystems	.1	.0	.0	7	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Academi Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
DAT Standard Information syste	.0	.0	.0	0	.0%	.0%	.0%	.0%
Secmai	.0	.0	.0	0	.0%	.0%	.0%	.0%
Sycotronic AG	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 24 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Personal Computer
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	78.9	31.5	43.8	7,118	34.0%	32.4%	36.9%	42.2%
All Companies	231.8	97.3	118.7	16,851	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	181.1	72.3	97.3	14,995	78.1%	74.3%	82.0%	89.0%
All Asian-Based Companies	35.5	20.3	12.0	1,050	15.3%	20.8%	10.1%	6.2%
All European-Based Companies	15.3	4.8	9.3	806	6.6%	4.9%	7.9%	4.8%
All Hardware Companies	72.8	71.1	.0	14,956	31.4%	73.0%	.0%	88.8%
All Turnkey & SW Companies	159.0	26.2	118.7	1,895	68.6%	27.0%	100.0%	11.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 25
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: North America
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Mentor Graphics	108.1	37.8	48.6	1,452	16.2%	14.2%	16.7%	8.0%
Valid	71.4	17.8	38.5	805	10.7%	6.7%	13.3%	4.4%
Dazix	63.3	25.3	25.3	604	9.5%	9.5%	8.7%	3.3%
Digital	43.3	32.4	.0	369	6.5%	12.2%	.0%	2.0%
Sun	40.8	36.7	.0	3,056	6.1%	13.8%	.0%	16.7%
Hewlett-Packard	32.8	26.2	1.2	2,555	4.9%	9.9%	.4%	14.0%
Cadence	30.1	.0	25.7	0	4.5%	.0%	8.8%	.0%
Zycad	20.5	14.3	.4	98	3.1%	5.4%	.1%	.5%
Intergraph	19.6	10.8	3.5	206	2.9%	4.1%	1.2%	1.1%
EEsof	18.0	.2	16.2	5	2.7%	.1%	5.6%	.0%
Compaq	16.3	16.3	.0	2,708	2.4%	6.1%	.0%	14.8%
Teradyne	15.0	.0	12.1	0	2.3%	.0%	4.2%	.0%
LSI Logic	10.7	1.1	8.0	40	1.6%	.4%	2.8%	.2%
Racal-Redac	9.5	.2	7.8	13	1.4%	.1%	2.7%	.1%
Computervision	8.6	3.2	2.7	44	1.3%	1.2%	.9%	.2%
Autodesk	7.8	.0	7.8	0	1.2%	.0%	2.7%	.0%
VLSI Technology	7.3	.4	5.8	24	1.1%	.2%	2.0%	.1%
Ikos Systems	7.2	5.7	1.4	57	1.1%	2.2%	.5%	.3%
Silicon Compiler Systems	6.7	.0	4.5	0	1.0%	.0%	1.6%	.0%
Synopsys	6.3	.0	5.4	0	.9%	.0%	1.8%	.0%
Xilinx	6.0	.0	5.4	0	.9%	.0%	1.9%	.0%
Logic Automation	5.4	.0	5.4	0	.8%	.0%	1.9%	.0%
Altera	5.4	.0	4.8	0	.8%	.0%	1.6%	.0%
Solbourne	5.0	4.4	.0	369	.8%	1.7%	.0%	2.0%
Apple Computer	4.4	3.9	.0	852	.7%	1.5%	.0%	4.7%
Genrad	3.9	.6	2.6	4	.6%	.2%	.9%	.0%
Meta-Software	3.7	.0	3.6	0	.6%	.0%	1.2%	.0%
ACTEL	3.7	.0	3.7	0	.6%	.0%	1.3%	.0%
Test Systems Strategies	3.6	.0	3.1	0	.5%	.0%	1.1%	.0%
Data I/O	3.4	.0	2.9	0	.5%	.0%	1.0%	.0%
Microsim	3.2	.0	3.0	0	.5%	.0%	1.0%	.0%
EDA Systems	3.1	.0	2.4	5	.5%	.0%	.8%	.0%
Orcad	3.1	.0	2.9	0	.5%	.0%	1.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 25
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Infinite Graphics	2.3	.0	2.3	0	.3%	.0%	.8%	.0%
Everex Systems	2.2	2.2	.0	655	.3%	.8%	.0%	3.6%
Automated Images	2.2	.0	1.9	0	.3%	.0%	.6%	.0%
Comdisco Systems	2.0	.0	1.8	0	.3%	.0%	.6%	.0%
Motorola	2.0	.0	2.0	0	.3%	.0%	.7%	.0%
Omation	1.6	.0	1.6	0	.2%	.0%	.5%	.0%
Phase Three Logic	1.5	.0	1.4	15	.2%	.0%	.5%	.1%
Circuits & Systems	1.4	.0	1.4	0	.2%	.0%	.5%	.0%
Analogy	1.2	.0	1.1	0	.2%	.0%	.4%	.0%
IBM	1.1	1.0	.0	222	.2%	.4%	.0%	1.2%
Spectrum Software	1.1	.0	1.1	0	.2%	.0%	.4%	.0%
Silvar-Lisco	1.1	.0	.6	0	.2%	.0%	.2%	.0%
Dell Computer	1.0	1.0	.0	258	.2%	.4%	.0%	1.4%
Silc Technologies	.9	.0	.8	0	.1%	.0%	.3%	.0%
EPIC Design Technology	.9	.0	.8	0	.1%	.0%	.3%	.0%
Electrical Eng. Software	.9	.0	.8	0	.1%	.0%	.3%	.0%
NCR Microelectronics	.9	.0	.9	0	.1%	.0%	.3%	.0%
Quantic Laboratories	.9	.0	.8	0	.1%	.0%	.3%	.0%
Visionics	.8	.0	.6	1	.1%	.0%	.2%	.0%
Seattle Silicon	.7	.0	.5	0	.1%	.0%	.2%	.0%
Intermetrics	.6	.0	.6	0	.1%	.0%	.2%	.0%
National Semiconductor	.6	.5	.2	0	.1%	.2%	.1%	.0%
Quad Design Technology	.6	.0	.5	0	.1%	.0%	.2%	.0%
Royal Digital Systems	.6	.0	.5	0	.1%	.0%	.2%	.0%
Capilano Computing	.5	.0	.5	0	.1%	.0%	.2%	.0%
ALDEC	.5	.0	.5	0	.1%	.0%	.2%	.0%
PLUS Logic	.5	.0	.5	0	.1%	.0%	.2%	.0%
The CAD Group	.5	.0	.5	0	.1%	.0%	.2%	.0%
Douglas Electronics	.5	.0	.5	0	.1%	.0%	.2%	.0%
BV Engineering	.4	.0	.4	0	.1%	.0%	.1%	.0%
CAD Software	.4	.0	.3	0	.1%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 25 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Scientific Calc.	.3	.1	.2	1	.0%	.0%	.1%	.0%
Accel Technologies	.3	.0	.3	0	.0%	.0%	.1%	.0%
Logic Modeling Systems	.2	.2	.0	70	.0%	.1%	.0%	.4%
Foresight Resources	.2	.0	.2	0	.0%	.0%	.1%	.0%
Microcomputer Graphics	.2	.0	.2	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.2	.0	.2	0	.0%	.0%	.1%	.0%
Vamp	.2	.0	.2	0	.0%	.0%	.1%	.0%
Secmai	.2	.0	.1	0	.0%	.0%	.0%	.0%
Tanner Research	.2	.0	.1	0	.0%	.0%	.0%	.0%
Cascade Graphics	.1	.0	.1	0	.0%	.0%	.0%	.0%
A/E Microsystems	.1	.1	.0	10	.0%	.0%	.0%	.1%
Assigraph	.1	.0	.1	0	.0%	.0%	.0%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.0%	.0%
Academi Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	101.5	30.2	64.2	3,916	15.2%	11.4%	22.1%	21.5%
All Companies	666.7	265.6	290.5	18,251	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	656.9	265.3	282.5	18,238	98.5%	99.9%	97.2%	99.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	9.8	.3	8.1	13	1.5%	.1%	2.8%	.1%
All Hardware Companies	164.3	143.0	.0	14,648	24.6%	53.8%	.0%	80.3%
All Turnkey & SW Companies	502.4	122.6	290.5	3,604	75.4%	46.2%	100.0%	19.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 26
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Technical Workstation
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	108.1	37.8	48.6	1,452	23.7%	22.9%	23.4%	16.5%
Valid	71.4	17.8	38.5	805	15.7%	10.8%	18.6%	9.1%
Dazix	63.3	25.3	25.3	604	13.9%	15.3%	12.2%	6.9%
Sun	32.6	29.4	.0	2,746	7.2%	17.8%	.0%	31.2%
Hewlett-Packard	28.6	22.7	1.2	2,107	6.3%	13.7%	.6%	23.9%
Cadence	24.9	.0	21.3	0	5.5%	.0%	10.3%	.0%
Intergraph	16.1	9.0	2.9	172	3.5%	5.5%	1.4%	2.0%
Digital	11.2	8.4	.0	369	2.5%	5.1%	.0%	4.2%
LSI Logic	9.6	1.0	7.2	36	2.1%	.6%	3.5%	.4%
Racal-Redac	8.1	.2	6.6	10	1.8%	.1%	3.2%	.1%
Computervision	7.8	3.1	2.0	43	1.7%	1.9%	1.0%	.5%
Silicon Compiler Systems	6.7	.0	4.5	0	1.5%	.0%	2.2%	.0%
Ikos Systems	6.4	5.1	1.3	51	1.4%	3.1%	.6%	.6%
VLSI Technology	6.2	.4	4.9	20	1.4%	.2%	2.4%	.2%
EEsof	5.9	.1	5.4	2	1.3%	.0%	2.6%	.0%
Logic Automation	5.3	.0	5.3	0	1.2%	.0%	2.5%	.0%
Teradyne	4.5	.0	3.7	0	1.0%	.0%	1.8%	.0%
Solbourne	4.0	3.5	.0	295	.9%	2.1%	.0%	3.4%
Synopsys	3.2	.0	2.7	0	.7%	.0%	1.3%	.0%
Test Systems Strategies	3.1	.0	2.6	0	.7%	.0%	1.3%	.0%
Genrad	3.0	.5	2.0	3	.7%	.3%	1.0%	.0%
Meta-Software	2.6	.0	2.5	0	.6%	.0%	1.2%	.0%
EDA Systems	2.3	.0	1.8	0	.5%	.0%	.9%	.0%
Comdisco Systems	2.0	.0	1.8	0	.4%	.0%	.8%	.0%
Motorola	2.0	.0	2.0	0	.4%	.0%	1.0%	.0%
Analogy	1.2	.0	1.1	0	.3%	.0%	.5%	.0%
Silvar-Lisco	1.0	.0	.5	0	.2%	.0%	.3%	.0%
EPIC Design Technology	.9	.0	.8	0	.2%	.0%	.4%	.0%
Quantic Laboratories	.9	.0	.8	0	.2%	.0%	.4%	.0%
NCR Microelectronics	.9	.0	.8	0	.2%	.0%	.4%	.0%
Silc Technologies	.9	.0	.7	0	.2%	.0%	.3%	.0%
Autodesk	.7	.0	.7	0	.1%	.0%	.3%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 26 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Technical Workstation
REGION: North America
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
Company	Revenue	Revenue	Revenue	Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Automated Images	.7	.0	.6	0	.1%	.0%	.3%	.0%
Seattle Silicon	.7	.0	.5	0	.1%	.0%	.2%	.0%
Electrical Eng. Software	.6	.0	.6	0	.1%	.0%	.3%	.0%
Intermetrics	.6	.0	.6	0	.1%	.0%	.3%	.0%
National Semiconductor	.6	.5	.2	0	.1%	.3%	.1%	.0%
Quad Design Technology	.6	.0	.5	0	.1%	.0%	.3%	.0%
Royal Digital Systems	.6	.0	.5	0	.1%	.0%	.3%	.0%
ACTEL	.6	.0	.6	0	.1%	.0%	.3%	.0%
Microsim	.6	.0	.5	0	.1%	.0%	.2%	.0%
Phase Three Logic	.4	.0	.4	0	.1%	.0%	.2%	.0%
Data I/O	.3	.0	.3	0	.1%	.0%	.1%	.0%
Xilinx	.3	.0	.3	0	.1%	.0%	.1%	.0%
Logic Modeling Systems	.2	.2	.0	70	.1%	.1%	.0%	.8%
Scientific Calc.	.2	.1	.1	1	.1%	.0%	.1%	.0%
Zycad	.2	.1	.0	1	.0%	.1%	.0%	.0%
Secmai	.2	.0	.1	0	.0%	.0%	.1%	.0%
Everex Systems	.1	.1	.0	13	.0%	.1%	.0%	.1%
Assigraph	.1	.0	.1	0	.0%	.0%	.0%	.0%
A/E Microsystems	.0	.0	.0	2	.0%	.0%	.0%	.0%
Academi Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	40.9	6.3	31.2	126	9.0%	3.8%	15.0%	1.4%
All Companies	455.5	165.3	207.5	8,801	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	447.2	165.0	200.7	8,792	98.2%	99.8%	96.7%	99.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	8.3	.3	6.8	10	1.8%	.2%	3.3%	.1%
All Hardware Companies	70.0	59.9	.0	5,380	15.4%	36.2%	.0%	61.1%
All Turnkey & SW Companies	385.5	105.4	207.5	3,422	84.6%	63.8%	100.0%	38.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 27
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Host/Server
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	32.1	24.1	.0	0	31.9%	40.4%	.0%	.0%
Zycad	20.3	14.2	.4	97	20.2%	23.8%	2.1%	10.5%
Sun	8.2	7.3	.0	311	8.1%	12.3%	.0%	33.8%
Teradyne	7.5	.0	6.0	0	7.5%	.0%	30.0%	.0%
Cadence	5.1	.0	4.3	0	5.1%	.0%	21.7%	.0%
Intergraph	3.5	1.8	.6	34	3.5%	3.0%	2.9%	3.7%
Synopsys	3.2	.0	2.7	0	3.1%	.0%	13.4%	.0%
Hewlett-Packard	2.2	1.8	.0	111	2.2%	3.1%	.0%	12.1%
Racal-Redac	1.3	.0	1.1	3	1.3%	.0%	5.7%	.3%
VLSI Technology	1.1	.1	.9	4	1.1%	.1%	4.3%	.4%
Meta-Software	1.1	.0	1.0	0	1.1%	.0%	5.2%	.0%
LSI Logic	1.1	.1	.8	4	1.1%	.2%	4.0%	.4%
Solbourne	1.0	.9	.0	74	1.0%	1.5%	.0%	8.0%
Genrad	.8	.1	.5	1	.7%	.2%	2.5%	.1%
EDA Systems	.6	.0	.4	1	.6%	.0%	2.1%	.1%
Test Systems Strategies	.5	.0	.4	0	.5%	.0%	2.2%	.0%
Electrical Eng. Software	.3	.0	.2	0	.3%	.0%	1.2%	.0%
Computervision	.2	.1	.0	2	.2%	.1%	.2%	.2%
Data I/O	.2	.0	.2	0	.2%	.0%	.8%	.0%
Logic Automation	.2	.0	.2	0	.2%	.0%	.8%	.0%
Silvar-Lisco	.1	.0	.1	0	.1%	.0%	.3%	.0%
Silc Technologies	.1	.0	.1	0	.1%	.0%	.4%	.0%
Scientific Calc.	.1	.0	.1	0	.1%	.0%	.3%	.0%
Assigraph	.0	.0	.0	0	.0%	.0%	.2%	.0%
A/E Microsystems	.0	.0	.0	1	.0%	.0%	.1%	.1%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 27 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Host/Server
REGION: North America
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Other Companies	16.7	9.3	5.6	279	16.6%	15.6%	28.0%	30.4%
All Companies	100.6	59.6	20.0	918	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	99.2	59.6	18.8	915	98.6%	100.0%	94.2%	99.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.4	.0	1.2	3	1.4%	.0%	5.8%	.3%
All Hardware Companies	53.5	43.3	.0	772	53.1%	72.6%	.0%	84.1%
All Turnkey & SW Companies	47.1	16.4	20.0	146	46.9%	27.4%	100.0%	15.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 28
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Personal Computer
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compaq	16.3	16.3	.0	2,708	14.7%	39.9%	.0%	31.7%
EEsof	12.1	.1	10.9	3	10.9%	.2%	17.2%	.0%
Autodesk	7.1	.0	7.1	0	6.4%	.0%	11.3%	.0%
Xilinx	5.7	.0	5.1	0	5.2%	.0%	8.1%	.0%
Altera	5.4	.0	4.8	0	4.9%	.0%	7.5%	.0%
Apple Computer	4.4	3.9	.0	852	4.0%	9.6%	.0%	10.0%
ACTEL	3.1	.0	3.1	0	2.8%	.0%	5.0%	.0%
Orcad	3.1	.0	2.9	0	2.8%	.0%	4.6%	.0%
Teradyne	3.0	.0	2.5	0	2.7%	.0%	3.9%	.0%
Data I/O	2.9	.0	2.5	0	2.6%	.0%	3.9%	.0%
Microsim	2.7	.0	2.5	0	2.4%	.0%	3.9%	.0%
Infinite Graphics	2.3	.0	2.3	0	2.1%	.0%	3.6%	.0%
Everex Systems	2.1	2.1	.0	642	1.9%	5.2%	.0%	7.5%
Hewlett-Packard	2.0	1.7	.0	337	1.8%	4.1%	.0%	3.9%
Omation	1.6	.0	1.6	0	1.4%	.0%	2.5%	.0%
Automated Images	1.5	.0	1.3	0	1.4%	.0%	2.1%	.0%
Circuits & Systems	1.4	.0	1.4	0	1.3%	.0%	2.2%	.0%
IBM	1.1	1.0	.0	222	1.0%	2.6%	.0%	2.6%
Phase Three Logic	1.1	.0	1.0	15	1.0%	.0%	1.6%	.2%
Spectrum Software	1.1	.0	1.1	0	1.0%	.0%	1.7%	.0%
Dell Computer	1.0	1.0	.0	258	.9%	2.5%	.0%	3.0%
Visionics	.8	.0	.6	1	.7%	.1%	1.0%	.0%
Ikos Systems	.8	.6	.2	6	.7%	1.5%	.3%	.1%
Computervision	.7	.0	.7	0	.6%	.0%	1.1%	.0%
Capilano Computing	.5	.0	.5	0	.5%	.0%	.8%	.0%
ALDEC	.5	.0	.5	0	.5%	.0%	.8%	.0%
PLUS Logic	.5	.0	.5	0	.5%	.0%	.8%	.0%
The CAD Group	.5	.0	.5	0	.5%	.0%	.8%	.0%
Douglas Electronics	.5	.0	.5	0	.4%	.0%	.7%	.0%
BV Engineering	.4	.0	.4	0	.4%	.0%	.6%	.0%
CAD Software	.4	.0	.3	0	.3%	.0%	.5%	.0%
Accel Technologies	.3	.0	.3	0	.3%	.0%	.4%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 28 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Personal Computer
REGION: North America
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
Company	Revenue	Revenue	Revenue	Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
EDA Systems	.2	.0	.2	4	.2%	.0%	.3%	.1%
Foresight Resources	.2	.0	.2	0	.2%	.0%	.3%	.0%
Microcomputer Graphics	.2	.0	.2	0	.2%	.0%	.3%	.0%
American Small Business Comp.	.2	.0	.2	0	.1%	.0%	.3%	.0%
Vamp	.2	.0	.2	0	.1%	.0%	.3%	.0%
Tanner Research	.2	.0	.1	0	.1%	.0%	.2%	.0%
Cascade Graphics	.1	.0	.1	0	.1%	.0%	.2%	.0%
Genrad	.1	.0	.1	0	.1%	.0%	.1%	.0%
Racal-Redac	.1	.0	.1	0	.1%	.0%	.1%	.0%
Innovative Data Design	.1	.0	.1	0	.1%	.0%	.1%	.0%
A/E Microsystems	.1	.0	.0	7	.0%	.1%	.0%	.1%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	43.8	14.6	27.5	3,511	39.6%	35.9%	43.6%	41.2%
All Companies	110.6	40.7	63.1	8,532	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	110.5	40.7	63.0	8,532	99.9%	100.0%	99.8%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.1	.0	.1	0	.1%	.0%	.2%	.0%
All Hardware Companies	40.9	39.9	.0	8,495	36.9%	98.0%	.0%	99.6%
All Turnkey & SW Companies	69.7	.8	63.1	37	63.1%	2.0%	100.0%	.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 29
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Mentor Graphics	68.8	21.2	33.8	910	17.2%	10.8%	24.9%	6.9%
Dazix	44.3	17.7	17.7	441	11.1%	9.1%	13.0%	3.3%
Hewlett-Packard	39.9	30.7	2.4	2,710	10.0%	15.7%	1.8%	20.5%
Digital	36.0	27.1	.0	307	9.0%	13.8%	.0%	2.3%
Valid	30.5	7.6	16.4	0	7.6%	3.9%	12.1%	.0%
Sun	27.8	25.1	.0	1,869	7.0%	12.8%	.0%	14.2%
Compaq	11.8	11.8	.0	1,969	3.0%	6.0%	.0%	14.9%
Intergraph	11.0	6.0	1.9	115	2.7%	3.1%	1.4%	.9%
Computervision	9.2	4.2	2.2	77	2.3%	2.1%	1.6%	.6%
Racal-Redac	8.5	.2	7.0	33	2.1%	.1%	5.1%	.3%
Zycad	7.9	5.5	.2	38	2.0%	2.8%	.1%	.3%
Aucotec	5.2	2.0	2.6	578	1.3%	1.0%	1.9%	4.4%
Autodesk	4.6	.0	4.6	0	1.2%	.0%	3.4%	.0%
Xilinx	4.5	.0	4.1	0	1.1%	.0%	3.0%	.0%
LSI Logic	4.5	.4	3.3	17	1.1%	.2%	2.4%	.1%
VLSI Technology	4.4	.3	3.4	14	1.1%	.1%	2.5%	.1%
Teradyne	4.0	.0	3.2	0	1.0%	.0%	2.4%	.0%
Genrad	3.6	.6	2.4	0	.9%	.3%	1.8%	.0%
Silicon Compiler Systems	3.4	.0	2.3	0	.8%	.0%	1.7%	.0%
Cadence	3.1	.0	2.7	0	.8%	.0%	2.0%	.0%
Ziegler	3.1	.1	2.8	99	.8%	.1%	2.1%	.8%
Altera	2.3	.0	2.0	0	.6%	.0%	1.5%	.0%
Rotring EURCAD	2.2	1.2	1.0	61	.6%	.6%	.7%	.5%
Assigraph	1.9	.0	1.5	24	.5%	.0%	1.1%	.2%
Orcad	1.9	.0	1.8	0	.5%	.0%	1.3%	.0%
Apple Computer	1.5	1.3	.0	288	.4%	.7%	.0%	2.2%
IBM	1.5	1.4	.0	295	.4%	.7%	.0%	2.2%
Logic Automation	1.4	.0	1.4	0	.4%	.0%	1.1%	.0%
Micrograph	1.4	.8	.5	36	.4%	.4%	.4%	.3%
ALS Design	1.4	.1	1.1	25	.4%	.1%	.8%	.2%
Microsim	1.4	.0	1.2	0	.3%	.0%	.9%	.0%
Analogy	1.2	.0	1.1	0	.3%	.0%	.8%	.0%
Test Systems Strategies	1.2	.0	1.0	0	.3%	.0%	.8%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 29
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					..... Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Data I/O	1.1	.0	1.0	0	.3%	.0%	.7%	.0%
Secmai	1.1	.7	.2	10	.3%	.4%	.2%	.1%
Ikos Systems	1.1	.9	.2	0	.3%	.5%	.2%	.0%
Dassault	1.1	.0	.9	0	.3%	.0%	.7%	.0%
Intercad	1.0	.5	.3	50	.3%	.3%	.2%	.4%
Serbi	1.0	.0	1.0	0	.2%	.0%	.7%	.0%
Synopsys	.9	.0	.8	0	.2%	.0%	.6%	.0%
Silvar-Lisco	.9	.0	.5	0	.2%	.0%	.4%	.0%
ACTEL	.7	.0	.7	0	.2%	.0%	.5%	.0%
Westward	.7	.7	.0	38	.2%	.3%	.0%	.3%
National Semiconductor	.6	.5	.2	8	.2%	.2%	.1%	.1%
Solbourne	.4	.4	.0	32	.1%	.2%	.0%	.2%
Omation	.3	.0	.3	0	.1%	.0%	.2%	.0%
Electrical Eng. Software	.3	.0	.3	0	.1%	.0%	.2%	.0%
Meta-Software	.3	.0	.3	0	.1%	.0%	.2%	.0%
Scientific Calc.	.3	.1	.2	1	.1%	.0%	.1%	.0%
Everex Systems	.2	.2	.0	58	.1%	.1%	.0%	.4%
Seattle Silicon	.1	.0	.1	0	.0%	.0%	.1%	.0%
Douglas Electronics	.1	.0	.1	0	.0%	.0%	.1%	.0%
Academi Systems	.1	.0	.1	1	.0%	.0%	.0%	.0%
CAD Software	.1	.0	.1	0	.0%	.0%	.1%	.0%
Accel Technologies	.1	.0	.1	0	.0%	.0%	.1%	.0%
EPIC Design Technology	.1	.0	.1	0	.0%	.0%	.0%	.0%
Dell Computer	.1	.1	.0	14	.0%	.0%	.0%	.1%
Logic Modeling Systems	.1	.0	.0	15	.0%	.0%	.0%	.1%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%
Capilano Computing	.0	.0	.0	0	.0%	.0%	.0%	.0%
DAT Standard Information syste	.0	.0	.0	0	.0%	.0%	.0%	.0%
Sycotronic AG	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 29 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	61.7	34.2	22.4	3,911	15.4%	17.5%	16.5%	29.6%
All Companies	399.4	195.5	135.9	13,198	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	370.7	189.1	117.0	12,242	92.8%	96.7%	86.0%	92.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	28.7	6.4	19.0	956	7.2%	3.3%	14.0%	7.2%
All Hardware Companies	133.4	115.4	.0	10,302	33.4%	59.0%	.0%	78.1%
All Turnkey & SW Companies	266.0	80.1	135.9	2,896	66.6%	41.0%	100.0%	21.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 30
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Technical Workstation
REGION: Europe
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Mentor Graphics	68.8	21.2	33.8	910	25.4%	17.9%	33.5%	14.9%
Dazix	44.3	17.7	17.7	441	16.4%	14.9%	17.5%	7.2%
Hewlett-Packard	35.7	27.2	2.4	2,266	13.2%	22.9%	2.4%	37.1%
Valid	30.5	7.6	16.4	0	11.3%	6.4%	16.3%	.0%
Sun	27.8	25.1	.0	1,869	10.3%	21.1%	.0%	30.6%
Digital	9.3	7.0	.0	307	3.4%	5.9%	.0%	5.0%
Intergraph	9.0	5.0	1.6	96	3.3%	4.2%	1.6%	1.6%
Computervision	7.7	3.6	1.8	47	2.9%	3.0%	1.8%	.8%
Racal-Redac	7.2	.2	5.9	25	2.7%	.2%	5.9%	.4%
LSI Logic	4.0	.4	3.0	15	1.5%	.3%	3.0%	.2%
VLSI Technology	3.7	.2	2.9	12	1.4%	.2%	2.9%	.2%
Silicon Compiler Systems	3.4	.0	2.3	0	1.2%	.0%	2.2%	.0%
Genrad	2.8	.4	1.9	0	1.0%	.4%	1.9%	.0%
Cadence	2.4	.0	2.0	0	.9%	.0%	2.0%	.0%
Logic Automation	1.4	.0	1.4	0	.5%	.0%	1.4%	.0%
Assigraph	1.2	.0	1.0	0	.5%	.0%	.9%	.0%
Analogy	1.2	.0	1.1	0	.4%	.0%	1.0%	.0%
Teradyne	1.2	.0	1.0	0	.4%	.0%	1.0%	.0%
Secmai	1.1	.7	.2	9	.4%	.6%	.2%	.2%
Test Systems Strategies	1.0	.0	.9	0	.4%	.0%	.9%	.0%
Ikos Systems	1.0	.8	.2	0	.4%	.7%	.2%	.0%
Silvar-Lisco	.8	.0	.4	0	.3%	.0%	.4%	.0%
National Semiconductor	.6	.5	.2	8	.2%	.4%	.2%	.1%
Synopsys	.5	.0	.4	0	.2%	.0%	.4%	.0%
Westward	.4	.4	.0	21	.1%	.3%	.0%	.3%
Solbourne	.3	.3	.0	25	.1%	.3%	.0%	.4%
Aucotec	.3	.1	.1	29	.1%	.1%	.1%	.5%
Microsim	.2	.0	.2	0	.1%	.0%	.2%	.0%
Xilinx	.2	.0	.2	0	.1%	.0%	.2%	.0%
Electrical Eng. Software	.2	.0	.2	0	.1%	.0%	.2%	.0%
Scientific Calc.	.2	.1	.1	1	.1%	.0%	.1%	.0%
Meta-Software	.2	.0	.2	0	.1%	.0%	.2%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 30 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Technical Workstation
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Dassault	.2	.0	.1	0	.1%	.0%	.1%	.0%
Autodesk	.2	.0	.2	0	.1%	.0%	.1%	.0%
Micrograph	.1	.1	.0	5	.1%	.1%	.0%	.1%
Seattle Silicon	.1	.0	.1	0	.0%	.0%	.1%	.0%
ACTEL	.1	.0	.1	0	.0%	.0%	.1%	.0%
Data I/O	.1	.0	.1	0	.0%	.0%	.1%	.0%
Academi Systems	.1	.0	.1	1	.0%	.0%	.1%	.0%
Zycad	.1	.1	.0	0	.0%	.1%	.0%	.0%
EPIC Design Technology	.1	.0	.1	0	.0%	.0%	.1%	.0%
Logic Modeling Systems	.1	.0	.0	15	.0%	.0%	.0%	.2%
Serbi	.1	.0	.1	0	.0%	.0%	.0%	.0%
Everex Systems	.0	.0	.0	1	.0%	.0%	.0%	.0%
Other Companies	12.8	3.0	8.2	88	4.7%	2.5%	8.1%	1.4%
All Companies	270.7	118.7	101.0	6,104	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	260.0	117.1	93.5	6,014	96.1%	98.7%	92.6%	98.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	10.7	1.5	7.5	90	3.9%	1.3%	7.4%	1.5%
All Hardware Companies	59.6	50.8	.0	4,163	22.0%	42.8%	.0%	68.2%
All Turnkey & SW Companies	211.1	67.8	101.0	1,941	78.0%	57.2%	100.0%	31.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 31
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Host/Server
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	26.7	20.1	.0	0	39.8%	43.7%	.0%	.0%
Zycad	7.8	5.5	.2	37	11.6%	11.9%	2.1%	3.9%
Hewlett-Packard	2.2	1.9	.0	111	3.3%	4.0%	.0%	11.7%
Teradyne	2.0	.0	1.6	0	3.0%	.0%	20.8%	.0%
Intergraph	2.0	1.0	.3	19	2.9%	2.1%	4.2%	2.0%
Computervision	1.3	.6	.3	28	2.0%	1.3%	4.2%	2.9%
Racal-Redac	1.2	.0	1.0	8	1.8%	.0%	13.1%	.9%
Dassault	.9	.0	.8	0	1.3%	.0%	10.0%	.0%
Cadence	.8	.0	.7	0	1.1%	.0%	8.5%	.0%
Assigraph	.7	.0	.6	24	1.1%	.0%	7.4%	2.6%
Genrad	.7	.1	.5	0	1.0%	.2%	6.1%	.0%
VLSI Technology	.7	.0	.5	2	1.0%	.1%	6.6%	.2%
LSI Logic	.5	.0	.3	2	.7%	.1%	4.3%	.2%
Synopsys	.5	.0	.4	0	.7%	.0%	4.9%	.0%
Aucotec	.3	.1	.1	29	.4%	.2%	1.6%	3.0%
Test Systems Strategies	.2	.0	.1	0	.3%	.0%	1.8%	.0%
Electrical Eng. Software	.1	.0	.1	0	.1%	.0%	1.0%	.0%
Silvar-Lisco	.1	.0	.1	0	.1%	.0%	.7%	.0%
Solbourne	.1	.1	.0	6	.1%	.2%	.0%	.7%
Meta-Software	.1	.0	.1	0	.1%	.0%	.9%	.0%
Scientific Calc.	.1	.0	.1	0	.1%	.0%	.7%	.0%
Data I/O	.1	.0	.1	0	.1%	.0%	.7%	.0%
Logic Automation	.0	.0	.0	0	.1%	.0%	.5%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 31 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Host/Server
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	20.8	16.8	1.9	735	31.0%	36.6%	24.3%	77.5%
All Companies	67.1	46.0	7.7	948	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	64.0	45.9	5.2	887	95.4%	99.8%	67.9%	93.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	3.1	.1	2.5	61	4.6%	.2%	32.1%	6.5%
All Hardware Companies	47.3	38.6	.0	799	70.5%	84.0%	.0%	84.3%
All Turnkey & SW Companies	19.8	7.3	7.7	149	29.5%	16.0%	100.0%	15.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 32
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Personal Computer
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compaq	11.8	11.8	.0	1,969	19.2%	38.3%	.0%	32.0%
Aucotec	4.7	1.9	2.3	520	7.5%	6.0%	8.5%	8.5%
Autodesk	4.5	.0	4.5	0	7.3%	.0%	16.5%	.0%
Xilinx	4.3	.0	3.9	0	6.9%	.0%	14.1%	.0%
Ziegler	3.1	.1	2.8	99	5.0%	.4%	10.3%	1.6%
Altera	2.3	.0	2.0	0	3.7%	.0%	7.3%	.0%
Rotring EURCAD	2.2	1.2	1.0	61	3.6%	4.0%	3.5%	1.0%
Hewlett-Packard	2.0	1.6	.0	333	3.2%	5.3%	.0%	5.4%
Orcad	1.9	.0	1.8	0	3.0%	.0%	6.5%	.0%
Apple Computer	1.5	1.3	.0	288	2.4%	4.2%	.0%	4.7%
IBM	1.5	1.4	.0	295	2.4%	4.5%	.0%	4.8%
ALS Design	1.4	.1	1.1	25	2.3%	.5%	4.2%	.4%
Micrograph	1.3	.7	.5	31	2.1%	2.1%	1.8%	.5%
Microsim	1.1	.0	1.0	0	1.8%	.0%	3.8%	.0%
Intercad	1.0	.5	.3	50	1.6%	1.6%	1.1%	.8%
Data I/O	1.0	.0	.8	0	1.6%	.0%	3.0%	.0%
Serbi	.9	.0	.9	0	1.5%	.0%	3.3%	.0%
Teradyne	.8	.0	.7	0	1.3%	.0%	2.4%	.0%
ACTEL	.6	.0	.6	0	1.0%	.0%	2.2%	.0%
Omation	.3	.0	.3	0	.5%	.0%	1.1%	.0%
Westward	.3	.3	.0	17	.4%	.8%	.0%	.3%
Everex Systems	.2	.2	.0	57	.3%	.6%	.0%	.9%
Ikos Systems	.1	.1	.0	0	.2%	.3%	.1%	.0%
Douglas Electronics	.1	.0	.1	0	.2%	.0%	.4%	.0%
Genrad	.1	.0	.1	0	.2%	.1%	.3%	.0%
CAD Software	.1	.0	.1	0	.1%	.0%	.3%	.0%
Computervision	.1	.0	.0	2	.1%	.1%	.0%	.0%
Accel Technologies	.1	.0	.1	0	.1%	.0%	.3%	.0%
Racal-Redac	.1	.0	.1	0	.1%	.0%	.3%	.0%
Dell Computer	.1	.1	.0	14	.1%	.2%	.0%	.2%
Foresight Resources	.0	.0	.0	0	.1%	.0%	.1%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 32 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Personal Computer
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Capilano Computing	.0	.0	.0	0	.0%	.0%	.1%	.0%
Academi Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
DAT Standard Information syste	.0	.0	.0	0	.0%	.0%	.0%	.0%
Secmai	.0	.0	.0	0	.0%	.0%	.0%	.0%
Sycotronic AG	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	28.1	14.3	12.3	3,088	45.6%	46.4%	45.1%	50.3%
All Companies	61.6	30.8	27.2	6,146	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	46.7	26.1	18.2	5,342	75.8%	84.6%	66.9%	86.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	14.9	4.8	9.0	804	24.2%	15.4%	33.1%	13.1%
All Hardware Companies	26.6	25.9	.0	5,339	43.1%	84.1%	.0%	86.9%
All Turnkey & SW Companies	35.1	4.9	27.2	806	56.9%	15.9%	100.0%	13.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 33
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Mentor Graphics	65.8	27.0	33.0	858	21.2%	19.2%	24.0%	11.9%
Hewlett-Packard	35.6	24.5	7.1	1,509	11.5%	17.5%	5.1%	21.0%
NEC	26.5	17.7	6.7	1,424	8.5%	12.6%	4.9%	19.8%
Fujitsu	24.5	13.9	7.7	548	7.9%	9.9%	5.6%	7.6%
Wacom	20.9	9.0	9.8	199	6.7%	6.4%	7.1%	2.8%
Valid	20.0	4.8	13.6	100	6.4%	3.4%	9.9%	1.4%
Dazix	15.4	4.5	9.3	140	4.9%	3.2%	7.0%	1.9%
Sun	13.6	12.3	.0	1,175	4.4%	8.8%	.0%	16.4%
Cadence	11.8	.0	10.5	0	3.8%	.0%	7.6%	.0%
Zuken	10.6	4.0	6.0	57	3.4%	2.8%	4.3%	.8%
Digital	8.1	6.1	.0	69	2.6%	4.3%	.0%	1.0%
Data I/O	6.3	.0	5.3	0	2.0%	.0%	3.9%	.0%
Racal-Redac	4.5	1.3	2.9	35	1.5%	.9%	2.1%	.5%
Xilinx	3.8	.0	3.4	0	1.2%	.0%	2.5%	.0%
Zycad	3.2	2.2	.1	15	1.0%	1.6%	.0%	.2%
Ikos Systems	2.2	1.8	.4	0	.7%	1.3%	.3%	.0%
Synopsys	1.8	.0	1.5	0	.6%	.0%	1.1%	.0%
LSI Logic	1.8	.2	1.3	7	.6%	.1%	1.0%	.1%
Tokyo Electron--NO OEM	1.7	.6	.8	6	.6%	.4%	.6%	.1%
Silicon Compiler Systems	1.7	.0	1.1	0	.5%	.0%	.8%	.0%
Autodesk	1.7	.0	1.7	0	.5%	.0%	1.2%	.0%
Kanematsu Semiconductor	1.4	.8	.5	8	.5%	.6%	.3%	.1%
Sophia Systems	1.4	.3	.9	16	.4%	.2%	.6%	.2%
Altera	1.4	.0	1.2	0	.4%	.0%	.9%	.0%
Meta-Software	1.3	.0	1.3	0	.4%	.0%	.9%	.0%
Intergraph	1.2	.6	.2	13	.4%	.4%	.1%	.2%
Test Systems Strategies	1.2	.0	1.0	0	.4%	.0%	.7%	.0%
VLSI Technology	1.2	.1	.9	4	.4%	.0%	.7%	.1%
Century Research Center	1.0	.5	.4	6	.3%	.4%	.3%	.1%
Sony	1.0	.8	.0	63	.3%	.6%	.0%	.9%
IBM	.9	.9	.0	185	.3%	.6%	.0%	2.6%
Silvar-Lisco	.9	.0	.7	0	.3%	.0%	.5%	.0%
Genrad	.9	.1	.6	0	.3%	.1%	.4%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 33
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Microsim	.8	.0	.8	0	.3%	.0%	.5%	.0%
Electrical Eng. Software	.8	.0	.7	0	.3%	.0%	.5%	.0%
Teradyne	.8	.0	.6	0	.3%	.0%	.5%	.0%
Orcad	.8	.0	.7	0	.3%	.0%	.5%	.0%
Sumisho Electronics	.8	.6	.2	45	.3%	.4%	.1%	.6%
Toshiba--NO OEM	.7	.4	.3	7	.2%	.3%	.2%	.1%
Analogy	.6	.0	.5	0	.2%	.0%	.4%	.0%
Compaq	.6	.6	.0	98	.2%	.4%	.0%	1.4%
Solbourne	.6	.5	.0	40	.2%	.3%	.0%	.6%
EPIC Design Technology	.4	.0	.4	0	.1%	.0%	.3%	.0%
Seattle Silicon	.4	.0	.3	0	.1%	.0%	.2%	.0%
Logic Automation	.4	.0	.4	0	.1%	.0%	.3%	.0%
Apple Computer	.3	.2	.0	48	.1%	.2%	.0%	.7%
Scientific Calc.	.2	.0	.1	1	.1%	.0%	.1%	.0%
Silc Technologies	.2	.0	.1	0	.1%	.0%	.1%	.0%
Douglas Electronics	.1	.0	.1	0	.0%	.0%	.1%	.0%
Omation	.1	.0	.1	0	.0%	.0%	.1%	.0%
ACTEL	.1	.0	.1	0	.0%	.0%	.0%	.0%
Everex Systems	.1	.1	.0	15	.0%	.0%	.0%	.2%
Logic Modeling Systems	.1	.0	.0	15	.0%	.0%	.0%	.2%
Capilano Computing	.0	.0	.0	0	.0%	.0%	.0%	.0%
Accel Technologies	.0	.0	.0	0	.0%	.0%	.0%	.0%
CAD Software	.0	.0	.0	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 33 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Other Companies	22.4	8.9	11.6	634	7.2%	6.3%	8.4%	8.8%
All Companies	310.2	140.2	137.5	7,185	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	217.4	91.7	102.0	4,825	70.1%	65.4%	74.2%	67.2%
All Asian-Based Companies	88.3	47.2	32.5	2,325	28.5%	33.6%	23.7%	32.4%
All European-Based Companies	4.5	1.3	2.9	35	1.5%	.9%	2.1%	.5%
All Hardware Companies	38.3	33.0	.0	2,923	12.3%	23.6%	.0%	40.7%
All Turnkey & SW Companies	272.0	107.1	137.5	4,262	87.7%	76.4%	100.0%	59.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 34
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Technical Workstation
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	65.8	27.0	33.0	858	29.6%	28.0%	31.7%	17.6%
Hewlett-Packard	34.5	23.6	7.1	1,407	15.5%	24.5%	6.8%	28.8%
Valid	20.0	4.8	13.6	100	9.0%	5.0%	13.1%	2.0%
NEC	16.7	8.7	6.7	773	7.5%	9.0%	6.4%	15.8%
Dazix	15.4	4.5	9.6	140	6.9%	4.7%	9.2%	2.9%
Sun	10.9	9.8	.0	1,056	4.9%	10.2%	.0%	21.6%
Zuken	10.6	4.0	6.0	57	4.8%	4.1%	5.7%	1.2%
Cadence	10.6	.0	9.4	0	4.8%	.0%	9.1%	.0%
Fujitsu	9.8	5.9	2.9	235	4.4%	6.1%	2.8%	4.8%
Racal-Redac	4.3	1.3	2.7	33	1.9%	1.4%	2.6%	.7%
Digital	2.1	1.6	.0	69	.9%	1.6%	.0%	1.4%
Ikos Systems	2.0	1.6	.4	0	.9%	1.6%	.4%	.0%
Tokyo Electron--NO OEM	1.7	.6	.8	6	.8%	.6%	.8%	.1%
Silicon Compiler Systems	1.7	.0	1.1	0	.8%	.0%	1.1%	.0%
LSI Logic	1.6	.2	1.2	6	.7%	.2%	1.2%	.1%
Test Systems Strategies	1.0	.0	.9	0	.5%	.0%	.8%	.0%
Century Research Center	1.0	.5	.4	6	.5%	.5%	.4%	.1%
Intergraph	1.0	.6	.2	11	.4%	.6%	.2%	.2%
VLSI Technology	1.0	.1	.8	3	.4%	.1%	.7%	.1%
Sony	1.0	.8	.0	63	.4%	.9%	.0%	1.3%
Meta-Software	.9	.0	.9	0	.4%	.0%	.9%	.0%
Synopsys	.9	.0	.8	0	.4%	.0%	.7%	.0%
Silvar-Lisco	.8	.0	.7	0	.4%	.0%	.6%	.0%
Toshiba--NO OEM	.7	.4	.3	7	.3%	.4%	.3%	.1%
Kanematsu Semiconductor	.7	.3	.3	8	.3%	.3%	.3%	.2%
Genrad	.7	.1	.4	0	.3%	.1%	.4%	.0%
Data I/O	.6	.0	.5	0	.3%	.0%	.5%	.0%
Analogy	.6	.0	.5	0	.3%	.0%	.5%	.0%
Electrical Eng. Software	.6	.0	.5	0	.3%	.0%	.5%	.0%
Solbourne	.4	.4	.0	32	.2%	.4%	.0%	.7%
EPIC Design Technology	.4	.0	.4	0	.2%	.0%	.4%	.0%
Seattle Silicon	.4	.0	.3	0	.2%	.0%	.3%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 34 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Technical Workstation
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Sumisho Electronics	.4	.3	.0	2	.2%	.3%	.0%	.0%
Logic Automation	.4	.0	.4	0	.2%	.0%	.3%	.0%
Sophia Systems	.3	.1	.2	2	.1%	.1%	.2%	.0%
Teradyne	.2	.0	.2	0	.1%	.0%	.2%	.0%
Xilinx	.2	.0	.2	0	.1%	.0%	.2%	.0%
Autodesk	.2	.0	.2	0	.1%	.0%	.1%	.0%
Scientific Calc.	.2	.0	.1	1	.1%	.0%	.1%	.0%
Silc Technologies	.2	.0	.1	0	.1%	.0%	.1%	.0%
Microsim	.1	.0	.1	0	.1%	.0%	.1%	.0%
Logic Modeling Systems	.1	.0	.0	15	.0%	.0%	.0%	.3%
Zycad	.0	.0	.0	0	.0%	.0%	.0%	.0%
ACTEL	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	10.4	3.1	6.3	86	4.7%	3.2%	6.1%	1.8%
All Companies	222.3	96.3	104.0	4,879	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	176.2	74.2	84.1	3,698	79.2%	77.0%	80.8%	75.8%
All Asian-Based Companies	41.8	20.8	17.3	1,148	18.8%	21.6%	16.6%	23.5%
All European-Based Companies	4.3	1.3	2.7	33	1.9%	1.4%	2.6%	.7%
All Hardware Companies	20.9	18.0	.0	1,814	9.4%	18.7%	.0%	37.2%
All Turnkey & SW Companies	201.4	78.3	104.0	3,065	90.6%	81.3%	100.0%	62.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 35
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Host/Server
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Fujitsu	11.0	6.1	3.3	130	34.2%	30.8%	46.9%	28.1%
Digital	6.0	4.5	.0	0	18.7%	22.8%	.0%	.0%
Zycad	3.1	2.2	.1	15	9.7%	11.0%	.9%	3.2%
Sun	2.7	2.5	.0	119	8.5%	12.4%	.0%	25.8%
Cadence	1.2	.0	1.0	0	3.6%	.0%	14.9%	.0%
Synopsys	.9	.0	.8	0	2.8%	.0%	11.0%	.0%
Kanematsu Semiconductor	.7	.5	.2	0	2.2%	2.5%	2.1%	.0%
Hewlett-Packard	.7	.6	.0	34	2.0%	2.8%	.0%	7.4%
Teradyne	.4	.0	.3	0	1.2%	.0%	4.6%	.0%
Meta-Software	.4	.0	.4	0	1.2%	.0%	5.3%	.0%
Data I/O	.3	.0	.3	0	1.0%	.0%	3.9%	.0%
Electrical Eng. Software	.2	.0	.2	0	.7%	.0%	3.1%	.0%
Intergraph	.2	.1	.0	2	.7%	.4%	.4%	.4%
LSI Logic	.2	.0	.1	1	.6%	.1%	1.9%	.1%
Test Systems Strategies	.2	.0	.1	0	.5%	.0%	2.0%	.0%
VLSI Technology	.2	.0	.1	1	.5%	.1%	1.9%	.1%
Genrad	.2	.0	.1	0	.5%	.2%	1.6%	.0%
Solbourne	.1	.1	.0	8	.3%	.5%	.0%	1.7%
Silvar-Lisco	.1	.0	.1	0	.3%	.0%	1.0%	.0%
Scientific Calc.	.1	.0	.0	0	.2%	.0%	.4%	.0%
Silc Technologies	.0	.0	.0	0	.1%	.0%	.1%	.0%
Logic Automation	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 35 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Host/Server
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	6.0	3.8	1.6	153	18.6%	19.1%	23.3%	33.1%
All Companies	32.2	19.8	7.0	464	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	21.2	13.7	3.7	333	65.8%	69.2%	53.1%	71.9%
All Asian-Based Companies	11.0	6.1	3.3	130	34.2%	30.8%	46.9%	28.1%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	13.6	11.4	.0	315	42.3%	57.5%	.0%	67.9%
All Turnkey & SW Companies	18.6	8.4	7.0	149	57.7%	42.5%	100.0%	32.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 36
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Personal Computer
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Wacom	20.9	9.0	9.8	199	37.4%	37.3%	37.1%	10.8%
NEC	9.8	9.0	.0	651	17.6%	37.6%	.0%	35.3%
Data I/O	5.3	.0	4.5	0	9.6%	.0%	17.1%	.0%
Fujitsu	3.7	2.0	1.5	183	6.6%	8.2%	5.6%	9.9%
Xilinx	3.6	.0	3.2	0	6.4%	.0%	12.1%	.0%
Autodesk	1.5	.0	1.5	0	2.7%	.0%	5.7%	.0%
Altera	1.4	.0	1.2	0	2.4%	.0%	4.5%	.0%
Sophia Systems	1.1	.3	.7	14	2.0%	1.2%	2.6%	.8%
IBM	.9	.9	.0	185	1.6%	3.6%	.0%	10.0%
Orcad	.8	.0	.7	0	1.4%	.0%	2.8%	.0%
Microsim	.7	.0	.6	0	1.2%	.0%	2.3%	.0%
Compaq	.6	.6	.0	98	1.1%	2.5%	.0%	5.3%
Hewlett-Packard	.4	.3	.0	67	.7%	1.4%	.0%	3.7%
Sumisho Electronics	.4	.2	.1	43	.7%	1.0%	.5%	2.3%
Apple Computer	.3	.2	.0	48	.4%	.9%	.0%	2.6%
Ikos Systems	.2	.2	.1	0	.4%	.8%	.2%	.0%
Racal-Redac	.2	.0	.2	2	.4%	.0%	.7%	.1%
Teradyne	.2	.0	.1	0	.3%	.0%	.5%	.0%
Douglas Electronics	.1	.0	.1	0	.3%	.0%	.5%	.0%
Omation	.1	.0	.1	0	.1%	.0%	.3%	.0%
Everex Systems	.1	.1	.0	14	.1%	.2%	.0%	.8%
ACTEL	.0	.0	.0	0	.1%	.0%	.2%	.0%
Capilano Computing	.0	.0	.0	0	.1%	.0%	.1%	.0%
Genrad	.0	.0	.0	0	.1%	.0%	.1%	.0%
Accel Technologies	.0	.0	.0	0	.0%	.0%	.1%	.0%
CAD Software	.0	.0	.0	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 36 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Personal Computer
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	6.0	2.0	3.7	395	10.8%	8.3%	13.8%	21.5%
All Companies	55.7	24.0	26.4	1,842	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	20.1	3.8	14.3	794	36.0%	15.7%	54.0%	43.1%
All Asian-Based Companies	35.4	20.2	12.0	1,047	63.6%	84.2%	45.3%	56.8%
All European-Based Companies	.2	.0	.2	2	.4%	.0%	.7%	.1%
All Hardware Companies	3.7	3.6	.0	794	6.7%	14.9%	.0%	43.1%
All Turnkey & SW Companies	52.0	20.4	26.4	1,048	93.3%	85.1%	100.0%	56.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 37
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	2.7	2.0	.0	23	17.9%	21.9%	.0%	3.4%
Hewlett-Packard	2.2	1.7	.1	164	14.6%	18.7%	2.7%	24.3%
Compaq	.9	.9	.0	148	5.9%	9.6%	.0%	21.8%
LSI Logic	.9	.1	.7	3	5.9%	1.0%	17.6%	.5%
Xilinx	.8	.0	.7	0	5.0%	.0%	17.9%	.0%
Sun	.7	.6	.0	51	4.6%	6.6%	.0%	7.5%
Data I/O	.6	.0	.5	0	3.8%	.0%	12.8%	.0%
Ikos Systems	.6	.4	.1	0	3.6%	4.8%	2.9%	.0%
Fujitsu	.5	.3	.2	11	3.1%	3.0%	4.0%	1.6%
Intergraph	.3	.2	.1	3	2.2%	2.0%	1.6%	.5%
Silicon Compiler Systems	.2	.0	.2	0	1.6%	.0%	4.3%	.0%
Teradyne	.2	.0	.2	0	1.3%	.0%	4.3%	.0%
IBM	.2	.2	.0	37	1.2%	1.8%	.0%	5.5%
Computervision	.2	.1	.1	1	1.1%	.8%	1.3%	.1%
Genrad	.2	.0	.1	0	1.1%	.3%	2.9%	.0%
Autodesk	.1	.0	.1	0	.9%	.0%	3.7%	.0%
Orcad	.1	.0	.1	0	.8%	.0%	2.9%	.0%
Solbourne	.1	.1	.0	9	.8%	1.2%	.0%	1.3%
Spectrum Software	.1	.0	.1	0	.7%	.0%	2.9%	.0%
Royal Digital Systems	.1	.0	.1	0	.5%	.0%	1.6%	.0%
Apple Computer	.1	.1	.0	12	.4%	.5%	.0%	1.8%
ACTEL	.1	.0	.1	0	.3%	.0%	1.3%	.0%
Secmai	.1	.0	.1	0	.3%	.0%	1.3%	.0%
Capilano Computing	.0	.0	.0	0	.2%	.0%	.8%	.0%
CAD Software	.0	.0	.0	0	.1%	.0%	.3%	.0%
Foresight Resources	.0	.0	.0	0	.1%	.0%	.3%	.0%
Serbi	.0	.0	.0	0	.1%	.0%	.3%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 37 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Other Companies	3.9	3.0	.7	215	26.1%	32.8%	17.6%	31.7%
All Companies	15.1	9.2	3.8	678	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	14.6	9.0	3.5	667	96.5%	97.0%	94.4%	98.4%
All Asian-Based Companies	.5	.3	.2	11	3.1%	3.0%	4.0%	1.6%
All European-Based Companies	.1	.0	.1	0	.4%	.0%	1.6%	.0%
All Hardware Companies	9.1	7.8	.0	647	60.0%	84.5%	.0%	95.5%
All Turnkey & SW Companies	6.0	1.4	3.8	31	40.0%	15.5%	100.0%	4.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 38
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Technical Workstation
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Hewlett-Packard	2.0	1.6	.1	149	32.8%	44.9%	6.3%	63.0%
LSI Logic	.8	.1	.6	3	13.2%	2.3%	38.0%	1.3%
Digital	.7	.5	.0	23	11.6%	14.9%	.0%	9.7%
Sun	.6	.5	.0	46	9.1%	14.0%	.0%	19.4%
Ikos Systems	.5	.4	.1	0	8.1%	11.1%	6.3%	.0%
Intergraph	.3	.2	.1	3	4.5%	4.3%	3.2%	1.2%
Silicon Compiler Systems	.2	.0	.2	0	4.0%	.0%	10.1%	.0%
Fujitsu	.2	.1	.1	5	3.1%	3.4%	3.8%	1.9%
Computervision	.2	.1	.0	1	2.6%	2.0%	2.5%	.4%
Genrad	.1	.0	.1	0	2.1%	.6%	5.7%	.0%
Solbourne	.1	.1	.0	7	1.7%	2.6%	.0%	3.0%
Royal Digital Systems	.1	.0	.1	0	1.2%	.0%	3.8%	.0%
Data I/O	.1	.0	.1	0	1.0%	.0%	3.2%	.0%
Teradyne	.1	.0	.1	0	1.0%	.0%	3.2%	.0%
Secmai	.1	.0	.1	0	.8%	.0%	3.2%	.0%
Xilinx	.0	.0	.0	0	.7%	.0%	1.9%	.0%
ACTEL	.0	.0	.0	0	.2%	.0%	.6%	.0%
Autodesk	.0	.0	.0	0	.2%	.0%	.6%	.0%
Other Companies	.8	.4	.3	0	12.4%	11.7%	19.6%	.0%
All Companies	6.1	3.5	1.6	236	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	5.8	3.4	1.5	232	96.0%	96.6%	93.0%	98.1%
All Asian-Based Companies	.2	.1	.1	5	3.1%	3.4%	3.8%	1.9%
All European-Based Companies	.1	.0	.1	0	.8%	.0%	3.2%	.0%
All Hardware Companies	2.8	2.3	.0	213	46.2%	66.6%	.0%	89.9%
All Turnkey & SW Companies	3.3	1.2	1.6	24	53.8%	33.4%	100.0%	10.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 39
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Host/Server
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Digital	2.0	1.5	.0	0	39.1%	37.4%	.0%	.0%
Fujitsu	.2	.1	.1	3	4.1%	3.0%	24.0%	2.3%
Hewlett-Packard	.2	.1	.0	8	3.1%	3.2%	.0%	7.2%
Sun	.1	.1	.0	5	2.7%	3.0%	.0%	4.7%
Teradyne	.1	.0	.1	0	2.0%	.0%	32.0%	.0%
LSI Logic	.1	.0	.1	0	1.8%	.2%	24.0%	.3%
Intergraph	.1	.0	.0	1	1.2%	.7%	4.0%	.5%
Data I/O	.0	.0	.0	0	.6%	.0%	8.0%	.0%
Genrad	.0	.0	.0	0	.6%	.2%	8.0%	.0%
Solbourne	.0	.0	.0	2	.4%	.5%	.0%	1.6%
Other Companies	2.3	2.1	.0	92	45.0%	51.9%	8.0%	83.3%
All Companies	5.1	4.0	.3	110	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	4.9	3.9	.2	108	95.9%	97.0%	76.0%	97.7%
All Asian-Based Companies	.2	.1	.1	3	4.1%	3.0%	24.0%	2.3%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	4.6	3.8	.0	107	89.8%	95.8%	.0%	96.9%
All Turnkey & SW Companies	.5	.2	.3	3	10.2%	4.2%	100.0%	3.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 40
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: Personal Computer
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Compaq	.9	.9	.0	148	22.7%	51.7%	.0%	44.6%
Xilinx	.7	.0	.6	0	18.1%	.0%	33.3%	.0%
Data I/O	.5	.0	.4	0	12.2%	.0%	21.4%	.0%
IBM	.2	.2	.0	37	4.6%	9.9%	.0%	11.2%
Autodesk	.1	.0	.1	0	3.3%	.0%	6.8%	.0%
Orcad	.1	.0	.1	0	3.1%	.0%	5.7%	.0%
Spectrum Software	.1	.0	.1	0	2.8%	.0%	5.7%	.0%
Fujitsu	.1	.0	.0	4	1.8%	2.3%	1.6%	1.1%
Apple Computer	.1	.1	.0	12	1.5%	2.9%	.0%	3.6%
Ikos Systems	.1	.1	.0	0	1.5%	2.9%	.5%	.0%
Hewlett-Packard	.1	.0	.0	7	1.3%	1.7%	.0%	2.3%
ACTEL	.0	.0	.0	0	1.0%	.0%	2.1%	.0%
Teradyne	.0	.0	.0	0	1.0%	.0%	1.6%	.0%
Capilano Computing	.0	.0	.0	0	.8%	.0%	1.6%	.0%
CAD Software	.0	.0	.0	0	.3%	.0%	.5%	.0%
Computervision	.0	.0	.0	0	.3%	.0%	.5%	.0%
Foresight Resources	.0	.0	.0	0	.3%	.0%	.5%	.0%
Genrad	.0	.0	.0	0	.3%	.0%	.0%	.0%
Serbi	.0	.0	.0	0	.3%	.0%	.5%	.0%
Other Companies	.9	.5	.3	123	22.7%	31.4%	17.2%	37.2%
All Companies	3.9	1.7	1.9	331	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	3.8	1.7	1.9	327	98.0%	97.7%	97.9%	98.9%
All Asian-Based Companies	.1	.0	.0	4	1.8%	2.3%	1.6%	1.1%
All European-Based Companies	.0	.0	.0	0	.3%	.0%	.5%	.0%
All Hardware Companies	1.7	1.6	.0	327	42.6%	94.8%	.0%	98.9%
All Turnkey & SW Companies	2.3	.1	1.9	4	57.4%	5.2%	100.0%	1.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 41
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					---------- Market Share ----------			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Cadence	88.1	.0	76.2	0	22.8%	.0%	47.3%	.0%
Sun	59.8	53.8	.0	4,616	15.5%	33.5%	.0%	54.1%
Seiko Instruments--NO OEM	38.4	23.4	7.8	216	9.9%	14.6%	3.6%	2.5%
Digital	36.0	27.0	.0	307	9.3%	16.9%	.0%	3.6%
Mentor Graphics	35.6	12.7	16.6	474	9.2%	7.9%	10.3%	5.6%
Silicon Compiler Systems	34.3	.0	23.0	0	8.9%	.0%	14.3%	.0%
Valid	17.4	4.2	10.8	84	4.5%	2.6%	6.7%	1.0%
Hewlett-Packard	16.1	13.4	.0	1,458	4.2%	8.4%	.0%	17.1%
Fujitsu	12.5	11.0	.0	279	3.2%	6.9%	.0%	3.3%
VLSI Technology	8.5	.5	6.7	28	2.2%	.3%	4.2%	.3%
Silvar-Lisco	7.5	.0	4.9	0	1.9%	.0%	3.0%	.0%
European Silicon Systems	7.3	1.8	5.5	40	1.9%	1.1%	3.4%	.5%
Seattle Silicon	4.7	.0	3.5	0	1.2%	.0%	2.2%	.0%
NEC	2.7	1.4	1.1	123	.7%	.9%	.7%	1.4%
Integrated Silicon Systems	2.4	.5	1.9	22	.6%	.3%	1.2%	.3%
LSI Logic	2.2	.2	1.7	8	.6%	.1%	1.0%	.1%
Kyocera	2.2	.9	1.1	10	.6%	.6%	.7%	.1%
Emerald Design Systems	1.5	.7	.6	23	.4%	.5%	.4%	.3%
Solbourne	1.4	1.2	.0	100	.4%	.8%	.0%	1.2%
National Semiconductor	1.3	.9	.3	8	.3%	.6%	.2%	.1%
Sony	1.0	.9	.0	70	.3%	.5%	.0%	.8%
Everex Systems	.7	.7	.0	194	.2%	.4%	.0%	2.3%
Tanner Research	.4	.0	.3	0	.1%	.0%	.2%	.0%
Siemens	.1	.1	.0	3	.0%	.0%	.0%	.0%
Sierra Semiconductor	.1	.0	.1	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 41 (Continued)
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					---------- Market Share ----------			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	25.1	10.7	12.3	483	6.5%	6.7%	7.7%	5.7%
All Companies	386.2	~~160.4~~ 142.8	~~161.0~~ 172.3	8,525	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	324.2	121.8	146.7	7,642	84.0%	76.0%	91.1%	89.6%
All Asian-Based Companies	54.5	36.7	8.9	839	14.1%	22.9%	5.5%	9.8%
All European-Based Companies	7.5	1.9	5.5	43	1.9%	1.2%	3.4%	.5%
All Hardware Companies	121.4	102.9	.0	7,066	31.4%	64.2%	.0%	82.9%
All Turnkey & SW Companies	264.9	57.5	161.0	1,459	68.6%	35.8%	100.0%	17.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 42
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Technical Workstation
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Cadence	68.5	.0	59.5	0	23.1%	.0%	42.9%	.0%
Sun	47.8	43.0	.0	4,146	16.1%	39.9%	.0%	60.1%
Mentor Graphics	35.6	12.7	16.6	474	12.0%	11.8%	12.0%	6.9%
Silicon Compiler Systems	34.3	.0	23.0	0	11.5%	.0%	16.6%	.0%
Seiko Instruments--NO OEM	29.9	18.0	6.0	187	10.1%	16.6%	4.3%	2.7%
Valid	17.4	4.2	10.8	84	5.9%	3.9%	7.8%	1.2%
Hewlett-Packard	13.4	11.2	.0	1,207	4.5%	10.4%	.0%	17.5%
Digital	9.3	7.0	.0	307	3.1%	6.5%	.0%	4.5%
VLSI Technology	7.2	.4	5.7	24	2.4%	.4%	4.1%	.3%
Silvar-Lisco	6.8	.0	4.4	0	2.3%	.0%	3.2%	.0%
European Silicon Systems	5.8	1.5	4.4	27	2.0%	1.4%	3.2%	.4%
Fujitsu	5.0	4.5	.0	120	1.7%	4.2%	.0%	1.7%
Seattle Silicon	4.7	.0	3.5	0	1.6%	.0%	2.6%	.0%
NEC	2.7	1.4	1.1	123	.9%	1.3%	.8%	1.8%
Kyocera	2.2	.9	1.1	10	.7%	.8%	.8%	.1%
LSI Logic	2.0	.2	1.5	7	.7%	.2%	1.1%	.1%
Emerald Design Systems	1.5	.7	.6	23	.5%	.7%	.5%	.3%
National Semiconductor	1.3	.9	.3	8	.4%	.9%	.2%	.1%
Integrated Silicon Systems	1.2	.2	1.0	10	.4%	.2%	.7%	.1%
Solbourne	1.1	1.0	.0	80	.4%	.9%	.0%	1.2%
Sony	1.0	.9	.0	70	.3%	.8%	.0%	1.0%
Siemens	.1	.1	.0	3	.0%	.1%	.0%	.0%
Sierra Semiconductor	.1	.0	.1	0	.0%	.0%	.1%	.0%
Everex Systems	.0	.0	.0	4	.0%	.0%	.0%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 42 (Continued)
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Technical Workstation
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Other Companies	15.7	4.2	10.0	137	5.3%	3.9%	7.2%	2.0%
All Companies	296.7	107.9	138.5	6,903	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	252.2	81.7	127.0	6,373	85.0%	75.7%	91.7%	92.3%
All Asian-Based Companies	38.6	24.7	7.0	499	13.0%	22.9%	5.1%	7.2%
All European-Based Companies	6.0	1.5	4.4	30	2.0%	1.4%	3.2%	.4%
All Hardware Companies	72.7	63.1	.0	5,814	24.5%	58.5%	.0%	84.2%
All Turnkey & SW Companies	224.0	44.8	138.5	1,088	75.5%	41.5%	100.0%	15.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 43
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Host/Server
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	26.7	20.1	.0	0	32.6%	42.0%	.0%	.0%
Cadence	19.6	.0	16.8	0	23.9%	.0%	82.8%	.0%
Sun	12.0	10.8	.0	469	14.6%	22.5%	.0%	60.4%
Seiko Instruments--NO OEM	8.4	5.4	1.8	29	10.3%	11.4%	8.9%	3.7%
Fujitsu	5.6	4.8	.0	66	6.8%	10.0%	.0%	8.6%
Hewlett-Packard	1.7	1.4	.0	85	2.0%	2.9%	.0%	10.9%
VLSI Technology	1.3	.1	1.0	4	1.6%	.2%	4.9%	.5%
Silvar-Lisco	.8	.0	.5	0	.9%	.0%	2.4%	.0%
Solbourne	.3	.2	.0	20	.3%	.5%	.0%	2.6%
LSI Logic	.2	.0	.2	1	.3%	.0%	.8%	.1%
Other Companies	5.6	5.1	.0	102	6.8%	10.6%	.0%	13.2%
All Companies	82.1	47.8	20.2	776	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	68.1	37.6	18.4	681	82.9%	78.6%	91.1%	87.7%
All Asian-Based Companies	14.1	10.2	1.8	95	17.1%	21.4%	8.9%	12.3%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	46.2	37.5	.0	676	56.3%	78.4%	.0%	87.1%
All Turnkey & SW Companies	35.9	10.3	20.2	100	43.7%	21.6%	100.0%	12.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 44
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Personal Computer
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Fujitsu	1.9	1.8	.0	93	25.5%	37.7%	.0%	11.0%
European Silicon Systems	1.5	.4	1.1	13	19.9%	7.5%	46.2%	1.6%
Integrated Silicon Systems	1.2	.3	.9	12	16.3%	5.5%	40.2%	1.4%
Hewlett-Packard	1.0	.8	.0	166	13.6%	17.9%	.0%	19.7%
Everex Systems	.6	.6	.0	190	8.4%	13.2%	.0%	22.5%
Tanner Research	.4	.0	.3	0	4.7%	.0%	13.7%	.0%
Other Companies	3.9	1.5	2.3	244	52.5%	31.1%	100.0%	28.9%
All Companies	7.4	4.7	2.3	846	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	4.0	2.6	1.3	588	54.5%	54.8%	53.8%	69.5%
All Asian-Based Companies	1.9	1.8	.0	245	25.5%	37.7%	.0%	28.9%
All European-Based Companies	1.5	.4	1.1	13	19.9%	7.5%	46.2%	1.6%
All Hardware Companies	2.5	2.3	.0	575	33.5%	49.3%	.0%	68.0%
All Turnkey & SW Companies	4.9	2.4	2.3	270	66.5%	50.5%	99.6%	32.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 45
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: North America
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Sun	44.8	40.4	.0	3,361	25.3%	55.3%	.0%	69.2%
Cadence	44.0	.0	37.0	0	24.9%	.0%	51.1%	.0%
Mentor Graphics	22.7	8.0	10.2	305	12.8%	10.9%	14.1%	6.3%
Silicon Compiler Systems	19.2	.0	12.9	0	10.8%	.0%	17.8%	.0%
Digital	17.3	13.0	.0	147	9.8%	17.8%	.0%	3.0%
Hewlett-Packard	6.7	5.6	.0	608	3.8%	7.7%	.0%	12.5%
VLSI Technology	4.9	.3	3.8	16	2.7%	.4%	5.3%	.3%
Valid	3.0	.8	1.6	34	1.7%	1.0%	2.2%	.7%
Silvar-Lisco	2.9	.0	1.6	0	1.6%	.0%	2.2%	.0%
Seattle Silicon	2.6	.0	2.0	0	1.5%	.0%	2.7%	.0%
Emerald Design Systems	1.5	.7	.6	23	.8%	1.0%	.9%	.5%
Integrated Silicon Systems	1.4	.3	1.2	13	.8%	.4%	1.6%	.3%
LSI Logic	1.3	.1	1.0	5	.7%	.2%	1.4%	.1%
Solbourne	1.1	1.0	.0	82	.6%	1.4%	.0%	1.7%
National Semiconductor	.6	.5	.2	0	.4%	.6%	.2%	.0%
Everex Systems	.6	.6	.0	175	.3%	.8%	.0%	3.6%
Tanner Research	.4	.0	.3	0	.2%	.0%	.4%	.0%
Sierra Semiconductor	.1	.0	.1	0	.1%	.0%	.1%	.0%
Other Companies	8.6	3.3	4.3	123	4.8%	4.5%	6.0%	2.5%
All Companies	177.1	72.9	72.4	4,857	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	177.1	72.9	72.4	4,857	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	72.5	62.3	.0	4,461	40.9%	85.4%	.0%	91.8%
All Turnkey & SW Companies	104.6	10.6	72.4	396	59.1%	14.6%	100.0%	8.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 46
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Technical Workstation
REGION: North America
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Sun	35.9	32.3	.0	3,020	26.3%	62.6%	.0%	73.2%
Cadence	31.3	.0	26.3	0	22.9%	.0%	43.8%	.0%
Mentor Graphics	22.7	8.0	10.2	305	16.6%	15.4%	17.0%	7.4%
Silicon Compiler Systems	19.2	.0	12.9	0	14.1%	.0%	21.4%	.0%
Hewlett-Packard	5.6	4.7	.0	506	4.1%	9.1%	.0%	12.3%
Digital	4.5	3.4	.0	147	3.3%	6.5%	.0%	3.6%
VLSI Technology	4.1	.3	3.3	14	3.0%	.5%	5.4%	.3%
Valid	3.0	.8	1.6	34	2.2%	1.5%	2.7%	.8%
Seattle Silicon	2.6	.0	2.0	0	1.9%	.0%	3.3%	.0%
Silvar-Lisco	2.6	.0	1.4	0	1.9%	.0%	2.4%	.0%
Emerald Design Systems	1.5	.7	.6	23	1.1%	1.4%	1.1%	.5%
LSI Logic	1.2	.1	.9	4	.9%	.2%	1.5%	.1%
Solbourne	.9	.8	.0	66	.7%	1.5%	.0%	1.6%
Integrated Silicon Systems	.7	.1	.6	6	.5%	.3%	1.0%	.1%
National Semiconductor	.6	.5	.2	0	.5%	.9%	.3%	.0%
Sierra Semiconductor	.1	.0	.1	0	.1%	.0%	.2%	.0%
Everex Systems	.0	.0	.0	3	.0%	.1%	.0%	.1%
Other Companies	5.5	1.3	3.4	28	4.1%	2.6%	5.7%	.7%
All Companies	136.5	51.5	60.0	4,128	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	136.5	51.5	60.0	4,128	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	46.9	41.1	.0	3,742	34.3%	79.8%	.0%	90.7%
All Turnkey & SW Companies	89.6	10.4	60.0	386	65.7%	20.2%	100.0%	9.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 47
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Host/Server
REGION: North America
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Digital	12.8	9.6	.0	0	33.6%	48.2%	.0%	.0%
Cadence	12.8	.0	10.7	0	33.4%	.0%	92.8%	.0%
Sun	9.0	8.1	.0	342	23.5%	40.4%	.0%	86.2%
VLSI Technology	.7	.0	.6	2	1.9%	.2%	4.9%	.6%
Hewlett-Packard	.7	.6	.0	36	1.8%	2.9%	.0%	9.0%
Silvar-Lisco	.3	.0	.2	0	.8%	.0%	1.4%	.0%
Solbourne	.2	.2	.0	16	.6%	1.0%	.0%	4.1%
LSI Logic	.1	.0	.1	0	.3%	.1%	.9%	.1%
Other Companies	1.6	1.4	.0	0	4.2%	7.2%	.0%	.0%
All Companies	38.2	20.0	11.6	396	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	38.2	20.0	11.6	396	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	24.3	19.9	.0	394	63.6%	99.7%	.0%	99.3%
All Turnkey & SW Companies	13.9	.1	11.6	3	36.4%	.3%	100.0%	.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 48
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Personal Computer
REGION: North America
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Integrated Silicon Systems	.7	.2	.6	7	30.3%	11.4%	63.6%	2.2%
Everex Systems	.6	.6	.0	171	23.5%	40.0%	.0%	51.5%
Hewlett-Packard	.4	.3	.0	67	16.8%	23.6%	.0%	20.0%
Tanner Research	.4	.0	.3	0	14.7%	.0%	36.4%	.0%
Other Companies	1.4	.5	.9	95	59.7%	36.4%	100.0%	28.5%
All Companies	2.4	1.4	.9	332	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	2.4	1.4	.9	332	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.3	1.2	.0	325	55.0%	88.6%	.0%	97.8%
All Turnkey & SW Companies	1.1	.2	.9	7	45.0%	11.4%	100.0%	2.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 49
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	14.4	10.8	.0	123	22.7%	46.5%	.0%	13.4%
Silicon Compiler Systems	9.6	.0	6.4	0	15.1%	.0%	23.5%	.0%
European Silicon Systems	7.3	1.8	5.5	40	11.5%	7.8%	20.0%	4.4%
Cadence	6.9	.0	5.8	0	10.9%	.0%	21.3%	.0%
Newlett-Packard	6.9	5.8	.0	629	10.9%	24.9%	.0%	68.8%
Mentor Graphics	5.3	1.6	2.6	70	8.3%	6.9%	9.6%	7.6%
Valid	4.4	1.1	2.3	0	6.9%	4.6%	8.6%	.0%
VLSI Technology	2.9	.2	2.3	9	4.6%	.8%	8.4%	1.0%
Silvar-Lisco	2.3	.0	1.3	0	3.7%	.0%	4.8%	.0%
National Semiconductor	.6	.5	.2	8	1.0%	2.0%	.6%	.8%
LSI Logic	.6	.1	.4	2	.9%	.3%	1.5%	.2%
Seattle Silicon	.5	.0	.4	0	.7%	.0%	1.3%	.0%
Siemens	.1	.1	.0	3	.2%	.3%	.1%	.3%
Integrated Silicon Systems	.1	.0	.1	1	.2%	.1%	.4%	.1%
Solbourne	.1	.1	.0	7	.2%	.4%	.0%	.8%
Everex Systems	.1	.1	.0	16	.1%	.2%	.0%	1.7%
Sierra Semiconductor	.0	.0	.0	0	.0%	.0%	.1%	.0%
Other Companies	9.9	3.5	6.1	56	15.6%	15.1%	22.3%	6.1%
All Companies	63.5	23.3	27.4	915	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	56.0	21.4	21.9	872	88.3%	91.9%	79.9%	95.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	7.4	1.9	5.5	43	11.7%	8.1%	20.1%	4.7%
All Hardware Companies	22.8	18.0	.0	782	36.0%	77.2%	.0%	85.5%
All Turnkey & SW Companies	40.7	5.3	27.3	133	64.0%	22.8%	100.0%	14.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 50
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Technical Workstation
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Silicon Compiler Systems	9.6	.0	6.4	0	20.9%	.0%	26.8%	.0%
European Silicon Systems	5.8	1.5	4.4	27	12.7%	11.7%	18.2%	3.5%
Hewlett-Packard	5.7	4.8	.0	511	12.5%	38.2%	.0%	67.5%
Mentor Graphics	5.3	1.6	2.6	70	11.5%	12.9%	10.9%	9.2%
Cadence	4.9	.0	4.1	0	10.7%	.0%	17.2%	.0%
Valid	4.4	1.1	2.3	0	9.5%	8.6%	9.7%	.0%
Digital	3.7	2.8	.0	123	8.1%	22.2%	.0%	16.2%
VLSI Technology	2.5	.2	2.0	8	5.4%	1.2%	8.1%	1.1%
Silvar-Lisco	2.1	.0	1.2	0	4.6%	.0%	4.9%	.0%
National Semiconductor	.6	.5	.2	8	1.4%	3.7%	.7%	1.0%
LSI Logic	.5	.1	.4	2	1.1%	.4%	1.5%	.2%
Seattle Silicon	.5	.0	.4	0	1.0%	.0%	1.5%	.0%
Siemens	.1	.1	.0	3	.3%	.6%	.2%	.4%
Solbourne	.1	.1	.0	6	.2%	.6%	.0%	.7%
Integrated Silicon Systems	.1	.0	.1	0	.1%	.1%	.2%	.1%
Sierra Semiconductor	.0	.0	.0	0	.1%	.0%	.1%	.0%
Other Companies	7.0	2.0	5.0	35	15.3%	15.5%	20.7%	4.6%
All Companies	45.9	12.6	24.0	757	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	40.0	11.1	19.6	727	87.0%	87.8%	81.6%	96.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	6.0	1.5	4.4	30	13.0%	12.2%	18.4%	3.9%
All Hardware Companies	9.5	7.7	.0	639	20.8%	61.0%	.0%	84.5%
All Turnkey & SW Companies	36.4	4.9	24.0	118	79.2%	39.0%	100.0%	15.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 51
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Host/Server
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					---------- Market Share ----------			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	10.7	8.0	.0	0	69.1%	81.4%	.0%	.0%
Cadence	2.0	.0	1.7	0	13.0%	.0%	76.8%	.0%
Hewlett-Packard	.7	.6	.0	36	4.5%	5.9%	.0%	92.2%
VLSI Technology	.4	.0	.3	1	2.8%	.3%	15.5%	3.7%
Silvar-Lisco	.2	.0	.1	0	1.5%	.0%	5.9%	.0%
LSI Logic	.1	.0	.0	0	.4%	.1%	1.8%	.5%
Solbourne	.0	.0	.0	1	.1%	.2%	.0%	3.6%
Other Companies	1.3	1.2	.0	0	8.5%	12.2%	.0%	.0%
All Companies	15.5	9.9	2.2	39	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	15.5	9.9	2.2	39	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	12.7	9.8	.0	37	82.3%	99.6%	.0%	95.8%
All Turnkey & SW Companies	2.7	.0	2.2	2	17.7%	.4%	100.0%	4.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 52
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Personal Computer
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
European Silicon Systems	1.5	.4	1.1	13	70.3%	41.7%	95.6%	11.2%
Hewlett-Packard	.5	.4	.0	83	23.9%	50.0%	.0%	69.6%
Integrated Silicon Systems	.1	.0	.1	1	2.9%	1.2%	4.4%	.5%
Everex Systems	.1	.1	.0	15	2.4%	6.0%	.0%	12.7%
Other Companies	1.5	.4	1.1	21	73.7%	44.0%	100.0%	17.7%
All Companies	2.1	.8	1.1	120	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	.6	.5	.0	106	29.7%	58.3%	4.4%	88.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.5	.4	1.1	13	70.3%	41.7%	95.6%	11.2%
All Hardware Companies	.6	.5	.0	106	26.8%	57.1%	.0%	88.3%
All Turnkey & SW Companies	1.5	.4	1.1	14	73.2%	41.7%	99.1%	11.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 53
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Seiko Instruments--NO OEM	38.4	~~23.4~~	~~7.8~~	216	27.6%	39.6%	12.9%	8.9%
Cadence	37.1	.0	33.4	0	26.7%	.0%	55.1%	.0%
Fujitsu	12.2	10.8	.0	274	8.8%	18.3%	.0%	11.3%
Sun	12.0	10.8	.0	1,030	8.6%	18.2%	.0%	42.4%
Valid	10.0	2.4	6.8	50	7.2%	4.1%	11.2%	2.1%
Mentor Graphics	7.6	3.1	3.8	99	5.5%	5.3%	6.3%	4.1%
Silicon Compiler Systems	4.8	.0	3.2	0	3.5%	.0%	5.3%	.0%
Digital	3.3	2.4	.0	28	2.3%	4.1%	.0%	1.1%
NEC	2.7	1.4	1.1	123	1.9%	2.3%	1.7%	5.0%
Silvar-Lisco	2.3	.0	2.0	0	1.7%	.0%	3.3%	.0%
Kyocera	2.2	.9	1.1	10	1.6%	1.5%	1.8%	.4%
Hewlett-Packard	2.0	1.7	.0	180	1.4%	2.8%	.0%	7.4%
Seattle Silicon	1.7	.0	1.2	0	1.2%	.0%	2.0%	.0%
Sony	1.0	.9	.0	70	.7%	1.5%	.0%	2.9%
VLSI Technology	.8	.1	.6	3	.6%	.1%	1.0%	.1%
Integrated Silicon Systems	.7	.1	.6	7	.5%	.2%	1.0%	.3%
LSI Logic	.2	.0	.2	1	.2%	.0%	.3%	.0%
Solbourne	.1	.1	.0	9	.1%	.2%	.0%	.4%
Everex Systems	.0	.0	.0	4	.0%	.0%	.0%	.2%
Siemens	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	5.6	3.0	1.8	263	4.0%	5.1%	3.0%	10.8%
All Companies	139.0	59.1	~~60.6~~ 71.9	2,430	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	84.7	22.7	51.8	1,596	60.9%	38.4%	85.4%	65.7%
All Asian-Based Companies	54.3	36.4	8.9	834	39.1%	61.6%	14.6%	34.3%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	20.5	17.8	.0	1,507	14.8%	30.2%	.0%	62.0%
All Turnkey & SW Companies	118.4	41.3	60.6	923	85.2%	69.8%	100.0%	38.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 54
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Technical Workstation
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Cadence	32.3	.0	29.0	0	29.3%	.0%	53.9%	.0%
Seiko Instruments--NO OEM	29.9	18.0	6.0	187	27.1%	43.8%	11.1%	10.6%
Valid	10.0	2.4	6.8	50	9.1%	5.9%	12.6%	2.8%
Sun	9.6	8.6	.0	925	8.7%	21.0%	.0%	52.4%
Mentor Graphics	7.6	3.1	3.8	99	6.9%	7.6%	7.1%	5.6%
Fujitsu	4.9	4.4	.0	117	4.4%	10.7%	.0%	6.6%
Silicon Compiler Systems	4.8	.0	3.2	0	4.4%	.0%	6.0%	.0%
NEC	2.7	1.4	1.1	123	2.4%	3.4%	2.0%	6.9%
Kyocera	2.2	.9	1.1	10	2.0%	2.2%	2.1%	.6%
Silvar-Lisco	2.1	.0	1.8	0	1.9%	.0%	3.3%	.0%
Hewlett-Packard	1.7	1.4	.0	154	1.5%	3.4%	.0%	8.7%
Seattle Silicon	1.7	.0	1.2	0	1.5%	.0%	2.3%	.0%
Sony	1.0	.9	.0	70	.9%	2.1%	.0%	4.0%
Digital	.8	.6	.0	28	.8%	1.5%	.0%	1.6%
VLSI Technology	.7	.0	.5	2	.6%	.1%	.9%	.1%
Integrated Silicon Systems	.4	.1	.3	3	.3%	.1%	.6%	.2%
LSI Logic	.2	.0	.2	1	.2%	.0%	.3%	.0%
Solbourne	.1	.1	.0	7	.1%	.2%	.0%	.4%
Siemens	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	3.0	.9	1.5	73	2.8%	2.2%	2.9%	4.1%
All Companies	110.3	40.9	53.9	1,767	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	71.8	16.4	46.8	1,269	65.1%	39.9%	86.9%	71.9%
All Asian-Based Companies	38.5	24.6	7.0	497	34.9%	60.1%	13.1%	28.1%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	13.2	11.6	.0	1,185	12.0%	28.3%	.0%	67.1%
All Turnkey & SW Companies	97.1	29.4	53.9	582	88.0%	71.7%	100.0%	32.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 55
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Host/Server
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Seiko Instruments--NO OEM	8.4	5.4	1.8	29	32.6%	34.4%	28.0%	10.5%
Fujitsu	5.5	4.7	.0	65	21.3%	29.6%	.0%	23.8%
Cadence	4.8	.0	4.3	0	18.6%	.0%	67.2%	.0%
Digital	2.4	1.8	.0	0	9.4%	11.5%	.0%	.0%
Sun	2.4	2.2	.0	105	9.2%	13.6%	.0%	38.1%
Silvar-Lisco	.2	.0	.2	0	.9%	.0%	3.1%	.0%
Hewlett-Packard	.2	.2	.0	11	.9%	1.1%	.0%	4.0%
VLSI Technology	.1	.0	.1	0	.5%	.1%	1.4%	.1%
LSI Logic	.0	.0	.0	0	.1%	.0%	.3%	.0%
Solbourne	.0	.0	.0	2	.1%	.1%	.0%	.7%
Other Companies	1.7	1.5	.0	63	6.5%	9.6%	.0%	22.8%
All Companies	25.9	15.8	6.5	274	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	11.9	5.7	4.7	180	46.1%	35.9%	72.0%	65.8%
All Asian-Based Companies	14.0	10.1	1.8	94	53.9%	64.1%	28.0%	34.2%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	6.7	5.7	.0	180	26.0%	35.9%	.0%	65.6%
All Turnkey & SW Companies	19.1	10.1	6.5	94	74.0%	64.1%	100.0%	34.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 56
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Personal Computer
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Fujitsu	1.8	1.7	.0	92	65.9%	72.4%	.0%	23.5%
Integrated Silicon Systems	.4	.1	.3	4	12.9%	3.3%	100.0%	.9%
Hewlett-Packard	.1	.1	.0	15	3.2%	3.3%	.0%	3.9%
Everex Systems	.0	.0	.0	4	.4%	.4%	.0%	1.0%
Other Companies	.9	.6	.3	127	30.5%	23.8%	100.0%	32.6%
All Companies	2.8	2.4	.3	389	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1.0	.7	.3	146	34.1%	27.6%	100.0%	37.5%
All Asian-Based Companies	1.8	1.7	.0	243	65.9%	72.4%	.0%	62.5%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.6	.6	.0	142	21.1%	24.3%	.0%	36.5%
All Turnkey & SW Companies	2.2	1.8	.3	247	78.9%	75.7%	100.0%	63.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 57
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

					..... Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Sun	3.0	2.7	.0	224	44.8%	53.6%	.0%	69.5%
Digital	1.1	.8	.0	9	16.2%	16.1%	.0%	2.9%
Silicon Compiler Systems	.7	.0	.5	0	10.3%	.0%	71.9%	.0%
Hewlett-Packard	.4	.4	.0	40	6.6%	7.4%	.0%	12.3%
Fujitsu	.2	.2	.0	5	3.6%	4.2%	.0%	1.6%
Integrated Silicon Systems	.1	.0	.1	1	1.8%	.4%	15.6%	.3%
LSI Logic	.1	.0	.1	0	1.6%	.2%	12.5%	.1%
Solbourne	.0	.0	.0	2	.4%	.4%	.0%	.6%
Other Companies	1.1	.9	.1	42	16.5%	18.1%	15.6%	13.0%
All Companies	6.7	5.0	.6	323	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	6.4	4.8	.6	317	96.4%	95.8%	100.0%	98.4%
All Asian-Based Companies	.2	.2	.0	5	3.6%	4.2%	.0%	1.6%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	5.5	4.8	.0	316	82.6%	95.2%	.0%	97.9%
All Turnkey & SW Companies	1.2	.2	.6	7	17.4%	4.8%	100.0%	2.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 58
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Technical Workstation
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Sun	2.4	2.2	.0	201	59.6%	76.8%	.0%	80.3%
Silicon Compiler Systems	.7	.0	.5	0	17.2%	.0%	79.3%	.0%
Hewlett-Packard	.4	.3	.0	36	9.5%	11.4%	.0%	14.2%
Digital	.3	.2	.0	9	7.0%	7.5%	.0%	3.7%
LSI Logic	.1	.0	.1	0	2.5%	.4%	12.1%	.1%
Fujitsu	.1	.1	.0	2	2.2%	2.9%	.0%	.9%
Integrated Silicon Systems	.1	.0	.1	0	1.5%	.4%	8.6%	.2%
Solbourne	.0	.0	.0	2	.5%	.7%	.0%	.6%
Other Companies	.1	.0	.1	0	1.5%	.4%	8.6%	.2%
All Companies	4.0	2.8	.6	251	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	3.9	2.7	.6	249	97.8%	97.1%	100.0%	99.1%
All Asian-Based Companies	.1	.1	.0	2	2.2%	2.9%	.0%	.9%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	3.1	2.7	.0	248	76.6%	96.4%	.0%	98.8%
All Turnkey & SW Companies	.9	.1	.6	3	23.4%	3.6%	100.0%	1.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 59
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Host/Server
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	.8	.6	.0	0	31.3%	27.8%	.0%	.0%
Sun	.6	.5	.0	23	23.4%	25.0%	.0%	34.1%
Fujitsu	.1	.1	.0	1	4.3%	4.2%	.0%	1.9%
Hewlett-Packard	.1	.0	.0	3	2.0%	1.9%	.0%	3.8%
LSI Logic	.0	.0	.0	0	.4%	.0%	100.0%	.1%
Solbourne	.0	.0	.0	0	.4%	.0%	.0%	.6%
Other Companies	1.0	.9	.0	40	38.3%	41.2%	.0%	59.6%
All Companies	2.6	2.2	.0	67	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	2.5	2.1	.0	66	95.7%	95.8%	100.0%	98.1%
All Asian-Based Companies	.1	.1	.0	1	4.3%	4.2%	.0%	1.9%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	2.4	2.1	.0	66	95.3%	95.8%	.0%	98.1%
All Turnkey & SW Companies	.1	.1	.0	1	4.7%	4.2%	100.0%	1.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 60
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: Personal Computer
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Integrated Silicon Systems	.1	.0	.1	1	54.5%	16.7%	100.0%	12.4%
Fujitsu	.0	.0	.0	2	36.4%	66.7%	.0%	36.1%
Hewlett-Packard	.0	.0	.0	2	9.1%	16.7%	.0%	33.7%
Other Companies	.1	.0	.1	1	54.5%	16.7%	100.0%	30.2%
All Companies	.1	.1	.1	5	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	.1	.0	.1	3	63.6%	33.3%	100.0%	63.9%
All Asian-Based Companies	.0	.0	.0	2	36.4%	66.7%	.0%	36.1%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.0	.0	.0	3	9.1%	16.7%	.0%	51.5%
All Turnkey & SW Companies	.1	.1	.1	2	90.9%	83.3%	100.0%	48.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 61
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Hewlett-Packard	103.0	71.4	8.6 10	6,331	9.7%	12.8%	2.7%	18.2%
Digital	99.1	73.7	.0	845	9.4%	13.2%	.0%	2.4%
Mentor Graphics	90.2	29.0	42.3 2	1,202	8.5%	5.2%	13.2%	3.4%
Racal-Redac	66.7	6.3	51.0 1	296	6.3%	1.1%	15.9%	.8%
Intergraph	57.5	29.2	10.1 9	603	5.4%	5.2%	3.1%	1.7%
Zuken	52.0	19.6	28.6 3	323	4.9%	3.5%	8.9%	.9%
IBM	46.6	31.3	7.9	1,186	4.4%	5.6%	2.4%	3.4%
Computervision	44.9	18.7	14.3 6	346	4.2%	3.3%	4.4%	1.0%
Sun	42.7	38.4	.0	3,294	4.0%	6.9%	.0%	9.4%
Compaq	36.5	36.5	.0	6,081	3.4%	6.5%	.0%	17.4%
Valid	34.8	8.6	20.2 4	232	3.3%	1.5%	6.3%	.7%
Dazix	30.7	9.5	15.8 5	291	2.9%	1.7%	4.9%	.8%
NEC	26.5	19.1	5.3 12	1,493	2.5%	3.4%	1.6%	4.3%
Scientific Calc.	25.2	5.6	12.8 8	116	2.4%	1.0%	4.0%	.3%
Fujitsu	24.9	14.2	7.9 11	559	2.4%	2.5%	2.4%	1.6%
Caley	24.5	7.1	14.2 7	226	2.3%	1.3%	4.4%	.6%
Sharp	20.3	8.7	9.6	115	1.9%	1.6%	3.0%	.3%
CADIX	15.1	6.1	7.6	105	1.4%	1.1%	2.4%	.3%
Secmai	13.4	7.0	4.0	95	1.3%	1.3%	1.2%	.3%
Hitachi	9.0	5.9	2.2	103	.8%	1.1%	.7%	.3%
Uchida Yoko	8.4	4.2	3.4	132	.8%	.8%	1.0%	.4%
Apple Computer	8.3	7.3	.0	1,600	.8%	1.3%	.0%	4.6%
CADAM	8.2	.0	7.3	3	.8%	.0%	2.3%	.0%
LPKF	7.5	4.5	2.3	750	.7%	.8%	.7%	2.2%
Toshiba--NO OEM	7.3	3.7	2.9	68	.7%	.7%	.9%	.2%
Mitsubishi Electric	7.2	5.3	1.2	140	.7%	.9%	.4%	.4%
Seiko Instruments--NO OEM	6.8	4.1	1.4	42	.6%	.7%	.4%	.1%
BETRONEX	5.8	.0	5.8	0	.5%	.0%	1.8%	.0%
Kanematsu Semiconductor	5.1	2.5	2.1	52	.5%	.4%	.6%	.1%
Schlumberger (Applicon)	4.9	1.4	1.8	69	.5%	.2%	.6%	.2%
ABB Cade International	4.1	2.1	1.0	2	.4%	.4%	.3%	.0%
CAD Software	3.7	.0	3.1	0	.3%	.0%	1.0%	.0%
Ziegler	3.0	.1	2.7	99	.3%	.0%	.8%	.3%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 61
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Tokyo Electron--NO OEM	2.6	.9	1.2	10	.2%	.2%	.4%	.0%
Shared Resources	2.6	.0	.3	0	.2%	.0%	.1%	.0%
Orcad	2.3	.0	2.2	0	.2%	.0%	.7%	.0%
Visionics	2.1	.1	1.6	4	.2%	.0%	.5%	.0%
Academi Systems	2.0	.4	1.4	22	.2%	.1%	.4%	.1%
Pacific Numeric	2.0	.0	2.0	0	.2%	.0%	.6%	.0%
Autodesk	2.0	.0	2.0	0	.2%	.0%	.6%	.0%
Siemens	1.9	1.1	.6	44	.2%	.2%	.2%	.1%
Aptos	1.8	.0	1.8	0	.2%	.0%	.6%	.0%
Omron	1.8	.9	.7	50	.2%	.2%	.2%	.1%
Everex Systems	1.6	1.6	.0	485	.2%	.3%	.0%	1.4%
Accel Technologies	1.6	.0	1.4	0	.2%	.0%	.4%	.0%
Automated Systems	1.5	.0	1.2	0	.1%	.0%	.4%	.0%
ALS Design	1.4	.1	1.1	25	.1%	.0%	.4%	.1%
DECAD	1.4	.1	1.0	11	.1%	.0%	.3%	.0%
Mesteck	1.4	.0	1.4	0	.1%	.0%	.4%	.0%
Sycotronic AG	1.1	.0	.9	2	.1%	.0%	.3%	.0%
CAD-UL	1.1	.3	.8	40	.1%	.1%	.2%	.1%
The Great Softwestern Co.	1.1	.0	1.1	0	.1%	.0%	.3%	.0%
Assigraph	1.1	.0	.8	11	.1%	.0%	.3%	.0%
Century Research Center	1.0	.5	.4	6	.1%	.1%	.1%	.0%
Royal Digital Systems	1.0	.0	.9	0	.1%	.0%	.3%	.0%
Cadisys	1.0	.0	.0	0	.1%	.0%	.0%	.0%
Dell Computer	.9	.9	.0	233	.1%	.2%	.0%	.7%
Sony	.9	.8	.0	49	.1%	.1%	.0%	.1%
Hitachi Zosen Info Systems	.8	.4	.3	7	.1%	.1%	.1%	.0%
ICL	.8	.5	.2	21	.1%	.1%	.1%	.1%
Sumisho Electronics	.8	.6	.1	5	.1%	.1%	.0%	.0%
Micrograph	.7	.4	.3	18	.1%	.1%	.1%	.1%
Solbourne	.7	.6	.0	50	.1%	.1%	.0%	.1%
Vamp	.4	.0	.4	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 61 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					---------- Market Share ----------			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Microtel Pacific Research	.4	.0	.4	1	.0%	.0%	.1%	.0%
Sophia Systems	.3	.1	.2	4	.0%	.0%	.1%	.0%
Andor	.3	.0	.3	2	.0%	.0%	.1%	.0%
Olivetti	.3	.1	.1	89	.0%	.0%	.0%	.3%
Instrumatic Espanola	.2	.0	.2	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.1	.0	.1	0	.0%	.0%	.0%	.0%
Foresight Resources	.1	.0	.1	0	.0%	.0%	.0%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	151.5	92.1	42.5	7,903	14.3%	16.5%	13.2%	22.7%
All Companies	1,059.2	559.5	321.5	34,868	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	736.7	434.3	160.9	29,648	69.6%	77.6%	50.0%	85.0%
All Asian-Based Companies	185.5	95.1	72.4	3,471	17.5%	17.0%	22.5%	10.0%
All European-Based Companies	137.0	30.1	88	1,749	12.9%	5.4%	27.4%	5.0%
All Hardware Companies	327.9	279.0	.[illegible]	25,314	31.0%	49.9%	.0%	72.6%
All Turnkey & SW Companies	731.2	280.5	321.5	9,554	69.0%	50.1%	100.0%	27.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 62
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Technical Workstation
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	90.2	29.0	42.3	1,202	13.6%	10.1%	16.7%	9.9%
Hewlett-Packard	82.4	54.5	8.6	3,145	12.4%	19.0%	3.4%	25.9%
Racal-Redac	65.7	6.2	50.1	287	9.9%	2.2%	19.8%	2.4%
Intergraph	47.1	24.0	8.5	504	7.1%	8.4%	3.3%	4.2%
Zuken	40.5	15.0	22.7	216	6.1%	5.2%	9.0%	1.8%
Computervision	36.9	15.4	11.1	230	5.6%	5.4%	4.4%	1.9%
Valid	34.8	8.6	20.2	232	5.2%	3.0%	8.0%	1.9%
Sun	34.1	30.7	.0	2,959	5.1%	10.7%	.0%	24.4%
Dazix	30.7	9.5	15.8	291	4.6%	3.3%	6.2%	2.4%
Digital	25.6	18.6	.0	845	3.9%	6.5%	.0%	7.0%
Calay	24.5	7.1	14.2	226	3.7%	2.5%	5.6%	1.9%
Sharp	20.3	8.7	9.6	115	3.1%	3.0%	3.8%	.9%
Scientific Calc.	18.9	4.9	8.9	90	2.8%	1.7%	3.5%	.7%
CADIX	15.1	6.1	7.6	105	2.3%	2.1%	3.0%	.9%
NEC	13.3	6.9	5.3	613	2.0%	2.4%	2.1%	5.1%
Secmai	13.2	6.9	3.9	93	2.0%	2.4%	1.5%	.8%
Fujitsu	10.0	6.0	3.0	239	1.5%	2.1%	1.2%	2.0%
Uchida Yoko	8.4	4.2	3.4	132	1.3%	1.5%	1.3%	1.1%
Toshiba--NO OEM	7.3	3.7	2.9	68	1.1%	1.3%	1.2%	.6%
Seiko Instruments--NO OEM	6.8	4.1	1.4	42	1.0%	1.4%	.5%	.3%
Mitsubishi Electric	5.0	4.2	.5	56	.8%	1.5%	.2%	.5%
Kanematsu Semiconductor	4.4	2.0	1.9	52	.7%	.7%	.8%	.4%
ABB Cade International	4.1	2.1	1.0	2	.6%	.7%	.4%	.0%
Hitachi	4.1	2.0	1.6	76	.6%	.7%	.6%	.6%
Schlumberger (Applicon)	2.8	.8	1.0	27	.4%	.3%	.4%	.2%
Tokyo Electron--NO OEM	2.6	.9	1.2	10	.4%	.3%	.5%	.1%
Shared Resources	2.6	.0	.3	0	.4%	.0%	.1%	.0%
IBM	2.1	1.3	.4	19	.3%	.5%	.2%	.2%
Pacific Numeric	1.9	.0	1.9	0	.3%	.0%	.8%	.0%
Siemens	1.9	1.1	.6	44	.3%	.4%	.2%	.4%
Omron	1.8	.9	.7	50	.3%	.3%	.3%	.4%
Academi Systems	1.7	.3	1.2	18	.3%	.1%	.5%	.2%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 62 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Technical Workstation
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
DECAD	1.3	.1	1.0	10	.2%	.0%	.4%	.1%
Century Research Center	1.0	.5	.4	6	.2%	.2%	.2%	.0%
Royal Digital Systems	1.0	.0	.9	0	.2%	.0%	.4%	.0%
Sony	.9	.8	.0	49	.1%	.3%	.0%	.4%
Nitachi Zosen Info Systems	.8	.4	.3	7	.1%	.1%	.1%	.1%
ICL	.8	.5	.2	21	.1%	.2%	.1%	.2%
Sumisho Electronics	.8	.6	.1	5	.1%	.2%	.0%	.0%
Assigraph	.7	.0	.6	0	.1%	.0%	.2%	.0%
Solbourne	.6	.5	.0	40	.1%	.2%	.0%	.3%
CADAM	.5	.0	.4	0	.1%	.0%	.2%	.0%
Autodesk	.1	.0	.1	0	.0%	.0%	.0%	.0%
Everex Systems	.1	.1	.0	10	.0%	.0%	.0%	.1%
Microtel Pacific Research	.1	.0	.1	0	.0%	.0%	.0%	.0%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.0%
Micrograph	.1	.0	.0	3	.0%	.0%	.0%	.0%
Sophia Systems	.1	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	38.9	15.9	15.3	367	5.9%	5.5%	6.0%	3.0%
All Companies	664.7	287.2	253.0	12,139	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	412.6	197.9	120.4	9,594	62.1%	68.9%	47.6%	79.0%
All Asian-Based Companies	138.1	65.0	60.0	1,841	20.8%	22.6%	23.7%	15.2%
All European-Based Companies	114.0	24.3	72.6	704	17.2%	8.5%	28.7%	5.8%
All Hardware Companies	98.4	78.9	.0	5,979	14.8%	27.5%	.0%	49.3%
All Turnkey & SW Companies	566.3	208.2	253.0	6,159	85.2%	72.5%	100.0%	50.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 63
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Host/Server
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	73.5	55.1	.0	0	30.6%	32.6%	.0%	.0%
IBM	40.8	26.4	7.4	428	17.0%	15.7%	26.4%	11.7%
Zuken	11.5	4.6	5.9	107	4.8%	2.7%	20.9%	2.9%
Fujitsu	11.2	6.2	3.3	133	4.7%	3.7%	11.9%	3.6%
Intergraph	10.4	5.2	1.6	99	4.3%	3.1%	5.8%	2.7%
Sun	8.5	7.7	.0	335	3.6%	4.5%	.0%	9.1%
Computervision	6.7	3.2	2.0	110	2.8%	1.9%	7.2%	3.0%
Scientific Calc.	6.3	.7	3.9	26	2.6%	.4%	13.8%	.7%
Hitachi	5.0	3.9	.5	27	2.1%	2.3%	1.9%	.7%
Hewlett-Packard	2.1	1.7	.0	106	.9%	1.0%	.0%	2.9%
Schlumberger (Applicon)	2.1	.6	.8	42	.9%	.4%	2.8%	1.1%
Automated Systems	1.5	.0	1.2	0	.6%	.0%	4.4%	.0%
Mitsubishi Electric	1.4	.7	.4	5	.6%	.4%	1.5%	.1%
Kanematsu Semiconductor	.7	.5	.2	0	.3%	.3%	.5%	.0%
CADAM	.7	.0	.6	3	.3%	.0%	2.0%	.1%
Assigraph	.3	.0	.3	11	.1%	.0%	1.0%	.3%
Solbourne	.1	.1	.0	10	.1%	.1%	.0%	.3%
Secmai	.1	.0	.1	0	.0%	.0%	.2%	.0%
DECAD	.1	.0	.0	1	.0%	.0%	.1%	.0%
Other Companies	59.9	52.7	1.6	2,230	24.9%	31.2%	5.7%	60.9%
All Companies	240.1	168.9	28.2	3,660	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	210.6	153.4	17.6	3,377	87.7%	90.9%	62.5%	92.3%
All Asian-Based Companies	29.1	15.4	10.2	271	12.1%	9.1%	36.2%	7.4%
All European-Based Companies	.5	.0	.4	12	.2%	.0%	1.3%	.3%
All Hardware Companies	142.2	117.3	.0	2,669	59.2%	69.5%	.0%	72.9%
All Turnkey & SW Companies	98.0	51.6	28.2	991	40.8%	30.5%	100.0%	27.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 64
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Personal Computer
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compaq	36.5	36.5	.0	6,081	23.7%	35.3%	.0%	31.9%
Hewlett-Packard	18.5	15.2	.0	3,080	12.0%	14.7%	.0%	16.2%
NEC	13.3	12.2	.0	879	8.6%	11.8%	.0%	4.6%
Apple Computer	8.3	7.3	.0	1,600	5.4%	7.1%	.0%	8.4%
LPKF	7.5	4.5	2.3	750	4.9%	4.3%	5.6%	3.9%
CADAM	7.0	.0	6.3	0	4.5%	.0%	15.5%	.0%
BETRONEX	5.8	.0	5.8	0	3.7%	.0%	14.3%	.0%
Fujitsu	3.7	2.0	1.5	187	2.4%	1.9%	3.7%	1.0%
IBM	3.7	3.5	.0	739	2.4%	3.4%	.0%	3.9%
CAD Software	3.7	.0	3.1	0	2.4%	.0%	7.7%	.0%
Ziegler	3.0	.1	2.7	99	1.9%	.1%	6.7%	.5%
Orcad	2.3	.0	2.2	0	1.5%	.0%	5.3%	.0%
Visionics	2.1	.1	1.6	4	1.4%	.1%	3.9%	.0%
Autodesk	1.9	.0	1.9	0	1.2%	.0%	4.6%	.0%
Aptos	1.8	.0	1.8	0	1.2%	.0%	4.5%	.0%
Accel Technologies	1.6	.0	1.4	0	1.0%	.0%	3.6%	.0%
Everex Systems	1.6	1.6	.0	475	1.0%	1.5%	.0%	2.5%
ALS Design	1.4	.1	1.1	25	.9%	.1%	2.8%	.1%
Massteck	1.4	.0	1.4	0	.9%	.0%	3.3%	.0%
Computervision	1.3	.1	1.1	6	.8%	.1%	2.8%	.0%
Sycotronic AG	1.1	.0	.9	2	.7%	.0%	2.2%	.0%
CAD-UL	1.1	.3	.8	40	.7%	.3%	1.9%	.2%
The Great Softwestern Co.	1.1	.0	1.1	0	.7%	.0%	2.7%	.0%
Cadisys	1.0	.0	.0	0	.6%	.0%	.0%	.0%
Racal-Redac	1.0	.0	.9	8	.6%	.0%	2.2%	.0%
Dell Computer	.9	.9	.0	233	.6%	.9%	.0%	1.2%
Nitsubishi Electric	.7	.5	.3	79	.5%	.4%	.7%	.4%
Micrograph	.7	.3	.3	15	.4%	.3%	.6%	.1%
Vamp	.4	.0	.4	0	.3%	.0%	1.1%	.0%
Microtel Pacific Research	.3	.0	.3	1	.2%	.0%	.7%	.0%
Andor	.3	.0	.3	2	.2%	.0%	.6%	.0%
Academi Systems	.3	.1	.2	3	.2%	.1%	.5%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 64 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Personal Computer
REGION: Worldwide
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Olivetti	.3	.1	.1	89	.2%	.1%	.3%	.5%
Sophia Systems	.3	.1	.2	4	.2%	.1%	.4%	.0%
Instrumatic Espanola	.2	.0	.2	0	.1%	.0%	.4%	.0%
American Small Business Comp.	.1	.0	.1	0	.1%	.0%	.3%	.0%
Secmai	.1	.1	.0	2	.1%	.1%	.0%	.0%
Pacific Numeric	.1	.0	.1	0	.1%	.0%	.2%	.0%
Foresight Resources	.1	.0	.1	0	.1%	.0%	.2%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.2%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	52.7	23.5	25.6	5,306	34.1%	22.7%	63.4%	27.8%
All Companies	154.3	103.5	40.3	19,069	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	113.5	83.0	22.9	16,677	73.6%	80.2%	56.7%	87.5%
All Asian-Based Companies	18.3	14.8	2.2	1,359	11.9%	14.3%	5.5%	7.1%
All European-Based Companies	22.5	5.7	15.2	1,034	14.6%	5.5%	37.8%	5.4%
All Hardware Companies	87.3	82.8	.0	16,666	56.6%	80.0%	.0%	87.4%
All Turnkey & SW Companies	67.0	20.7	40.3	2,403	43.4%	20.0%	100.0%	12.6%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 65
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Hewlett-Packard	52.5	38.9	4.4	3,132	13.7%	17.1%	4.9%	18.4%
Mentor Graphics	51.3	18.0	23.1	689	13.4%	7.9%	26.1%	4.0%
Digital	47.6	35.7	.0	406	12.4%	15.7%	.0%	2.4%
Intergraph	35.1	19.3	6.2	368	9.2%	8.5%	7.0%	2.2%
Sun	32.0	28.8	.0	2,399	8.4%	12.7%	.0%	14.1%
Compaq	20.1	20.1	.0	3,345	5.2%	8.8%	.0%	19.6%
Valid	16.1	4.0	8.7	182	4.2%	1.8%	9.8%	1.1%
IBM	12.7	8.6	2.1	342	3.3%	3.8%	2.4%	2.0%
Scientific Calc.	10.1	2.3	5.1	47	2.6%	1.0%	5.8%	.3%
Racal-Redac	9.1	.3	7.5	11	2.4%	.1%	8.4%	.1%
Computervision	8.6	3.1	3.0	42	2.2%	1.3%	3.4%	.2%
Calay	8.6	2.2	5.7	71	2.2%	1.0%	6.5%	.4%
Apple Computer	5.9	5.2	.0	1,136	1.5%	2.3%	.0%	6.7%
Dazix	4.3	1.7	1.7	41	1.1%	.8%	2.0%	.2%
Schlumberger (Applicon)	2.8	.9	1.1	47	.7%	.4%	1.2%	.3%
CAD Software	2.8	.0	2.3	0	.7%	.0%	2.6%	.0%
Shared Resources	2.6	.0	.3	0	.7%	.0%	.3%	.0%
Visionics	2.1	.1	1.6	4	.5%	.0%	1.8%	.0%
Secmai	2.0	.3	1.5	4	.5%	.1%	1.7%	.0%
Pacific Numeric	1.8	.0	1.8	0	.5%	.0%	2.0%	.0%
BETRONEX	1.6	.0	1.6	0	.4%	.0%	1.8%	.0%
Automated Systems	1.5	.0	1.2	0	.4%	.0%	1.4%	.0%
Everex Systems	1.5	1.5	.0	437	.4%	.6%	.0%	2.6%
Aptos	1.4	.0	1.4	0	.4%	.0%	1.6%	.0%
Accel Technologies	1.2	.0	1.1	0	.3%	.0%	1.2%	.0%
Orcad	1.2	.0	1.1	0	.3%	.0%	1.3%	.0%
Autodesk	1.2	.0	1.2	0	.3%	.0%	1.3%	.0%
The Great Softwestern Co.	1.1	.0	1.1	0	.3%	.0%	1.2%	.0%
Cadisys	1.0	.0	.0	0	.3%	.0%	.0%	.0%
CADAM	1.0	.0	.9	3	.3%	.0%	1.0%	.0%
Massteck	1.0	.0	1.0	0	.2%	.0%	1.1%	.0%
Royal Digital Systems	.9	.0	.8	0	.2%	.0%	.9%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 65 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: North America
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Dell Computer	.9	.9	.0	221	.2%	.4%	.0%	1.3%
Solbourne	.6	.5	.0	41	.1%	.2%	.0%	.2%
Vamp	.4	.0	.4	0	.1%	.0%	.5%	.0%
Microtel Pacific Research	.3	.0	.3	1	.1%	.0%	.3%	.0%
Academi Systems	.2	.0	.1	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.1	.0	.1	0	.0%	.0%	.1%	.0%
Foresight Resources	.1	.0	.1	0	.0%	.0%	.1%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
Assigraph	.1	.0	.1	0	.0%	.0%	.1%	.0%
Zuken	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	60.8	35.6	17.9	4,076	15.9%	15.7%	20.3%	23.9%
All Companies	382.6	227.3	88.6	17,034	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	361.0	224.4	72.0	16,948	94.4%	98.7%	81.3%	99.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	21.5	2.8	16.5	86	5.6%	1.2%	18.7%	.5%
All Hardware Companies	175.3	152.2	.0	14,851	45.8%	67.0%	.0%	87.2%
All Turnkey & SW Companies	207.3	75.1	88.6	2,183	54.2%	33.0%	100.0%	12.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 66
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Technical Workstation
REGION: North America
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Mentor Graphics	51.3	18.0	23.1	689	23.0%	16.1%	34.5%	12.6%
Hewlett-Packard	42.0	30.2	4.4	1,486	18.8%	27.2%	6.5%	27.1%
Intergraph	28.8	16.1	5.2	308	12.9%	14.5%	7.7%	5.6%
Sun	25.6	23.0	.0	2,155	11.5%	20.7%	.0%	39.3%
Valid	16.1	4.0	8.7	182	7.2%	3.6%	13.0%	3.3%
Digital	12.3	9.2	.0	406	5.5%	8.3%	.0%	7.4%
Racal-Redac	9.1	.3	7.5	11	4.1%	.2%	11.2%	.2%
Caley	8.6	2.2	5.7	71	3.8%	2.0%	8.6%	1.3%
Scientific Calc.	7.6	2.0	3.6	36	3.4%	1.8%	5.3%	.7%
Computervision	7.6	3.1	2.0	42	3.4%	2.7%	2.9%	.8%
Dazix	4.3	1.7	1.7	41	1.9%	1.5%	2.6%	.7%
Shared Resources	2.6	.0	.3	0	1.2%	.0%	.4%	.0%
Secmai	1.9	.3	1.5	4	.9%	.3%	2.2%	.1%
Pacific Numeric	1.7	.0	1.7	0	.8%	.0%	2.6%	.0%
Schlumberger (Applicon)	1.0	.3	.4	10	.4%	.3%	.6%	.2%
Royal Digital Systems	.9	.0	.8	0	.4%	.0%	1.2%	.0%
IBM	.6	.4	.1	5	.3%	.3%	.2%	.1%
Solbourne	.5	.4	.0	33	.2%	.4%	.0%	.6%
CADAM	.3	.0	.2	0	.1%	.0%	.3%	.0%
Academi Systems	.2	.0	.1	0	.1%	.0%	.2%	.0%
Autodesk	.1	.0	.1	0	.0%	.0%	.1%	.0%
Everex Systems	.1	.1	.0	9	.0%	.1%	.0%	.2%
Microtel Pacific Research	.1	.0	.1	0	.0%	.0%	.1%	.0%
Assigraph	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 66 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Technical Workstation
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	7.4	.3	4.4	4	3.3%	.3%	6.6%	.1%
All Companies	223.0	111.3	67.0	5,487	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	203.2	108.5	52.2	5,401	91.1%	97.5%	77.9%	98.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	19.8	2.8	14.8	86	8.9%	2.5%	22.1%	1.6%
All Hardware Companies	56.2	47.5	.0	3,535	25.2%	42.7%	.0%	64.4%
All Turnkey & SW Companies	166.8	63.8	67.0	1,952	74.8%	57.3%	100.0%	35.6%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 67
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Host/Server
REGION: North America
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Company								
Digital	35.3	26.5	.0	0	38.7%	39.6%	.0%	.0%
IBM	11.0	7.1	2.0	116	12.1%	10.7%	29.2%	7.9%
Sun	6.4	5.8	.0	244	7.0%	8.6%	.0%	16.7%
Intergraph	6.3	3.2	1.0	60	6.9%	4.7%	14.7%	4.1%
Scientific Calc.	2.5	.3	1.6	10	2.8%	.4%	22.6%	.7%
Schlumberger (Applicon)	1.8	.6	.7	37	2.0%	.8%	10.3%	2.5%
Automated Systems	1.5	.0	1.2	0	1.6%	.0%	17.9%	.0%
Hewlett-Packard	.9	.7	.0	44	1.0%	1.1%	.0%	3.0%
CADAM	.3	.0	.3	3	.4%	.0%	4.1%	.2%
Solbourne	.1	.1	.0	8	.1%	.1%	.0%	.6%
Secmai	.1	.0	.1	0	.1%	.0%	.9%	.0%
Zuken	.0	.0	.0	0	.0%	.0%	.1%	.0%
Assigraph	.0	.0	.0	0	.0%	.0%	.3%	.0%
Other Companies	26.5	22.7	1.3	934	29.1%	33.9%	19.0%	64.1%
All Companies	91.2	66.9	6.9	1,457	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	91.1	66.9	6.8	1,457	99.9%	100.0%	98.7%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.1%	.0%
All European-Based Companies	.1	.0	.1	0	.1%	.0%	1.2%	.0%
All Hardware Companies	67.6	55.7	.0	1,230	74.1%	83.3%	.0%	84.4%
All Turnkey & SW Companies	23.6	11.2	6.9	227	25.9%	16.7%	100.0%	15.6%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 68
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Personal Computer
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compaq	20.1	20.1	.0	3,345	29.4%	40.9%	.0%	33.1%
Hewlett-Packard	9.6	7.9	.0	1,601	14.1%	16.1%	.0%	15.9%
Apple Computer	5.9	5.2	.0	1,136	8.6%	10.6%	.0%	11.3%
CAD Software	2.8	.0	2.3	0	4.0%	.0%	15.9%	.0%
Visionics	2.1	.1	1.6	4	3.1%	.2%	10.6%	.0%
BETRONEX	1.6	.0	1.6	0	2.4%	.0%	11.0%	.0%
Aptos	1.4	.0	1.4	0	2.1%	.0%	9.7%	.0%
Everex Systems	1.4	1.4	.0	428	2.0%	2.8%	.0%	4.2%
Accel Technologies	1.2	.0	1.1	0	1.8%	.0%	7.4%	.0%
Orcad	1.2	.0	1.1	0	1.7%	.0%	7.7%	.0%
IBM	1.1	1.0	.0	222	1.6%	2.1%	.0%	2.2%
The Great Softwestern Co.	1.1	.0	1.1	0	1.6%	.0%	7.5%	.0%
Autodesk	1.1	.0	1.1	0	1.6%	.0%	7.4%	.0%
Computervision	1.0	.0	1.0	0	1.5%	.0%	7.0%	.0%
Cadisys	1.0	.0	.0	0	1.5%	.0%	.0%	.0%
Massteck	1.0	.0	1.0	0	1.4%	.0%	6.5%	.0%
Dell Computer	.9	.9	.0	221	1.3%	1.8%	.0%	2.2%
Vamp	.4	.0	.4	0	.6%	.0%	3.0%	.0%
CADAM	.4	.0	.4	0	.6%	.0%	2.5%	.0%
Microtel Pacific Research	.2	.0	.2	1	.3%	.0%	1.4%	.0%
American Small Business Comp.	.1	.0	.1	0	.2%	.0%	.8%	.0%
Pacific Numeric	.1	.0	.1	0	.1%	.0%	.6%	.0%
Foresight Resources	.1	.0	.1	0	.1%	.0%	.5%	.0%
Innovative Data Design	.1	.0	.1	0	.1%	.0%	.5%	.0%
Academi Systems	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 68 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Personal Computer
REGION: North America
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	26.9	12.7	12.2	3,138	39.3%	25.7%	83.1%	31.1%
All Companies	68.4	49.1	14.7	10,090	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	66.7	49.1	13.1	10,090	97.6%	100.0%	88.9%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.6	.0	1.6	0	2.4%	.0%	11.1%	.0%
All Hardware Companies	51.5	49.0	.0	10,086	75.3%	99.8%	.0%	100.0%
All Turnkey & SW Companies	16.9	.1	14.7	4	24.7%	.2%	100.0%	.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 69
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	39.7	29.1	.0	338	11.6%	18.3%	.0%	3.3%
Racal-Redac	37.5	.0	30.8	130	11.0%	.0%	28.5%	1.3%
Hewlett-Packard	36.2	22.0	2.4	2,363	10.6%	13.8%	2.2%	23.1%
Mentor Graphics	29.6	7.3	14.6	392	8.7%	4.6%	13.5%	3.8%
Computervision	22.9	10.1	5.4	193	6.7%	6.3%	5.0%	1.9%
Intergraph	19.6	8.4	3.5	206	5.7%	5.3%	3.2%	2.0%
IBM	16.9	11.4	2.8	457	5.0%	7.2%	2.6%	4.5%
Compaq	14.6	14.6	.0	2,432	4.3%	9.2%	.0%	23.8%
Calay	13.5	4.2	6.8	134	3.9%	2.6%	6.3%	1.3%
Secmai	11.2	6.7	2.4	92	3.3%	4.2%	2.2%	.9%
Dazix	11.1	3.3	4.4	110	3.2%	2.1%	4.1%	1.1%
Scientific Calc.	8.8	2.0	4.5	41	2.6%	1.2%	4.1%	.4%
Valid	8.7	2.2	4.7	0	2.5%	1.4%	4.3%	.0%
LPKF	7.5	4.5	2.3	750	2.2%	2.8%	2.1%	7.3%
CADAM	6.7	.0	6.0	0	2.0%	.0%	5.5%	.0%
ABB Cade International	4.1	2.1	1.0	2	1.2%	1.3%	.9%	.0%
BETRONEX	3.1	.0	3.1	0	.9%	.0%	2.8%	.0%
Ziegler	3.0	.1	2.7	99	.9%	.1%	2.5%	1.0%
Schlumberger (Applicon)	2.1	.5	.7	22	.6%	.3%	.6%	.2%
Apple Computer	2.0	1.8	.0	384	.6%	1.1%	.0%	3.8%
Academi Systems	1.8	.4	1.3	22	.5%	.2%	1.2%	.2%
Siemens	1.8	1.1	.5	41	.5%	.7%	.5%	.4%
ALS Design	1.4	.1	1.1	25	.4%	.1%	1.1%	.2%
DECAD	1.4	.1	1.0	11	.4%	.0%	.9%	.1%
CAD-UL	1.1	.3	.8	40	.3%	.2%	.7%	.4%
Sycotronic AG	1.1	.0	.9	2	.3%	.0%	.8%	.0%
Assigraph	1.0	.0	.8	11	.3%	.0%	.7%	.1%
ICL	.8	.5	.2	21	.2%	.3%	.2%	.2%
Micrograph	.7	.4	.3	18	.2%	.2%	.2%	.2%
Orcad	.7	.0	.7	0	.2%	.0%	.6%	.0%
CAD Software	.7	.0	.6	0	.2%	.0%	.5%	.0%
Autodesk	.6	.0	.6	0	.2%	.0%	.5%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 69 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Massteck	.3	.0	.3	0	.1%	.0%	.3%	.0%
Accel Technologies	.3	.0	.3	0	.1%	.0%	.3%	.0%
Aptos	.3	.0	.3	0	.1%	.0%	.3%	.0%
Olivetti	.3	.1	.1	78	.1%	.1%	.1%	.8%
Instrumatic Espanola	.2	.0	.2	0	.1%	.0%	.2%	.0%
Pacific Numeric	.2	.0	.2	0	.1%	.0%	.2%	.0%
Everex Systems	.1	.1	.0	39	.0%	.1%	.0%	.4%
Microtel Pacific Research	.1	.0	.1	0	.0%	.0%	.1%	.0%
Dell Computer	.1	.1	.0	12	.0%	.0%	.0%	.1%
Solbourne	.1	.0	.0	4	.0%	.0%	.0%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	65.2	40.2	17.5	2,737	19.1%	25.3%	16.1%	26.7%
All Companies	341.8	159.0	108.1	10,231	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	250.3	138.5	52.0	8,757	73.2%	87.1%	48.1%	85.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	91.5	20.5	56.0	1,474	26.8%	12.9%	51.9%	14.4%
All Hardware Companies	108.4	88.9	.0	7,327	31.7%	55.9%	.0%	71.6%
All Turnkey & SW Companies	233.4	70.1	108.1	2,904	68.3%	44.1%	100.0%	28.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 70
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Technical Workstation
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Racal-Redac	37.5	.0	30.8	130	18.3%	.0%	37.5%	4.6%
Mentor Graphics	29.6	7.3	14.6	392	14.4%	10.7%	17.8%	14.0%
Hewlett-Packard	28.3	15.5	2.4	1,154	13.8%	22.9%	3.0%	41.3%
Computervision	19.4	8.4	4.6	117	9.4%	12.4%	5.6%	4.2%
Intergraph	16.1	6.6	2.9	172	7.8%	9.7%	3.5%	6.2%
Calay	13.5	4.2	6.8	134	6.6%	6.2%	8.3%	4.8%
Secmai	11.1	6.6	2.3	90	5.4%	9.7%	2.8%	3.2%
Dazix	11.1	3.3	4.4	110	5.4%	4.9%	5.4%	3.9%
Digital	10.2	7.1	.0	338	5.0%	10.4%	.0%	12.1%
Valid	8.7	2.2	4.7	0	4.2%	3.2%	5.7%	.0%
Scientific Calc.	6.6	1.7	3.1	32	3.2%	2.5%	3.8%	1.1%
ABB Cade International	4.1	2.1	1.0	2	2.0%	3.1%	1.2%	.1%
Schlumberger (Applicon)	1.9	.5	.6	17	.9%	.7%	.7%	.6%
Siemens	1.8	1.1	.5	41	.9%	1.6%	.6%	1.5%
Academi Systems	1.6	.3	1.1	18	.8%	.4%	1.3%	.7%
DECAD	1.3	.1	1.0	10	.6%	.1%	1.2%	.4%
ICL	.8	.5	.2	21	.4%	.7%	.2%	.8%
IBM	.8	.5	.1	7	.4%	.7%	.2%	.2%
Assigraph	.7	.0	.5	0	.3%	.0%	.7%	.0%
Pacific Numeric	.2	.0	.2	0	.1%	.0%	.2%	.0%
CADAM	.1	.0	.1	0	.1%	.0%	.1%	.0%
Micrograph	.1	.0	.0	3	.0%	.0%	.0%	.1%
Solbourne	.0	.0	.0	3	.0%	.0%	.0%	.1%
Microtel Pacific Research	.0	.0	.0	0	.0%	.0%	.0%	.0%
Everex Systems	.0	.0	.0	1	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 70 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Technical Workstation
REGION: Europe
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Other Companies	19.0	9.1	6.1	123	9.3%	13.4%	7.4%	4.4%
All Companies	205.5	67.9	82.0	2,792	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	133.1	53.1	37.8	2,343	64.8%	78.1%	46.1%	83.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	72.4	14.9	44.2	449	35.2%	21.9%	53.9%	16.1%
All Hardware Companies	25.0	16.8	.0	1,190	12.2%	24.7%	.0%	42.6%
All Turnkey & SW Companies	180.4	51.1	82.0	1,602	87.8%	75.3%	100.0%	57.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 71
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Host/Server
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	29.4	22.1	.0	0	37.0%	37.8%	.0%	.0%
IBM	14.7	9.5	2.7	154	18.5%	16.3%	45.6%	12.0%
Intergraph	3.5	1.8	.6	34	4.4%	3.0%	9.5%	2.6%
Computervision	3.3	1.6	.8	69	4.2%	2.7%	13.3%	5.4%
Scientific Calc.	2.2	.3	1.4	9	2.8%	.4%	23.1%	.7%
Hewlett-Packard	.9	.7	.0	44	1.1%	1.3%	.0%	3.5%
Assigraph	.3	.0	.3	11	.4%	.0%	4.3%	.8%
Schlumberger (Applicon)	.3	.1	.1	5	.3%	.1%	1.2%	.4%
CADAM	.2	.0	.1	0	.2%	.0%	2.4%	.0%
DECAD	.1	.0	.0	1	.1%	.0%	.7%	.1%
Solbourne	.0	.0	.0	1	.0%	.0%	.0%	.1%
Other Companies	25.0	22.4	.3	966	31.5%	38.4%	4.9%	75.3%
All Companies	79.5	58.4	5.9	1,282	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	79.1	58.4	5.6	1,271	99.5%	100.0%	95.1%	99.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.4	.0	.3	11	.5%	.0%	4.9%	.9%
All Hardware Companies	54.9	45.2	.0	1,000	69.1%	77.4%	.0%	78.0%
All Turnkey & SW Companies	24.5	13.2	5.9	283	30.9%	22.6%	100.0%	22.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 72
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Personal Computer
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					---------- Market Share ----------			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compaq	14.6	14.6	.0	2,432	25.7%	44.6%	.0%	39.5%
LPKF	7.5	4.5	2.3	750	13.2%	13.7%	11.1%	12.2%
Hewlett-Packard	7.0	5.8	.0	1,165	12.3%	17.6%	.0%	18.9%
CADAM	6.4	.0	5.7	0	11.3%	.0%	28.2%	.0%
BETRONEX	3.1	.0	3.1	0	5.4%	.0%	15.1%	.0%
Ziegler	3.0	.1	2.7	99	5.3%	.3%	13.5%	1.6%
Apple Computer	2.0	1.8	.0	384	3.5%	5.4%	.0%	6.2%
IBM	1.5	1.4	.0	295	2.6%	4.3%	.0%	4.8%
ALS Design	1.4	.1	1.1	25	2.5%	.4%	5.6%	.4%
CAD-UL	1.1	.3	.8	40	1.9%	1.0%	3.8%	.6%
Sycotronic AG	1.1	.0	.9	2	1.9%	.1%	4.4%	.0%
Orcad	.7	.0	.7	0	1.3%	.0%	3.4%	.0%
CAD Software	.7	.0	.6	0	1.2%	.0%	2.8%	.0%
Micrograph	.7	.3	.3	15	1.1%	1.0%	1.2%	.3%
Autodesk	.6	.0	.6	0	1.0%	.0%	2.8%	.0%
Nassteck	.3	.0	.3	0	.6%	.0%	1.7%	.0%
Accel Technologies	.3	.0	.3	0	.6%	.0%	1.4%	.0%
Aptos	.3	.0	.3	0	.5%	.0%	1.5%	.0%
Academi Systems	.3	.1	.2	3	.5%	.2%	.9%	.1%
Olivetti	.3	.1	.1	78	.5%	.3%	.6%	1.3%
Computervision	.2	.1	.0	6	.4%	.3%	.1%	.1%
Instrumatic Espanola	.2	.0	.2	0	.4%	.0%	.9%	.0%
Secmai	.1	.1	.0	2	.2%	.3%	.1%	.0%
Everex Systems	.1	.1	.0	38	.2%	.4%	.0%	.6%
Microtel Pacific Research	.1	.0	.1	0	.2%	.0%	.4%	.0%
Dell Computer	.1	.1	.0	12	.1%	.2%	.0%	.2%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.1%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.1%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.0%	.0%
Pacific Numeric	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 72 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Personal Computer
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	21.2	8.7	11.1	1,648	37.3%	26.7%	54.7%	26.8%
All Companies	56.9	32.7	20.2	6,158	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	38.2	27.0	8.6	5,144	67.1%	82.7%	42.7%	83.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	18.7	5.7	11.6	1,014	32.9%	17.3%	57.3%	16.5%
All Hardware Companies	28.5	26.9	.0	5,138	50.1%	82.4%	.0%	83.4%
All Turnkey & SW Companies	28.4	5.8	20.2	1,020	49.9%	17.6%	100.0%	16.6%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 73
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Zuken	52.0	19.6	28.6	323	16.2%	12.1%	23.1%	4.7%
NEC	26.5	19.1	5.3	1,493	8.3%	11.8%	4.3%	21.8%
Fujitsu	24.5	13.9	7.7	548	7.6%	8.6%	6.2%	8.0%
Sharp	20.3	8.7	9.6	115	6.4%	5.4%	7.7%	1.7%
Racal-Redac	20.0	5.9	12.7	155	6.3%	3.6%	10.3%	2.3%
IBM	15.5	10.3	2.7	337	4.9%	6.4%	2.2%	4.9%
Dazix	15.4	4.5	9.6	140	4.8%	2.8%	7.8%	2.0%
CADIX	15.1	6.1	7.6	105	4.7%	3.7%	6.1%	1.5%
Computervision	13.0	5.4	5.7	110	4.1%	3.3%	4.6%	1.6%
Hewlett-Packard	12.4	9.1	1.6	728	3.9%	5.6%	1.3%	10.7%
Valid	10.0	2.4	6.8	50	3.1%	1.5%	5.5%	.7%
Mentor Graphics	9.3	3.8	4.7	121	2.9%	2.3%	3.8%	1.8%
Hitachi	9.0	5.9	2.2	103	2.8%	3.7%	1.7%	1.5%
Digital	8.9	6.7	.0	76	2.8%	4.1%	.0%	1.1%
Sun	8.5	7.7	.0	735	2.7%	4.7%	.0%	10.8%
Uchida Yoko	8.4	4.2	3.4	132	2.6%	2.6%	2.7%	1.9%
Toshiba--NO OEM	7.3	3.7	2.9	68	2.3%	2.3%	2.4%	1.0%
Mitsubishi Electric	7.2	5.3	1.2	140	2.3%	3.3%	.9%	2.0%
Seiko Instruments--NO OEM	6.8	4.1	1.4	42	2.1%	2.5%	1.1%	.6%
Scientific Calc.	6.3	1.4	3.2	29	2.0%	.9%	2.6%	.4%
Kanematsu Semiconductor	5.1	2.5	2.1	52	1.6%	1.5%	1.7%	.8%
Tokyo Electron--NO OEM	2.6	.9	1.2	10	.8%	.5%	1.0%	.1%
Calay	2.5	.6	1.7	20	.8%	.4%	1.3%	.3%
Intergraph	2.2	1.2	.4	23	.7%	.7%	.3%	.3%
Omron	1.8	.9	.7	50	.6%	.6%	.6%	.7%
Century Research Center	1.0	.5	.4	6	.3%	.3%	.3%	.1%
BETRONEX	.9	.0	.9	0	.3%	.0%	.7%	.0%
Sony	.9	.8	.0	49	.3%	.5%	.0%	.7%
Hitachi Zosen Info Systems	.8	.4	.3	7	.3%	.3%	.3%	.1%
Sumisho Electronics	.8	.6	.1	5	.2%	.4%	.1%	.1%
Compaq	.7	.7	.0	122	.2%	.5%	.0%	1.8%
CADAM	.5	.0	.4	0	.1%	.0%	.3%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 73 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Sophia Systems	.3	.1	.2	4	.1%	.0%	.2%	.1%
Apple Computer	.3	.3	.0	64	.1%	.2%	.0%	.9%
Andor	.3	.0	.3	2	.1%	.0%	.2%	.0%
Orcad	.3	.0	.3	0	.1%	.0%	.2%	.0%
Autodesk	.2	.0	.2	0	.1%	.0%	.2%	.0%
CAD Software	.2	.0	.2	0	.1%	.0%	.1%	.0%
Siemens	.1	.1	.0	2	.0%	.0%	.0%	.0%
Accel Technologies	.1	.0	.1	0	.0%	.0%	.1%	.0%
Aptos	.1	.0	.1	0	.0%	.0%	.1%	.0%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.0%
Solbourne	.1	.1	.0	5	.0%	.0%	.0%	.1%
Everex Systems	.0	.0	.0	10	.0%	.0%	.0%	.1%
Massteck	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	22.0	13.6	6.5	895	6.9%	8.4%	5.3%	13.1%
All Companies	319.9	162.0	123.5	6,834	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	111.5	60.6	35.9	3,196	34.9%	37.4%	29.1%	46.8%
All Asian-Based Companies	185.0	94.8	72.2	3,460	57.8%	58.5%	58.5%	50.6%
All European-Based Companies	23.5	6.6	15.3	177	7.3%	4.1%	12.4%	2.6%
All Hardware Companies	33.9	29.1	.0	2,435	10.6%	17.9%	.0%	35.6%
All Turnkey & SW Companies	286.0	133.0	123.5	4,399	89.4%	82.1%	100.0%	64.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 74
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Technical Workstation
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Zuken	40.5	15.0	22.7	216	17.6%	14.4%	21.9%	6.0%
Sharp	20.3	8.7	9.6	115	8.8%	8.4%	9.2%	3.2%
Racal-Redac	19.0	5.9	11.8	147	8.2%	5.6%	11.4%	4.1%
Dazix	15.4	4.5	9.6	140	6.7%	4.3%	9.3%	3.9%
CADIX	15.1	6.1	7.6	105	6.6%	5.8%	7.3%	2.9%
NEC	13.3	6.9	5.3	613	5.7%	6.6%	5.1%	17.0%
Hewlett-Packard	10.4	7.5	1.6	431	4.5%	7.2%	1.6%	12.0%
Valid	10.0	2.4	6.8	50	4.3%	2.3%	6.6%	1.4%
Fujitsu	9.8	5.9	2.9	235	4.2%	5.6%	2.8%	6.5%
Computervision	9.6	3.8	4.5	69	4.2%	3.6%	4.3%	1.9%
Mentor Graphics	9.3	3.8	4.7	121	4.0%	3.7%	4.5%	3.4%
Uchida Yoko	8.4	4.2	3.4	132	3.6%	4.0%	3.3%	3.7%
Toshiba--NO OEM	7.3	3.7	2.9	68	3.2%	3.5%	2.8%	1.9%
Sun	6.8	6.1	.0	660	3.0%	5.9%	.0%	18.3%
Seiko Instruments--NO OEM	6.8	4.1	1.4	42	2.9%	3.9%	1.3%	1.2%
Mitsubishi Electric	5.0	4.2	.5	56	2.2%	4.0%	.4%	1.6%
Scientific Calc.	4.7	1.2	2.2	23	2.1%	1.2%	2.2%	.6%
Kanematsu Semiconductor	4.4	2.0	1.9	52	1.9%	1.9%	1.9%	1.4%
Hitachi	4.1	2.0	1.6	76	1.8%	1.9%	1.6%	2.1%
Tokyo Electron--NO OEM	2.6	.9	1.2	10	1.1%	.9%	1.2%	.3%
Calay	2.5	.6	1.7	20	1.1%	.6%	1.6%	.6%
Digital	2.3	1.7	.0	76	1.0%	1.7%	.0%	2.1%
Omron	1.8	.9	.7	50	.8%	.9%	.7%	1.4%
Intergraph	1.8	1.0	.3	19	.8%	1.0%	.3%	.5%
Century Research Center	1.0	.5	.4	6	.4%	.5%	.4%	.2%
Sony	.9	.8	.0	49	.4%	.7%	.0%	1.4%
Hitachi Zosen Info Systems	.8	.4	.3	7	.4%	.4%	.3%	.2%
Sumisho Electronics	.8	.6	.1	5	.3%	.6%	.1%	.1%
IBM	.7	.5	.2	7	.3%	.5%	.1%	.2%
CADAM	.1	.0	.1	0	.1%	.0%	.1%	.0%
Siemens	.1	.1	.0	2	.0%	.1%	.0%	.1%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 74 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Technical Workstation
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Sophia Systems	.1	.0	.0	0	.0%	.0%	.0%	.0%
Solbourne	.1	.0	.0	4	.0%	.0%	.0%	.1%
Autodesk	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	12.2	6.4	4.6	241	5.3%	6.2%	4.4%	6.7%
All Companies	230.6	103.9	103.4	3,604	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	71.1	32.6	30.0	1,599	30.8%	31.3%	29.0%	44.4%
All Asian-Based Companies	137.9	64.8	59.9	1,836	59.8%	62.4%	57.9%	50.9%
All European-Based Companies	21.5	6.6	13.5	169	9.3%	6.3%	13.1%	4.7%
All Hardware Companies	14.0	12.0	.0	1,034	6.1%	11.5%	.0%	28.7%
All Turnkey & SW Companies	216.6	92.0	103.4	2,570	93.9%	88.5%	100.0%	71.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 75
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Host/Server
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
IBM	13.9	9.0	2.5	146	22.1%	23.4%	16.8%	18.5%
Zuken	11.4	4.6	5.9	107	18.2%	12.0%	39.0%	13.6%
Fujitsu	11.0	6.1	3.3	130	17.5%	15.9%	21.8%	16.6%
Digital	6.6	5.0	.0	0	10.6%	12.9%	.0%	.0%
Hitachi	5.0	3.9	.5	27	7.9%	10.2%	3.5%	3.4%
Computervision	3.4	1.6	1.3	41	5.4%	4.3%	8.4%	5.2%
Sun	1.7	1.5	.0	75	2.7%	4.0%	.0%	9.5%
Scientific Calc.	1.6	.2	1.0	7	2.5%	.4%	6.5%	.8%
Mitsubishi Electric	1.4	.7	.4	5	2.3%	1.7%	2.9%	.6%
Kanematsu Semiconductor	.7	.5	.2	0	1.1%	1.3%	1.0%	.0%
Intergraph	.4	.2	.1	4	.6%	.5%	.3%	.5%
Hewlett-Packard	.3	.2	.0	14	.4%	.6%	.0%	1.7%
CADAM	.2	.0	.1	0	.3%	.0%	.9%	.0%
Solbourne	.0	.0	.0	1	.0%	.0%	.0%	.1%
Other Companies	6.0	5.4	.0	233	9.5%	14.1%	.0%	29.6%
All Companies	62.8	38.4	15.1	788	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	34.0	23.1	5.0	519	54.1%	60.2%	32.9%	65.9%
All Asian-Based Companies	28.8	15.3	10.1	269	45.9%	39.8%	67.1%	34.1%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	14.6	12.1	.0	322	23.2%	31.6%	.0%	40.9%
All Turnkey & SW Companies	48.2	26.3	15.1	466	76.8%	68.4%	100.0%	59.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 76
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Personal Computer
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
NEC	13.3	12.2	.0	879	49.9%	61.8%	.0%	36.0%
Fujitsu	3.7	2.0	1.5	183	13.8%	10.0%	29.7%	7.5%
Hewlett-Packard	1.7	1.4	.0	283	6.4%	7.0%	.0%	11.6%
Racal-Redac	1.0	.0	.9	8	3.8%	.2%	17.8%	.3%
BETRONEX	.9	.0	.9	0	3.5%	.0%	18.4%	.0%
IBM	.9	.9	.0	185	3.5%	4.4%	.0%	7.6%
Compaq	.7	.7	.0	122	2.7%	3.7%	.0%	5.0%
Mitsubishi Electric	.7	.5	.3	79	2.7%	2.3%	5.4%	3.3%
Apple Computer	.3	.3	.0	64	1.2%	1.5%	.0%	2.6%
Andor	.3	.0	.3	2	1.2%	.2%	5.0%	.1%
Orcad	.3	.0	.3	0	1.2%	.0%	5.8%	.0%
Sophia Systems	.3	.1	.2	4	1.0%	.3%	3.6%	.1%
Autodesk	.2	.0	.2	0	.8%	.0%	4.0%	.0%
CADAM	.2	.0	.2	0	.7%	.0%	3.6%	.0%
CAD Software	.2	.0	.2	0	.7%	.0%	3.2%	.0%
Accel Technologies	.1	.0	.1	0	.3%	.0%	1.4%	.0%
Aptos	.1	.0	.1	0	.3%	.0%	1.4%	.0%
Everex Systems	.0	.0	.0	10	.1%	.2%	.0%	.4%
Massteck	.0	.0	.0	0	.1%	.0%	.6%	.0%
Other Companies	3.8	1.8	2.0	421	14.4%	8.9%	39.5%	17.2%
All Companies	26.6	19.7	5.0	2,442	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	6.4	5.0	1.0	1,078	24.2%	25.2%	20.0%	44.2%
All Asian-Based Companies	18.2	14.7	2.2	1,355	68.6%	74.6%	43.7%	55.5%
All European-Based Companies	1.9	.0	1.8	8	7.2%	.2%	36.3%	.3%
All Hardware Companies	5.4	5.0	.0	1,078	20.2%	25.2%	.0%	44.2%
All Turnkey & SW Companies	21.2	14.8	5.0	1,364	79.8%	74.8%	100.0%	55.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 77
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Digital	3.0	2.2	.0	25	20.1%	19.9%	.0%	3.3%
Sun	2.1	1.9	.0	160	14.4%	17.1%	.0%	20.8%
Hewlett-Packard	2.0	1.4	.2	107	13.1%	12.7%	12.7%	14.0%
IBM	1.5	1.0	.2	50	9.8%	8.9%	16.2%	6.6%
Compaq	1.1	1.1	.0	182	7.3%	9.7%	.0%	23.7%
Intergraph	.6	.3	.1	6	4.0%	2.9%	7.7%	.8%
Fujitsu	.5	.3	.2	11	3.2%	2.5%	10.6%	1.4%
Computervision	.5	.2	.2	2	3.0%	1.4%	10.6%	.3%
BETRONEX	.2	.0	.2	0	1.1%	.0%	12.0%	.0%
Secmai	.2	.0	.1	0	1.1%	.2%	9.2%	.0%
Racal-Redac	.1	.1	.0	0	.7%	.8%	.0%	.0%
Royal Digital Systems	.1	.0	.1	0	.7%	.0%	6.3%	.0%
Apple Computer	.1	.1	.0	16	.5%	.6%	.0%	2.1%
CAD Software	.1	.0	.1	0	.5%	.0%	4.2%	.0%
Orcad	.1	.0	.0	0	.3%	.0%	2.8%	.0%
CADAM	.0	.0	.0	0	.2%	.0%	1.4%	.0%
Massteck	.0	.0	.0	0	.2%	.0%	2.1%	.0%
Olivetti	.0	.0	.0	12	.2%	.2%	.7%	1.5%
Sycotronic AG	.0	.0	.0	0	.2%	.0%	1.4%	.0%
Autodesk	.0	.0	.0	0	.1%	.0%	1.4%	.0%
CAD-UL	.0	.0	.0	0	.1%	.1%	.7%	.0%
Solbourne	.0	.0	.0	1	.1%	.1%	.0%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 77 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	3.4	2.6	.6	195	23.1%	23.3%	38.7%	25.4%
All Companies	14.8	11.2	1.4	769	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	13.9	10.8	.9	746	93.3%	96.3%	65.5%	97.1%
All Asian-Based Companies	.5	.3	.2	11	3.2%	2.5%	10.6%	1.4%
All European-Based Companies	.5	.1	.3	12	3.5%	1.2%	23.9%	1.5%
All Hardware Companies	10.2	8.8	.0	701	68.8%	78.8%	.0%	91.2%
All Turnkey & SW Companies	4.6	2.4	1.4	67	31.2%	21.2%	100.0%	8.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 78
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Technical Workstation
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Sun	1.7	1.5	.0	144	30.0%	38.0%	.0%	56.2%
Newlett-Packard	1.7	1.2	.2	73	29.8%	30.1%	27.7%	28.7%
Digital	.8	.6	.0	25	13.5%	14.3%	.0%	9.9%
Intergraph	.5	.3	.1	5	8.4%	6.7%	13.8%	2.0%
Computervision	.4	.2	.1	2	7.0%	4.0%	15.4%	.9%
Fujitsu	.2	.1	.1	5	3.3%	3.0%	9.2%	1.8%
Secmei	.2	.0	.1	0	2.8%	.5%	18.5%	.0%
Racal-Redac	.1	.1	.0	0	1.9%	2.2%	.0%	.0%
Royal Digital Systems	.1	.0	.1	0	1.8%	.0%	13.8%	.0%
IBM	.1	.0	.0	1	1.1%	1.0%	1.5%	.2%
CADAM	.0	.0	.0	0	.2%	.0%	.0%	.0%
Solbourne	.0	.0	.0	1	.2%	.2%	.0%	.3%
Other Companies	.3	.0	.2	0	4.6%	.5%	32.3%	.0%
All Companies	5.7	4.1	.7	256	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	5.2	3.8	.5	251	91.9%	94.3%	72.3%	98.2%
All Asian-Based Companies	.2	.1	.1	5	3.3%	3.0%	9.2%	1.8%
All European-Based Companies	.3	.1	.1	0	4.7%	2.7%	18.5%	.0%
All Hardware Companies	3.2	2.7	.0	220	55.6%	66.7%	.0%	86.0%
All Turnkey & SW Companies	2.5	1.4	.7	36	44.4%	33.3%	100.0%	14.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 79
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Host/Server
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	2.2	1.7	.0	0	33.1%	31.5%	.0%	.0%
IBM	1.2	.8	.2	13	18.3%	15.1%	68.8%	9.6%
Sun	.4	.4	.0	16	6.4%	7.3%	.0%	12.2%
Fujitsu	.2	.1	.1	3	3.1%	2.3%	18.8%	1.9%
Intergraph	.1	.1	.0	1	1.6%	1.0%	6.3%	.7%
Hewlett-Packard	.1	.1	.0	3	.9%	1.0%	.0%	2.4%
CADAM	.0	.0	.0	0	.1%	.0%	3.1%	.2%
Secmai	.0	.0	.0	0	.1%	.0%	3.1%	.0%
Other Companies	2.4	2.2	.0	97	36.3%	41.9%	3.1%	72.9%
All Companies	6.7	5.2	.3	133	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	6.5	5.1	.3	131	96.7%	97.7%	78.1%	98.1%
All Asian-Based Companies	.2	.1	.1	3	3.1%	2.3%	18.8%	1.9%
All European-Based Companies	.0	.0	.0	0	.1%	.0%	3.1%	.0%
All Hardware Companies	5.1	4.3	.0	117	76.6%	81.6%	.0%	87.6%
All Turnkey & SW Companies	1.6	1.0	.3	17	23.4%	18.4%	100.0%	12.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

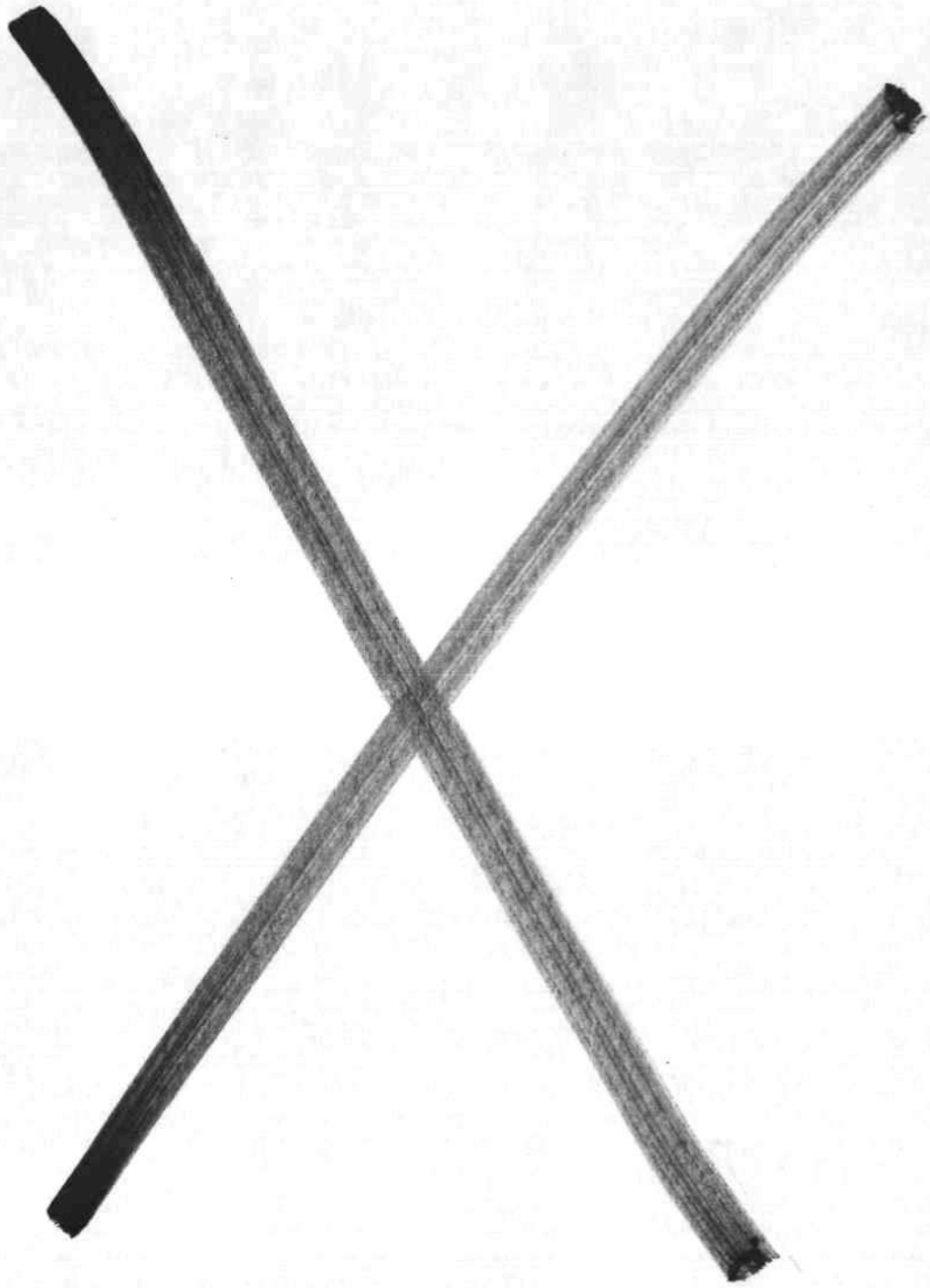
Market Share

TABLE NUMBER: 80
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: Personal Computer
REGION: Rest of World
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Compaq	1.1	1.1	.0	182	44.1%	56.2%	.0%	48.1%
Hewlett-Packard	.2	.2	.0	31	7.7%	7.7%	.0%	8.1%
IBM	.2	.2	.0	37	7.3%	8.8%	.0%	9.7%
BETRONEX	.2	.0	.2	0	6.9%	.0%	37.8%	.0%
Apple Computer	.1	.1	.0	16	3.2%	3.6%	.0%	4.2%
CAD Software	.1	.0	.1	0	2.8%	.0%	13.3%	.0%
Fujitsu	.1	.0	.0	4	2.8%	2.1%	6.7%	.9%
Computervision	.1	.0	.1	0	2.0%	.0%	11.1%	.0%
Orcad	.1	.0	.0	0	2.0%	.0%	8.9%	.0%
Maasteck	.0	.0	.0	0	1.2%	.0%	6.7%	.0%
Olivetti	.0	.0	.0	12	1.2%	1.0%	2.2%	3.0%
Sycotronic AG	.0	.0	.0	0	1.2%	.0%	4.4%	.0%
Autodesk	.0	.0	.0	0	.8%	.0%	4.4%	.0%
CAD-UL	.0	.0	.0	0	.4%	.5%	2.2%	.0%
CADAM	.0	.0	.0	0	.4%	.0%	2.2%	.0%
Other Companies	.8	.4	.3	98	30.4%	20.6%	73.3%	25.9%
All Companies	2.5	1.9	.5	379	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	2.2	1.9	.2	364	87.4%	96.4%	46.7%	96.0%
All Asian-Based Companies	.1	.0	.0	4	2.8%	2.1%	6.7%	.9%
All European-Based Companies	.2	.0	.2	12	9.7%	1.5%	46.7%	3.0%
All Hardware Companies	1.9	1.9	.0	364	78.1%	96.4%	.0%	96.0%
All Turnkey & SW Companies	.5	.1	.5	15	21.9%	3.6%	100.0%	4.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May



Market Share

TABLE NUMBER: 1
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
IBM	532.9	358.8	89.0	14,277	17.1%	20.0%	9.4%	17.9%
Fujitsu	305.9	177.9	92.3	6,850	9.8%	9.9%	9.8%	8.6%
NEC	265.0	186.4	57.4	12,950	8.5%	10.4%	6.1%	16.2%
Nihon Unisys	181.0	125.9	20.7	1,550	5.8%	7.0%	2.2%	1.9%
Hitachi	180.0	95.2	66.8	4,800	5.8%	5.3%	7.1%	6.0%
Hewlett-Packard	122.1	86.8	20.2	6,170	3.9%	4.8%	2.1%	7.7%
Computervision	108.0	44.8	48.2	908	3.5%	2.5%	5.1%	1.1%
Mutoh Industries	99.0	51.2	36.9	2,500	3.2%	2.8%	3.9%	3.1%
Seiko	96.0	56.5	21.2	1,016	3.1%	3.1%	2.2%	1.3%
Toshiba	86.3	43.1	34.5	1,800	2.8%	2.4%	3.7%	2.3%
Mentor Graphics	84.4	34.6	42.2	1,100	2.7%	1.9%	4.5%	1.4%
Hitachi Zosen Info Systems	82.7	42.2	32.2	750	2.6%	2.4%	3.4%	.9%
Digital	81.0	60.7	.0	588	2.6%	3.4%	.0%	.7%
Mitsubishi Electric	72.0	52.8	11.5	1,400	2.3%	2.9%	1.2%	1.8%
Zuken	62.6	23.6	34.5	380	2.0%	1.3%	3.7%	.5%
Sun	58.0	52.2	.0	5,000	1.9%	2.9%	.0%	6.3%
Cadence	48.9	.0	43.8	0	1.6%	.0%	4.6%	.0%
Silicon Graphics	46.1	41.7	.0	1,167	1.5%	2.3%	.0%	1.5%
Sharp	44.2	19.0	20.8	250	1.4%	1.1%	2.2%	.3%
Valid	40.0	9.6	27.2	200	1.3%	.5%	2.9%	.3%
ARGO GRAPHICS	36.0	25.3	8.5	660	1.2%	1.4%	.9%	.8%
Hakuto	36.0	19.4	14.4	880	1.2%	1.1%	1.5%	1.1%
Intergraph	31.7	16.9	6.2	323	1.0%	.9%	.7%	.4%
Dazix	30.7	9.0	19.2	280	1.0%	.5%	2.0%	.4%
C. Itoh Techno-Science	29.5	11.8	14.8	650	.9%	.7%	1.6%	.8%
Info. Services Int'l. Dentsu	29.5	1.3	20.3	45	.9%	.1%	2.1%	.1%
Tokyo Electron	29.0	9.9	13.3	107	.9%	.5%	1.4%	.1%
Wacom	27.8	11.9	13.1	610	.9%	.7%	1.4%	.8%
Sumisho Electronics	26.0	20.5	4.2	680	.8%	1.1%	.4%	.9%
Sumitomo Denko Workstation	25.0	22.8	.0	1,158	.8%	1.3%	.0%	1.5%
Racal-Redac	24.5	7.2	15.6	190	.8%	.4%	1.7%	.2%
Mitsui Engineering	23.4	16.7	4.4	155	.7%	.9%	.5%	.2%
ARC/YAMAGIWA	21.6	13.0	6.5	116	.7%	.7%	.7%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 1
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms*
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
CADIX	21.6	8.7	10.8	150	.7%	.5%	1.1%	.2%
Autodesk	21.2	.0	21.2	0	.7%	.0%	2.2%	.0%
Toyo	18.0	10.8	5.9	180	.6%	.6%	.6%	.2%
Marubeni Hytech	14.3	.0	14.3	0	.5%	.0%	1.5%	.0%
Uchida Yoko	14.0	7.0	5.6	220	.4%	.4%	.6%	.3%
SDRC	13.6	.0	13.6	0	.4%	.0%	1.4%	.0%
Century Research Center	13.4	5.9	6.1	71	.4%	.3%	.6%	.1%
Graphtec Engineering	12.9	6.5	5.1	0	.4%	.4%	.5%	.0%
Control Data	11.0	7.8	1.3	118	.4%	.4%	.1%	.1%
Design Automation	10.8	.0	9.7	0	.3%	.0%	1.0%	.0%
Andor	9.3	1.6	7.4	76	.3%	.1%	.8%	.1%
Kanematsu Computer Systems	9.3	5.3	3.7	186	.3%	.3%	.4%	.2%
MacNeal-Schwendler	9.0	.0	8.6	0	.3%	.0%	.9%	.0%
Sony	8.8	7.6	.0	532	.3%	.4%	.0%	.7%
McDonnell Douglas	8.7	4.7	2.6	139	.3%	.3%	.3%	.2%
Apple Computer	8.3	7.3	.0	1,600	.3%	.4%	.0%	2.0%
INS Engineering	8.3	5.8	1.7	75	.3%	.3%	.2%	.1%
Omron	7.2	3.6	2.9	200	.2%	.2%	.3%	.3%
Schlumberger (Applicon)	7.2	3.0	3.5	66	.2%	.2%	.4%	.1%
Compaq	7.0	7.0	.0	1,158	.2%	.4%	.0%	1.5%
Sumisho Electronic Systems	6.6	.0	5.7	317	.2%	.0%	.6%	.4%
Kanematsu Semiconductor	6.5	3.3	2.5	60	.2%	.2%	.3%	.1%
Scientific Calc.	6.5	1.4	3.3	30	.2%	.1%	.4%	.0%
Silicon Compiler Systems	6.5	.0	4.3	0	.2%	.0%	.5%	.0%
Nihon Itek	6.3	3.5	2.4	35	.2%	.2%	.3%	.0%
Data I/O	6.3	.0	5.3	0	.2%	.0%	.6%	.0%
CPU	5.9	.0	5.6	309	.2%	.0%	.6%	.4%
CADAM	5.8	.0	5.2	0	.2%	.0%	.6%	.0%
Gerber Systems	5.0	2.4	1.6	76	.2%	.1%	.2%	.1%
Technovision	3.6	.0	3.6	0	.1%	.0%	.4%	.0%
Matra Datavision	3.2	1.9	1.0	0	.1%	.1%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 1 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Silvar-Lisco	3.2	.0	2.7	0	.1%	.0%	.3%	.0%
Zycad	3.2	2.2	.1	15	.1%	.1%	.0%	.0%
Calay	2.5	.6	1.7	20	.1%	.0%	.2%	.0%
ESRI	2.4	.0	2.1	0	.1%	.0%	.2%	.0%
Kubota Computer	2.2	1.5	.7	300	.1%	.1%	.1%	.4%
Kyocera	2.2	.9	1.1	10	.1%	.1%	.1%	.0%
LSI Logic	2.0	.2	1.5	8	.1%	.0%	.2%	.0%
VLSI Technology	1.9	.1	1.5	6	.1%	.0%	.2%	.0%
Sophia Systems	1.7	.4	1.1	20	.1%	.0%	.1%	.0%
Swanson Analysis	1.7	.0	1.7	0	.1%	.0%	.2%	.0%
ISICAD	1.4	.6	.6	14	.0%	.0%	.1%	.0%
Manufacturing Consultants	1.3	.0	1.1	0	.0%	.0%	.1%	.0%
Ricoh	1.1	.0	1.0	0	.0%	.0%	.1%	.0%
Pasco	.9	.4	.5	12	.0%	.0%	.0%	.0%
PDA Engineering	.4	.0		0	.0%	.0%	.0%	.0%
Other Companies	210.4	112.8	81.3	10,539	6.7%	6.3%	8.6%	13.2%
All Companies	3,124.5	1,797.2	944.3	79,803	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1,431.2	824.7	410.8	42,149	45.8%	45.9%	43.5%	52.8%
All Asian-Based Companies	1,648.5	956.7	507.9	37,250	52.8%	53.2%	53.8%	46.7%
All European-Based Companies	44.8	15.7	25.5	404	1.4%	.9%	2.7%	.5%
All Hardware Companies	371.3	323.2	.0	31,915	11.9%	18.0%	.0%	40.0%
All Turnkey & SW Companies	2,753.2	1,473.9	944.3	47,887	88.1%	82.0%	100.0%	60.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 2
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Fujitsu	122.4	74.9	35.2	2,932	7.9%	9.2%	6.3%	9.8%
Hewlett-Packard	110.8	77.5	20.2	4,548	7.1%	9.5%	3.6%	15.2%
NEC	108.2	56.3	43.3	5,008	7.0%	6.9%	7.7%	16.7%
Mentor Graphics	84.4	34.6	42.2	1,100	5.4%	4.2%	7.5%	3.7%
Hitachi Zosen Info Systems	81.9	41.8	31.9	740	5.3%	5.1%	5.7%	2.5%
Hitachi	81.0	40.5	32.4	1,529	5.2%	5.0%	5.8%	5.1%
Seiko	80.4	46.4	17.9	969	5.2%	5.7%	3.2%	3.2%
Computervision	79.2	31.2	36.9	567	5.1%	3.8%	6.6%	1.9%
Toshiba	62.4	31.2	24.9	581	4.0%	3.8%	4.4%	1.9%
Zuken	51.2	19.0	28.7	273	3.3%	2.3%	5.1%	.9%
Mitsubishi Electric	50.4	41.8	4.5	561	3.2%	5.1%	.8%	1.9%
Nihon Unisys	48.0	34.1	4.8	451	3.1%	4.2%	.9%	1.5%
Sun	46.4	41.7	.0	4,492	3.0%	5.1%	.0%	15.0%
Silicon Graphics	45.8	41.7	.0	1,167	2.9%	5.1%	.0%	3.9%
IBM	44.5	28.8	8.2	400	2.9%	3.5%	1.5%	1.3%
Sharp	44.2	19.0	20.8	250	2.8%	2.3%	3.7%	.8%
Cadence	42.9	.0	38.5	0	2.8%	.0%	6.9%	.0%
Mutoh Industries	40.2	20.1	13.7	499	2.6%	2.5%	2.4%	1.7%
Valid	40.0	9.6	27.2	200	2.6%	1.2%	4.9%	.7%
Dazix	30.7	9.0	19.2	280	2.0%	1.1%	3.4%	.9%
C. Itoh Techno-Science	29.5	11.8	14.8	650	1.9%	1.4%	2.6%	2.2%
Tokyo Electron	29.0	9.9	13.3	107	1.9%	1.2%	2.4%	.4%
Info. Services Int'l. Dentsu	25.4	1.0	18.5	20	1.6%	.1%	3.3%	.1%
Intergraph	25.1	14.1	4.5	269	1.6%	1.7%	.8%	.9%
Sumitomo Denko Workstation	25.0	22.8	.0	1,158	1.6%	2.8%	.0%	3.9%
Racal-Redac	23.3	7.2	14.5	180	1.5%	.9%	2.6%	.6%
Mitsui Engineering	22.0	15.4	4.4	136	1.4%	1.9%	.8%	.5%
CADIX	21.6	8.7	10.8	150	1.4%	1.1%	1.9%	.5%
Sumisho Electronics	21.0	17.4	2.3	125	1.3%	2.1%	.4%	.4%
Digital	17.8	13.4	.0	588	1.1%	1.6%	.0%	2.0%
ARGO GRAPHICS	14.4	13.5	.0	660	.9%	1.7%	.0%	2.2%
Uchida Yoko	14.0	7.0	5.6	220	.9%	.9%	1.0%	.7%
Toyo	12.2	7.5	3.9	47	.8%	.9%	.7%	.2%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 2
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Century Research Center	11.8	5.9	4.7	71	.8%	.7%	.8%	.2%
Graphtec Engineering	11.6	5.8	4.6	0	.7%	.7%	.8%	.0%
SDRC	10.9	.0	10.9	0	.7%	.0%	1.9%	.0%
Sony	8.8	7.6	.0	532	.6%	.9%	.0%	1.8%
Omron	7.2	3.6	2.9	200	.5%	.4%	.5%	.7%
Schlumberger (Applicon)	7.2	3.0	3.5	66	.5%	.4%	.6%	.2%
McDonnell Douglas	6.8	3.7	2.0	100	.4%	.4%	.4%	.3%
Marubeni Hytech	6.7	.0	6.7	0	.4%	.0%	1.2%	.0%
Sumisho Electronic Systems	6.6	.0	5.7	264	.4%	.0%	1.0%	.9%
Silicon Compiler Systems	6.5	.0	4.3	0	.4%	.0%	.8%	.0%
Nihon Itek	6.3	3.5	2.4	35	.4%	.4%	.4%	.1%
Kanematsu Semiconductor	5.1	2.3	2.2	60	.3%	.3%	.4%	.2%
Gerber Systems	5.0	2.4	1.6	76	.3%	.3%	.3%	.3%
Scientific Calc.	4.9	1.3	2.3	23	.3%	.2%	.4%	.1%
Control Data	3.7	2.7	.5	69	.2%	.3%	.1%	.2%
INS Engineering	3.6	2.5	.7	25	.2%	.3%	.1%	.1%
Matra Datavision	3.2	1.9	1.0	0	.2%	.2%	.2%	.0%
Silvar-Lisco	2.9	.0	2.4	0	.2%	.0%	.4%	.0%
Kanematsu Computer Systems	2.6	1.8	.4	30	.2%	.2%	.1%	.1%
Calay	2.5	.6	1.7	20	.2%	.1%	.3%	.1%
Kyocera	2.2	.9	1.1	10	.1%	.1%	.2%	.0%
Autodesk	1.9	.0	1.9	0	.1%	.0%	.3%	.0%
LSI Logic	1.8	.2	1.4	7	.1%	.0%	.2%	.0%
VLSI Technology	1.6	.1	1.3	5	.1%	.0%	.2%	.0%
CADAM	1.6	.0	1.3	0	.1%	.0%	.2%	.0%
ISICAD	1.2	.6	.4	14	.1%	.1%	.1%	.0%
Ricoh	1.1	.0	1.0	0	.1%	.0%	.2%	.0%
Kubota Computer	1.0	.7	.3	50	.1%	.1%	.1%	.2%
ESRI	.9	.0	.8	0	.1%	.0%	.1%	.0%
MacNeal-Schwendler	.9	.0	.9	0	.1%	.0%	.2%	.0%
Pasco	.7	.3	.4	8	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 2 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Data I/O	.6	.0	.5	0	.0%	.0%	.1%	.0%
Swanson Analysis	.5	.0	.5	0	.0%	.0%	.1%	.0%
Manufacturing Consultants	.5	.0	.4	0	.0%	.0%	.1%	.0%
Hakuto	.4	.2	.1	5	.0%	.0%	.0%	.0%
Sophia Systems	.3	.1	.2	2	.0%	.0%	.0%	.0%
PDA Engineering	.2	.0		0	.0%	.0%	.0%	.0%
Zycad	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	81.5	36.4	37.0	1,152	5.2%	4.4%	6.6%	3.9%
All Companies	1,555.4	817.2	561.1	29,918	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	647.9	318.5	249.5	14,092	41.7%	39.0%	44.5%	47.1%
All Asian-Based Companies	868.0	484.1	289.7	15,460	55.8%	59.2%	51.6%	51.7%
All European-Based Companies	39.6	14.6	21.9	365	2.5%	1.8%	3.9%	1.2%
All Hardware Companies	150.5	130.9	.0	9,077	9.7%	16.0%	.0%	30.3%
All Turnkey & SW Companies	1,404.9	686.3	561.1	20,840	90.3%	84.0%	100.0%	69.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 3
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	442.6	286.5	80.8	4,644	41.3%	41.7%	38.3%	37.1%
Fujitsu	137.6	77.7	39.3	1,630	12.9%	11.3%	18.6%	13.0%
Nihon Unisys	133.0	91.9	15.9	1,099	12.4%	13.4%	7.5%	8.8%
Digital	63.2	47.4	.0	0	5.9%	6.9%	.0%	.0%
NEC	58.2	45.0	8.6	1,397	5.4%	6.5%	4.1%	11.2%
Hitachi	37.8	29.9	4.1	204	3.5%	4.4%	1.9%	1.6%
Computervision	28.1	13.6	10.5	341	2.6%	2.0%	5.0%	2.7%
ARC/YAMAGIWA	21.6	13.0	6.5	116	2.0%	1.9%	3.1%	.9%
Seiko	15.6	10.1	3.4	47	1.5%	1.5%	1.6%	.4%
Mitsubishi Electric	14.4	6.5	4.3	45	1.3%	.9%	2.0%	.4%
Sun	11.6	10.4	.0	508	1.1%	1.5%	.0%	4.1%
Zuken	11.4	4.6	5.9	107	1.1%	.7%	2.8%	.9%
Toshiba	9.7	4.8	3.9	138	.9%	.7%	1.8%	1.1%
MacNeal-Schwendler	7.8	.0	7.4	0	.7%	.0%	3.5%	.0%
Control Data	7.3	5.2	.9	49	.7%	.7%	.4%	.4%
Cadence	6.0	.0	5.4	0	.6%	.0%	2.5%	.0%
Mutoh Industries	5.9	2.1	1.4	8	.6%	.3%	.7%	.1%
Toyo	5.8	3.4	2.0	133	.5%	.5%	.9%	1.1%
Marubeni Hytech	5.7	.0	5.7	0	.5%	.0%	2.7%	.0%
Intergraph	5.7	2.8	.9	54	.5%	.4%	.4%	.4%
INS Engineering	4.3	3.0	.9	7	.4%	.4%	.4%	.1%
Zycad	3.1	2.2	.1	15	.3%	.3%	.0%	.1%
SDRC	2.7	.0	2.7	0	.3%	.0%	1.3%	.0%
Hewlett-Packard	2.3	1.9	.0	118	.2%	.3%	.0%	.9%
Info. Services Int'l. Dentsu	2.1	.0	.7	0	.2%	.0%	.3%	.0%
McDonnell Douglas	2.0	1.1	.6	39	.2%	.2%	.3%	.3%
CADAM	2.0	.0	1.7	0	.2%	.0%	.8%	.0%
Scientific Calc.	1.6	.2	1.0	7	.2%	.0%	.5%	.1%
Century Research Center	1.5	.0	1.4	0	.1%	.0%	.7%	.0%
Kanematsu Semiconductor	1.4	1.0	.3	0	.1%	.1%	.1%	.0%
ESRI	1.3	.0	1.1	0	.1%	.0%	.5%	.0%
Kubota Computer	1.2	.8	.4	250	.1%	.1%	.2%	2.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 3 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Swanson Analysis	.9	.0	.9	0	.1%	.0%	.4%	.0%
Hitachi Zosen Info Systems	.8	.5	.3	10	.1%	.1%	.1%	.1%
Manufacturing Consultants	.6	.0	.5	0	.1%	.0%	.2%	.0%
Silicon Graphics	.4	.0	.0	0	.0%	.0%	.0%	.0%
Silver-Lisco	.3	.0	.3	0	.0%	.0%	.1%	.0%
Data I/O	.3	.0	.3	0	.0%	.0%	.1%	.0%
VLSI Technology	.3	.0	.2	1	.0%	.0%	.1%	.0%
LSI Logic	.2	.0	.2	1	.0%	.0%	.1%	.0%
PDA Engineering	.2	.0		0	.0%	.0%	.0%	.0%
Other Companies	59.4	45.2	8.9	1,955	5.6%	6.6%	4.2%	15.6%
All Companies	1,070.4	687.2	211.2	12,530	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	641.8	412.5	120.9	7,485	60.0%	60.0%	57.2%	59.7%
All Asian-Based Companies	426.1	273.9	88.8	5,028	39.8%	39.9%	42.0%	40.1%
All European-Based Companies	2.5	.8	1.5	17	.2%	.1%	.7%	.1%
All Hardware Companies	122.7	100.8	.0	2,333	11.5%	14.7%	.0%	18.6%
All Turnkey & SW Companies	947.7	586.4	211.2	10,197	88.5%	85.3%	100.0%	81.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 4
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
NEC	98.6	85.2	5.6	6,544	19.8%	29.1%	3.2%	17.5%
Hitachi	61.2	24.8	30.3	3,067	12.3%	8.5%	17.6%	8.2%
Mutoh Industries	52.9	29.0	21.8	1,994	10.6%	9.9%	12.7%	5.3%
Fujitsu	45.9	25.3	17.8	2,288	9.2%	8.7%	10.3%	6.1%
IBM	45.8	43.5	.0	9,233	9.2%	14.8%	.0%	24.7%
Hakuto	35.6	19.3	14.3	875	7.1%	6.6%	8.3%	2.3%
Wacom	27.8	11.9	13.1	610	5.6%	4.1%	7.6%	1.6%
ARGO GRAPHICS	21.6	11.8	8.5	0	4.3%	4.0%	5.0%	.0%
Autodesk	19.3	.0	19.3	0	3.9%	.0%	11.2%	.0%
Toshiba	14.2	7.1	5.7	1,080	2.9%	2.4%	3.3%	2.9%
Design Automation	10.8	.0	9.7	0	2.2%	.0%	5.7%	.0%
Andor	9.3	1.6	7.4	76	1.9%	.5%	4.3%	.2%
Hewlett-Packard	9.0	7.4	.0	1,504	1.8%	2.5%	.0%	4.0%
Apple Computer	8.3	7.3	.0	1,600	1.7%	2.5%	.0%	4.3%
Mitsubishi Electric	7.2	4.5	2.7	794	1.4%	1.6%	1.5%	2.1%
Compaq	7.0	7.0	.0	1,158	1.4%	2.4%	.0%	3.1%
Kanematsu Computer Systems	6.7	3.5	3.3	156	1.3%	1.2%	1.9%	.4%
CPU	5.9	.0	5.6	309	1.2%	.0%	3.3%	.8%
Data I/O	5.3	.0	4.5	0	1.1%	.0%	2.6%	.0%
Sumisho Electronics	5.0	3.1	1.9	555	1.0%	1.1%	1.1%	1.5%
Technovision	3.6	.0	3.6	0	.7%	.0%	2.1%	.0%
CADAM	2.3	.0	2.2	0	.5%	.0%	1.3%	.0%
Info. Services Int'l. Dentsu	2.1	.3	1.1	25	.4%	.1%	.6%	.1%
Marubeni Hytech	1.9	.0	1.9	0	.4%	.0%	1.1%	.0%
Mitsui Engineering	1.4	1.3	.0	19	.3%	.4%	.0%	.1%
Sophia Systems	1.4	.3	.9	18	.3%	.1%	.5%	.0%
Graphtec Engineering	1.3	.7	.5	0	.3%	.2%	.3%	.0%
Racal-Redac	1.2	.1	1.1	10	.2%	.0%	.6%	.0%
Intergraph	.9	.0	.8	0	.2%	.0%	.5%	.0%
Computervision	.8	.0	.8	0	.2%	.0%	.4%	.0%
INS Engineering	.4	.3	.1	43	.1%	.1%	.0%	.1%
MacNeal-Schwendler	.3	.0	.3	0	.1%	.0%	.2%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 4 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Manufacturing Consultants	.3	.0	.2	0	.1%	.0%	.1%	.0%
Swanson Analysis	.2	.0	.2	0	.0%	.0%	.1%	.0%
ESRI	.2	.0	.2	0	.0%	.0%	.1%	.0%
ISICAD	.2	.0	.2	0	.0%	.0%	.1%	.0%
Pasco	.2	.1	.1	4	.0%	.0%	.1%	.0%
Other Companies	69.4	31.3	35.4	7,432	13.9%	10.7%	20.6%	19.9%
All Companies	498.7	292.8	172.0	37,355	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	141.5	93.7	40.5	20,572	28.4%	32.0%	23.5%	55.1%
All Asian-Based Companies	354.5	198.7	129.4	16,761	71.1%	67.9%	75.2%	44.9%
All European-Based Companies	2.7	.4	2.1	22	.5%	.1%	1.2%	.1%
All Hardware Companies	98.1	91.5	.0	20,505	19.7%	31.3%	.0%	54.9%
All Turnkey & SW Companies	400.6	201.3	172.0	16,850	80.3%	68.7%	100.0%	45.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 5
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	444.1	295.1	76.5	9,411	24.8%	27.2%	16.0%	21.6%
NEC	161.7	111.5	37.3	6,965	9.0%	10.3%	7.8%	16.0%
Nihon Unisys	161.1	112.1	18.4	1,380	9.0%	10.3%	3.8%	3.2%
Hitachi	135.0	68.3	53.2	3,962	7.5%	6.3%	11.1%	9.1%
Fujitsu	122.4	69.6	38.5	2,740	6.8%	6.4%	8.0%	6.3%
Computervision	76.7	31.7	34.3	643	4.3%	2.9%	7.2%	1.5%
Hitachi Zosen Info Systems	74.4	38.0	29.0	675	4.1%	3.5%	6.1%	1.5%
Mutoh Industries	71.3	37.4	27.1	1,942	4.0%	3.4%	5.7%	4.5%
Hewlett-Packard	66.4	46.8	11.5	3,218	3.7%	4.3%	2.4%	7.4%
Toshiba	57.0	28.5	22.8	1,527	3.2%	2.6%	4.8%	3.5%
Digital	43.7	32.8	.0	299	2.4%	3.0%	.0%	.7%
Silicon Graphics	40.1	36.5	.0	1,023	2.2%	3.4%	.0%	2.3%
ARGO GRAPHICS	36.0	25.3	8.5	660	2.0%	2.3%	1.8%	1.5%
Hakuto	36.0	19.4	14.4	880	2.0%	1.8%	3.0%	2.0%
Seiko	32.6	19.9	6.6	419	1.8%	1.8%	1.4%	1.0%
Info. Services Int'l. Dentsu	29.5	1.3	20.3	45	1.6%	.1%	4.2%	.1%
Mitsubishi Electric	28.8	21.1	4.6	560	1.6%	1.9%	1.0%	1.3%
Tokyo Electron	24.7	8.4	11.3	91	1.4%	.8%	2.4%	.2%
Sharp	23.9	10.3	11.2	135	1.3%	.9%	2.3%	.3%
Sumisho Electronics	20.0	16.0	3.0	411	1.1%	1.5%	.6%	.9%
Sumitomo Denko Workstation	20.0	18.2	.0	926	1.1%	1.7%	.0%	2.1%
Sun	18.8	16.9	.0	1,620	1.0%	1.6%	.0%	3.7%
Toyo	15.3	9.2	5.0	153	.9%	.8%	1.0%	.4%
Mitsui Engineering	14.2	10.2	2.5	97	.8%	.9%	.5%	.2%
SDRC	13.6	.0	13.6	0	.8%	.0%	2.8%	.0%
Graphtec Engineering	12.5	6.3	4.9	0	.7%	.6%	1.0%	.0%
Design Automation	10.8	.0	9.7	0	.6%	.0%	2.0%	.0%
Control Data	10.5	7.4	1.3	112	.6%	.7%	.3%	.3%
C. Itoh Techno-Science	10.0	4.0	5.0	221	.6%	.4%	1.0%	.5%
MacNeal-Schwendler	9.0	.0	8.6	0	.5%	.0%	1.8%	.0%
Autodesk	8.7	.0	8.7	0	.5%	.0%	1.8%	.0%
Intergraph	8.5	4.5	1.7	86	.5%	.4%	.4%	.2%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 5 (Continued)
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Schlumberger (Applicon)	7.2	3.0	3.5	66	.4%	.3%	.7%	.2%
McDonnell Douglas	7.0	3.8	2.1	111	.4%	.3%	.4%	.3%
Wacom	7.0	3.0	3.3	53	.4%	.3%	.7%	.1%
Andor	6.9	1.2	5.5	54	.4%	.1%	1.1%	.1%
Nihon Itek	5.6	3.1	2.1	31	.3%	.3%	.4%	.1%
Omron	5.4	2.7	2.2	150	.3%	.2%	.5%	.3%
Sony	5.1	4.4	.0	296	.3%	.4%	.0%	.7%
Gerber Systems	5.0	2.4	1.6	76	.3%	.2%	.3%	.2%
Sumisho Electronic Systems	4.6	.0	4.0	245	.3%	.0%	.8%	.6%
CADAM	4.5	.0	4.0	0	.3%	.0%	.8%	.0%
Apple Computer	3.7	3.3	.0	720	.2%	.3%	.0%	1.7%
Compaq	3.7	3.7	.0	614	.2%	.3%	.0%	1.4%
Matra Datavision	3.2	1.9	1.0	0	.2%	.2%	.2%	.0%
Century Research Center	2.6	.5	1.8	6	.1%	.0%	.4%	.0%
CADIX	2.2	.9	1.1	15	.1%	.1%	.2%	.0%
Mentor Graphics	1.7	.7	.8	22	.1%	.1%	.2%	.1%
Swanson Analysis	1.7	.0	1.7	0	.1%	.0%	.4%	.0%
Kubota Computer	1.5	1.0	.5	264	.1%	.1%	.1%	.6%
Manufacturing Consultants	1.3	.0	1.1	0	.1%	.0%	.2%	.0%
Ricoh	1.1	.0	1.0	0	.1%	.0%	.2%	.0%
ISICAD	.5	.2	.2	6	.0%	.0%	.0%	.0%
PDA Engineering	.4	.0		0	.0%	.0%	.0%	.0%
Other Companies	92.9	46.2	39.7	4,295	5.2%	4.3%	8.3%	9.9%
All Companies	1,793.9	1,085.8	478.4	43,563	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	819.5	518.2	182.2	21,588	45.7%	47.7%	38.1%	49.6%
All Asian-Based Companies	961.0	561.8	289.9	21,851	53.6%	51.7%	60.6%	50.2%
All European-Based Companies	13.4	5.8	6.3	124	.7%	.5%	1.3%	.3%
All Hardware Companies	191.7	165.9	.0	15,023	10.7%	15.3%	.0%	34.5%
All Turnkey & SW Companies	1,602.2	919.9	478.4	28,539	89.3%	84.7%	100.0%	65.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 6
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Fujitsu	91.8	52.2	28.9	2,055	23.5%	21.5%	28.0%	12.9%
IBM	55.0	40.4	7.1	3,639	14.1%	16.7%	6.9%	22.9%
NEC	42.4	33.8	5.2	2,686	10.9%	14.0%	5.0%	16.9%
ARC/YAMAGIWA	21.6	13.0	6.5	116	5.5%	5.3%	6.3%	.7%
Nihon Unisys	19.9	13.8	2.3	170	5.1%	5.7%	2.2%	1.1%
Mutoh Industries	19.8	9.9	7.0	397	5.1%	4.1%	6.8%	2.5%
Computervision	18.4	7.7	8.1	155	4.7%	3.2%	7.9%	1.0%
Toshiba	18.1	9.1	7.3	169	4.6%	3.7%	7.0%	1.1%
Hitachi	18.0	9.1	7.1	528	4.6%	3.8%	6.9%	3.3%
Kanematsu Computer Systems	9.3	5.3	3.7	186	2.4%	2.2%	3.6%	1.2%
Digital	8.9	6.7	.0	61	2.3%	2.8%	.0%	.4%
Autodesk	8.7	.0	8.7	0	2.2%	.0%	8.4%	.0%
Intergraph	8.5	4.5	1.7	86	2.2%	1.9%	1.6%	.5%
Hitachi Zosen Info Systems	7.4	3.8	2.9	68	1.9%	1.6%	2.8%	.4%
Mitsubishi Electric	7.2	5.3	1.2	140	1.8%	2.2%	1.1%	.9%
Century Research Center	6.5	3.3	2.6	39	1.7%	1.3%	2.5%	.2%
Silicon Graphics	6.0	5.1	.0	144	1.5%	2.1%	.0%	.9%
CPU	5.9	.0	5.6	309	1.5%	.0%	5.4%	1.9%
Hewlett-Packard	5.6	4.7	.0	515	1.4%	1.9%	.0%	3.2%
INS Engineering	4.0	2.8	.8	68	1.0%	1.1%	.8%	.4%
Sumisho Electronics	3.6	2.7	.8	173	.9%	1.1%	.8%	1.1%
Technovision	3.6	.0	3.6	0	.9%	.0%	3.5%	.0%
Apple Computer	3.6	3.2	.0	688	.9%	1.3%	.0%	4.3%
C. Itoh Techno-Science	3.5	1.4	1.8	78	.9%	.6%	1.7%	.5%
Sun	3.4	3.1	.0	295	.9%	1.3%	.0%	1.9%
Toyo	2.7	1.6	.9	27	.7%	.7%	.9%	.2%
Sumitomo Denko Workstation	2.5	2.3	.0	116	.6%	.9%	.0%	.7%
Sumisho Electronic Systems	2.0	.0	1.7	28	.5%	.0%	1.7%	.2%
Andor	1.8	.3	1.4	16	.5%	.1%	1.4%	.1%
Compaq	1.6	1.6	.0	266	.4%	.7%	.0%	1.7%
McDonnell Douglas	1.5	.8	.4	24	.4%	.3%	.4%	.2%
Uchida Yoko	1.4	.7	.6	22	.4%	.3%	.5%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 6 (Continued)
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Mitsui Engineering	1.2	.9	.2	7	.3%	.4%	.2%	.0%
Sony	.9	.8	.0	54	.2%	.3%	.0%	.3%
CADAM	.9	.0	.8	0	.2%	.0%	.8%	.0%
ISICAD	.8	.3	.4	8	.2%	.1%	.3%	.1%
Nihon Itek	.7	.4	.3	4	.2%	.2%	.3%	.0%
Kubota Computer	.5	.3	.2	25	.1%	.1%	.2%	.2%
Graphtec Engineering	.4	.2	.2	0	.1%	.1%	.1%	.0%
Control Data	.2	.2	.0	2	.1%	.1%	.0%	.0%
Other Companies	46.3	27.1	16.7	3,763	11.9%	11.2%	16.2%	23.7%
All Companies	390.8	242.4	103.1	15,888	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	144.7	97.2	29.1	9,169	37.0%	40.1%	28.2%	57.7%
All Asian-Based Companies	245.3	144.8	73.8	6,709	62.8%	59.7%	71.6%	42.2%
All European-Based Companies	.8	.4	.3	10	.2%	.2%	.2%	.1%
All Hardware Companies	65.6	59.1	.0	8,528	16.8%	24.4%	.0%	53.7%
All Turnkey & SW Companies	325.2	183.3	103.1	7,360	83.2%	75.6%	100.0%	46.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 7
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Fujitsu	30.6	17.4	9.6	685	17.9%	16.2%	23.3%	17.5%
Mitsubishi Electric	28.8	21.1	4.6	560	16.9%	19.6%	11.1%	14.3%
Hitachi	18.0	11.9	4.3	206	10.5%	11.0%	10.4%	5.3%
IBM	17.4	12.1	2.7	706	10.2%	11.2%	6.5%	18.1%
Intergraph	11.3	6.0	2.2	115	6.6%	5.6%	5.4%	3.0%
Digital	8.1	6.1	.0	55	4.7%	5.6%	.0%	1.4%
Mitsui Engineering	8.1	5.6	1.6	50	4.7%	5.2%	4.0%	1.3%
Mutoh Industries	7.9	3.9	2.8	161	4.6%	3.6%	6.7%	4.1%
NEC	5.3	3.0	1.9	260	3.1%	2.8%	4.5%	6.7%
CADIX	4.3	1.7	2.2	30	2.5%	1.6%	5.2%	.8%
INS Engineering	4.3	3.0	.9	7	2.5%	2.8%	2.1%	.2%
Uchida Yoko	4.2	2.1	1.7	66	2.5%	2.0%	4.1%	1.7%
ESRI	2.4	.0	2.1	0	1.4%	.0%	5.2%	.0%
Century Research Center	2.3	1.1	.9	14	1.3%	1.1%	2.3%	.4%
Autodesk	1.9	.0	1.9	0	1.1%	.0%	4.6%	.0%
Toshiba	1.7	.9	.7	16	1.0%	.8%	1.7%	.4%
Sun	1.7	1.5	.0	145	1.0%	1.4%	.0%	3.7%
Sumitomo Denko Workstation	1.3	1.1	.0	58	.7%	1.1%	.0%	1.5%
Pasco	.9	.4	.5	12	.5%	.3%	1.1%	.3%
Sumisho Electronics	.8	.6	.2	45	.5%	.5%	.4%	1.2%
Apple Computer	.4	.4	.0	80	.2%	.3%	.0%	2.0%
Compaq	.4	.4	.0	58	.2%	.3%	.0%	1.5%
Andor	.3	.1	.2	4	.2%	.1%	.6%	.1%
Control Data	.3	.2	.0	4	.2%	.2%	.1%	.1%
C. Itoh Techno-Science	.3	.1	.2	7	.2%	.1%	.4%	.2%
McDonnell Douglas	.2	.1	.1	4	.1%	.1%	.2%	.1%
Hewlett-Packard	.2	.2	.0	20	.1%	.2%	.0%	.5%
Kubota Computer	.2	.1	.1	8	.1%	.1%	.1%	.2%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 7 (Continued)
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	21.1	14.1	5.0	690	12.4%	13.1%	12.1%	17.7%
All Companies	170.7	107.6	41.3	3,903	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	53.4	34.3	9.8	1,776	31.3%	31.9%	23.8%	45.5%
All Asian-Based Companies	114.7	71.7	30.7	2,071	67.2%	66.7%	74.3%	53.0%
All European-Based Companies	2.7	1.6	.8	57	1.6%	1.4%	1.9%	1.5%
All Hardware Companies	21.3	18.3	.0	1,499	12.5%	17.0%	.0%	38.4%
All Turnkey & SW Companies	149.4	89.3	41.3	2,404	87.5%	83.0%	100.0%	61.6%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 8
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Revenue				Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	82.7	33.9	41.4	1,078	10.8%	9.4%	12.9%	6.6%
Seiko	63.4	36.6	14.6	597	8.2%	10.1%	4.5%	3.6%
Zuken	62.6	23.6	34.5	380	8.1%	6.5%	10.7%	2.3%
Fujitsu	61.2	38.7	15.4	1,370	8.0%	10.7%	4.8%	8.3%
NEC	55.7	38.2	13.0	3,039	7.2%	10.6%	4.1%	18.5%
Hewlett-Packard	49.9	35.2	8.7	2,417	6.5%	9.8%	2.7%	14.7%
Cadence	48.9	.0	43.8	0	6.4%	.0%	13.6%	.0%
Valid	40.0	9.6	27.2	200	5.2%	2.7%	8.5%	1.2%
Sun	34.1	30.7	.0	2,940	4.4%	8.5%	.0%	17.9%
Dazix	30.7	9.0	19.2	280	4.0%	2.5%	6.0%	1.7%
Racal-Redac	24.5	7.2	15.6	190	3.2%	2.0%	4.9%	1.2%
Wacom	20.9	9.0	9.8	558	2.7%	2.5%	3.0%	3.4%
Sharp	20.3	8.7	9.6	115	2.6%	2.4%	3.0%	.7%
Digital	20.3	15.2	.0	173	2.6%	4.2%	.0%	1.1%
IBM	16.5	11.2	2.7	522	2.1%	3.1%	.8%	3.2%
C. Itoh Techno-Science	15.7	6.3	7.8	345	2.0%	1.7%	2.4%	2.1%
CADIX	15.1	6.1	7.6	105	2.0%	1.7%	2.4%	.6%
Marubeni Hytech	14.3	.0	14.3	0	1.9%	.0%	4.4%	.0%
Computervision	13.0	5.4	5.7	110	1.7%	1.5%	1.8%	.7%
Toshiba	9.5	4.7	3.8	88	1.2%	1.3%	1.2%	.5%
Hitachi	9.0	5.9	2.2	103	1.2%	1.6%	.7%	.6%
Uchida Yoko	8.4	4.2	3.4	132	1.1%	1.2%	1.0%	.8%
Mitsubishi Electric	7.2	5.3	1.2	140	.9%	1.5%	.4%	.9%
Kanematsu Semiconductor	6.5	3.3	2.5	60	.8%	.9%	.8%	.4%
Scientific Calc.	6.5	1.4	3.3	30	.8%	.4%	1.0%	.2%
Silicon Compiler Systems	6.5	.0	4.3	0	.8%	.0%	1.3%	.0%
Data I/O	6.3	.0	5.3	0	.8%	.0%	1.7%	.0%
Tokyo Electron	4.4	1.5	2.0	16	.6%	.4%	.6%	.1%
Intergraph	3.4	1.8	.6	35	.4%	.5%	.2%	.2%
Silvar-Lisco	3.2	.0	2.7	0	.4%	.0%	.8%	.0%
Zycad	3.2	2.2	.1	15	.4%	.6%	.0%	.1%
Sony	2.8	2.4	.0	182	.4%	.7%	.0%	1.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 8 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Calay	2.5	.6	1.7	20	.3%	.2%	.5%	.1%
Kyocera	2.2	.9	1.1	10	.3%	.2%	.3%	.1%
Century Research Center	2.0	1.0	.8	12	.3%	.3%	.3%	.1%
LSI Logic	2.0	.2	1.5	8	.3%	.1%	.5%	.0%
VLSI Technology	1.9	.1	1.5	6	.2%	.0%	.5%	.0%
Autodesk	1.9	.0	1.9	0	.2%	.0%	.6%	.0%
Omron	1.8	.9	.7	50	.2%	.2%	.2%	.3%
Sophia Systems	1.7	.4	1.1	20	.2%	.1%	.3%	.1%
Sumisho Electronics	1.6	1.2	.3	50	.2%	.3%	.1%	.3%
Compaq	1.3	1.3	.0	220	.2%	.4%	.0%	1.3%
Sumitomo Denko Workstation	1.3	1.1	.0	58	.2%	.3%	.0%	.4%
Hitachi Zosen Info Systems	.8	.4	.3	7	.1%	.1%	.1%	.0%
Apple Computer	.6	.5	.0	112	.1%	.1%	.0%	.7%
CADAM	.5	.0	.4	0	.1%	.0%	.1%	.0%
Andor	.3	.0	.3	2	.0%	.0%	.1%	.0%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.0%
Other Companies	50.0	25.5	19.9	1,792	6.5%	7.0%	6.2%	10.9%
All Companies	769.1	361.3	321.5	16,449	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	413.6	175.0	189.7	9,617	53.8%	48.4%	59.0%	58.5%
All Asian-Based Companies	327.5	178.4	113.6	6,619	42.6%	49.4%	35.3%	40.2%
All European-Based Companies	28.0	7.9	18.2	213	3.6%	2.2%	5.7%	1.3%
All Hardware Companies	92.7	79.9	.0	6,865	12.1%	22.1%	.0%	41.7%
All Turnkey & SW Companies	676.4	281.4	321.5	9,584	87.9%	77.9%	100.0%	58.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 9
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	65.8	27.0	33.0	858	21.2%	19.2%	24.0%	11.9%
Hewlett-Packard	35.6	24.5	7.1	1,509	11.5%	17.5%	5.1%	21.0%
NEC	26.5	17.7	6.7	1,424	8.5%	12.6%	4.9%	19.8%
Fujitsu	24.5	13.9	7.7	548	7.9%	9.9%	5.6%	7.6%
Wacom	20.9	9.0	9.8	199	6.7%	6.4%	7.1%	2.8%
Valid	20.0	4.8	13.6	100	6.4%	3.4%	9.9%	1.4%
Seiko	18.2	9.1	5.5	123	5.9%	6.5%	4.0%	1.7%
Dazix	15.4	4.5	9.6	140	4.9%	3.2%	7.0%	1.9%
Marubeni Hytech	14.3	.0	14.3	0	4.6%	.0%	10.4%	.0%
Sun	13.6	12.3	.0	1,175	4.4%	8.8%	.0%	16.4%
Cadence	11.8	.0	10.5	0	3.8%	.0%	7.6%	.0%
Zuken	10.6	4.0	6.0	57	3.4%	2.8%	4.3%	.8%
Digital	8.1	6.1	.0	69	2.6%	4.3%	.0%	1.0%
C. Itoh Techno-Science	8.0	3.2	4.0	176	2.6%	2.3%	2.9%	2.4%
Data I/O	6.3	.0	5.3	0	2.0%	.0%	3.9%	.0%
Racal-Redac	4.5	1.3	2.9	35	1.5%	.9%	2.1%	.5%
Zycad	3.2	2.2	.1	15	1.0%	1.6%	.0%	.2%
LSI Logic	1.8	.2	1.3	7	.6%	.1%	1.0%	.1%
Tokyo Electron	1.7	.6	.8	6	.6%	.4%	.6%	.1%
Silicon Compiler Systems	1.7	.0	1.1	0	.5%	.0%	.8%	.0%
Autodesk	1.7	.0	1.7	0	.5%	.0%	1.2%	.0%
Kanematsu Semiconductor	1.4	.8	.5	8	.5%	.6%	.3%	.1%
Sophia Systems	1.4	.3	.9	16	.4%	.2%	.6%	.2%
Intergraph	1.2	.6	.2	13	.4%	.4%	.1%	.2%
VLSI Technology	1.2	.1	.9	4	.4%	.0%	.7%	.1%
Century Research Center	1.0	.5	.4	6	.3%	.4%	.3%	.1%
Sony	1.0	.8	.0	63	.3%	.6%	.0%	.9%
IBM	.9	.9	.0	185	.3%	.6%	.0%	2.6%
Silvar-Lisco	.9	.0	.7	0	.3%	.0%	.5%	.0%
Toshiba	.9	.4	.3	8	.3%	.3%	.2%	.1%
Sumisho Electronics	.8	.6	.2	45	.3%	.4%	.1%	.6%
Compaq	.6	.6	.0	98	.2%	.4%	.0%	1.4%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 9 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Apple Computer	.3	.2	.0	48	.1%	.2%	.0%	.7%
Scientific Calc.	.2	.0	.1	1	.1%	.0%	.1%	.0%
Other Companies	22.4	8.9	11.6	634	7.2%	6.3%	8.4%	8.8%
All Companies	310.2	140.2	137.5	7,185	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	217.4	91.7	102.0	4,825	70.1%	65.4%	74.2%	67.2%
All Asian-Based Companies	88.3	47.2	32.5	2,325	28.5%	33.6%	23.7%	32.4%
All European-Based Companies	4.5	1.3	2.9	35	1.5%	.9%	2.1%	.5%
All Hardware Companies	38.3	33.0	.0	2,923	12.3%	23.6%	.0%	40.7%
All Turnkey & SW Companies	272.0	107.1	137.5	4,262	87.7%	76.4%	100.0%	59.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 10
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Seiko	38.4	~~23.4~~	~~7.8~~	386	27.6%	39.6%	12.9%	15.9%
Cadence	37.1	.0	33.4	0	26.7%	.0%	55.1%	.0%
Fujitsu	12.2	10.8	.0	274	8.8%	18.3%	.0%	11.3%
Sun	12.0	10.8	.0	1,030	8.6%	18.2%	.0%	42.4%
Valid	10.0	2.4	6.8	50	7.2%	4.1%	11.2%	2.1%
Mentor Graphics	7.6	3.1	3.8	99	5.5%	5.3%	6.3%	4.1%
C. Itoh Techno-Science	6.8	2.7	3.4	150	4.9%	4.6%	5.6%	6.2%
Silicon Compiler Systems	4.8	.0	3.2	0	3.5%	.0%	5.3%	.0%
Digital	3.3	2.4	.0	28	2.3%	4.1%	.0%	1.1%
NEC	2.7	1.4	1.1	123	1.9%	2.3%	1.7%	5.0%
Silvar-Lisco	2.3	.0	2.0	0	1.7%	.0%	3.3%	.0%
Kyocera	2.2	.9	1.1	10	1.6%	1.5%	1.8%	.4%
Hewlett-Packard	2.0	1.7	.0	180	1.4%	2.8%	.0%	7.4%
Sony	1.0	.9	.0	70	.7%	1.5%	.0%	2.9%
VLSI Technology	.8	.1	.6	3	.6%	.1%	1.0%	.1%
LSI Logic	.2	.0	.2	1	.2%	.0%	.3%	.0%
Other Companies	5.6	3.0	1.8	263	4.0%	5.1%	3.0%	10.8%
All Companies	139.0	59.1	~~60.6~~ 71.9	2,430	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	84.7	22.7	51.8	1,596	60.9%	38.4%	85.4%	65.7%
All Asian-Based Companies	54.3	36.4	8.9	834	39.1%	61.6%	14.6%	34.3%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	20.5	17.8	.0	1,507	14.8%	30.2%	.0%	62.0%
All Turnkey & SW Companies	118.4	41.3	60.6	923	85.2%	69.8%	100.0%	38.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 11
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Zuken	52.0	19.6	28.6	323	16.2%	12.1%	23.1%	4.7%
NEC	26.5	19.1	5.3	1,493	8.3%	11.8%	4.3%	21.8%
Fujitsu	24.5	13.9	7.7	548	7.6%	8.6%	6.2%	8.0%
Sharp	20.3	8.7	9.6	115	6.4%	5.4%	7.7%	1.7%
Racal-Redac	20.0	5.9	12.7	155	6.3%	3.6%	10.3%	2.3%
IBM	15.5	10.3	2.7	337	4.9%	6.4%	2.2%	4.9%
Dazix	15.4	4.5	9.6	140	4.8%	2.8%	7.8%	2.0%
CADIX	15.1	6.1	7.6	105	4.7%	3.7%	6.1%	1.5%
Computervision	13.0	5.4	5.7	110	4.1%	3.3%	4.6%	1.6%
Hewlett-Packard	12.4	9.1	1.6	728	3.9%	5.6%	1.3%	10.7%
Valid	10.0	2.4	6.8	50	3.1%	1.5%	5.5%	.7%
Mentor Graphics	9.3	3.8	4.7	121	2.9%	2.3%	3.8%	1.8%
Hitachi	9.0	5.9	2.2	103	2.8%	3.7%	1.7%	1.5%
Digital	8.9	6.7	.0	76	2.8%	4.1%	.0%	1.1%
Toshiba	8.6	4.3	3.5	80	2.7%	2.7%	2.8%	1.2%
Sun	8.5	7.7	.0	735	2.7%	4.7%	.0%	10.8%
Uchida Yoko	8.4	4.2	3.4	132	2.6%	2.6%	2.7%	1.9%
Mitsubishi Electric	7.2	5.3	1.2	140	2.3%	3.3%	.9%	2.0%
Seiko	6.8	4.1	1.4	88	2.1%	2.5%	1.1%	1.3%
Scientific Calc.	6.3	1.4	3.2	29	2.0%	.9%	2.6%	.4%
Kanematsu Semiconductor	5.1	2.5	2.1	52	1.6%	1.5%	1.7%	.8%
Tokyo Electron	2.6	.9	1.2	10	.8%	.5%	1.0%	.1%
Calay	2.5	.6	1.7	20	.8%	.4%	1.3%	.3%
Intergraph	2.2	1.2	.4	23	.7%	.7%	.3%	.3%
Omron	1.8	.9	.7	50	.6%	.6%	.6%	.7%
Sumitomo Denko Workstation	1.3	1.1	.0	58	.4%	.7%	.0%	.8%
Century Research Center	1.0	.5	.4	6	.3%	.3%	.3%	.1%
C. Itoh Techno-Science	.9	.4	.4	20	.3%	.2%	.4%	.3%
Sony	.9	.8	.0	49	.3%	.5%	.0%	.7%
Hitachi Zosen Info Systems	.8	.4	.3	7	.3%	.3%	.3%	.1%
Sumisho Electronics	.8	.6	.1	3	.2%	.4%	.1%	.1%
Compaq	.7	.7	.0	122	.2%	.5%	.0%	1.8%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 11 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Asia
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
Company	Revenue	Revenue	Revenue	Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
CADAM	.5	.0	.4	0	.1%	.0%	.3%	.0%
Sophia Systems	.3	.1	.2	4	.1%	.0%	.2%	.1%
Apple Computer	.3	.3	.0	64	.1%	.2%	.0%	.9%
Andor	.3	.0	.3	2	.1%	.0%	.2%	.0%
Autodesk	.2	.0	.2	0	.1%	.0%	.2%	.0%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.0%
Other Companies	22.0	13.6	6.5	895	6.9%	8.4%	5.3%	13.1%
All Companies	319.9	162.0	123.5	6,834	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	111.5	60.6	35.9	3,196	34.9%	37.4%	29.1%	46.8%
All Asian-Based Companies	185.0	94.8	72.2	3,460	57.8%	58.5%	58.5%	50.6%
All European-Based Companies	23.5	6.6	15.3	177	7.3%	4.1%	12.4%	2.6%
All Hardware Companies	33.9	29.1	.0	2,435	10.6%	17.9%	.0%	35.6%
All Turnkey & SW Companies	286.0	133.0	123.5	4,399	89.4%	82.1%	100.0%	64.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 12
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: China
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	21.3	14.4	3.6	573	48.9%	47.7%	51.9%	34.5%
Computervision	5.4	2.2	2.4	45	12.4%	7.4%	34.7%	2.7%
Digital	4.4	3.4	.0	32	10.2%	11.1%	.0%	1.9%
Silicon Graphics	2.3	2.1	.0	58	5.3%	6.9%	.0%	3.5%
Intergraph	1.0	.5	.2	10	2.2%	1.7%	2.9%	.6%
Sun	.7	.6	.0	59	1.6%	2.0%	.0%	3.5%
Dazix	.3	.1	.2	3	.7%	.3%	2.9%	.2%
Hewlett-Packard	.3	.2	.0	24	.6%	.7%	.0%	1.4%
Racal-Redac	.2	.1	.2	2	.5%	.2%	2.2%	.1%
Mentor Graphics	.2	.1	.1	2	.4%	.3%	1.3%	.1%
Other Companies	5.4	5.1	.0	634	12.4%	16.9%	.0%	38.2%
All Companies	43.7	30.1	6.9	1,662	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	43.4	30.0	6.7	1,660	99.5%	99.8%	97.8%	99.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.2	.1	.2	2	.5%	.2%	2.2%	.1%
All Hardware Companies	16.4	14.3	.0	1,395	37.6%	47.4%	.0%	83.9%
All Turnkey & SW Companies	27.3	15.8	6.9	267	62.4%	52.6%	100.0%	16.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 13
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: China
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Computervision	4.0	1.6	1.8	28	33.3%	21.7%	63.3%	12.2%
Silicon Graphics	2.3	2.1	.0	58	19.3%	29.1%	.0%	25.1%
IBM	1.8	1.2	.3	16	15.1%	16.1%	11.8%	6.9%
Digital	1.0	.7	.0	32	8.0%	10.2%	.0%	13.6%
Intergraph	.8	.4	.1	8	6.5%	5.7%	4.8%	3.5%
Sun	.5	.5	.0	53	4.5%	6.8%	.0%	22.6%
Dazix	.3	.1	.2	3	2.5%	1.1%	6.9%	1.2%
Hewlett-Packard	.2	.2	.0	22	1.9%	2.6%	.0%	9.6%
Racal-Redac	.2	.1	.1	2	1.9%	1.0%	4.8%	.8%
Mentor Graphics	.2	.1	.1	2	1.4%	1.1%	3.1%	.9%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	11.9	7.2	2.9	232	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	11.7	7.1	2.8	230	98.1%	99.0%	95.2%	99.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.2	.1	.1	2	1.9%	1.0%	4.8%	.8%
All Hardware Companies	4.4	3.7	.0	172	36.8%	52.0%	.0%	73.9%
All Turnkey & SW Companies	7.5	3.5	2.9	61	63.2%	48.0%	100.0%	26.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 14
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: China
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
IBM	17.7	11.5	3.2	186	66.4%	62.9%	84.3%	53.1%
Digital	3.5	2.6	.0	0	13.1%	14.4%	.0%	.0%
Computervision	1.4	.7	.5	17	5.3%	3.7%	13.6%	4.9%
Intergraph	.2	.1	.0	2	.7%	.5%	.8%	.5%
Sun	.1	.1	.0	6	.5%	.7%	.0%	1.7%
Hewlett-Packard	.0	.0	.0	1	.1%	.1%	.0%	.4%
Silicon Graphics	.0	.0	.0	0	.1%	.0%	.0%	.0%
Other Companies	3.4	3.1	.0	136	12.8%	17.0%	.0%	38.8%
All Companies	26.7	18.2	3.8	350	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	26.7	18.2	3.8	350	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	7.1	5.9	.0	144	26.6%	32.1%	.0%	41.1%
All Turnkey & SW Companies	19.6	12.4	3.8	206	73.4%	67.9%	100.0%	58.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 15
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: China
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
IBM	1.8	1.7	.0	371	35.9%	37.2%	.0%	34.3%
Computervision	.0	.0	.0	0	.8%	.0%	25.0%	.0%
Intergraph	.0	.0	.0	0	.6%	.0%	18.8%	.0%
Racal-Redac	.0	.0	.0	0	.2%	.0%	6.3%	.0%
Other Companies	2.0	2.0	.0	498	39.1%	42.7%	.0%	46.2%
All Companies	5.1	4.7	.2	1,079	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	5.1	4.7	.2	1,079	99.8%	100.0%	93.8%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.2%	.0%	6.3%	.0%
All Hardware Companies	5.0	4.7	.0	1,079	96.9%	100.0%	.0%	100.0%
All Turnkey & SW Companies	.2	.0	.2	0	3.1%	.0%	100.0%	.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 16
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: China
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
IBM	17.8	11.8	3.1	376	58.9%	57.8%	61.3%	46.7%
Computervision	3.8	1.6	1.7	32	12.7%	7.7%	34.3%	4.0%
Digital	2.2	1.6	.0	15	7.2%	8.0%	.0%	1.9%
Silicon Graphics	2.0	1.8	.0	51	6.7%	9.0%	.0%	6.3%
Sun	.5	.5	.0	45	1.8%	2.3%	.0%	5.6%
Intergraph	.3	.1	.1	3	.9%	.7%	1.2%	.3%
Hewlett-Packard	.1	.1	.0	10	.3%	.4%	.0%	1.2%
Other Companies	2.3	2.1	.0	178	7.6%	10.3%	.0%	22.1%
All Companies	30.2	20.4	5.0	806	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	30.2	20.4	5.0	806	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	8.9	7.7	.0	596	29.4%	37.4%	.0%	73.9%
All Turnkey & SW Companies	21.3	12.8	5.0	210	70.6%	62.6%	100.0%	26.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 17
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: China
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	2.2	1.6	.3	146	29.8%	28.5%	37.7%	22.6%
Computervision	.9	.4	.4	8	12.4%	6.9%	51.9%	1.2%
Digital	.9	.7	.0	6	12.4%	12.0%	.0%	1.0%
Silicon Graphics	.3	.3	.0	7	4.1%	4.6%	.0%	1.1%
Intergraph	.3	.1	.1	3	3.5%	2.5%	7.8%	.4%
Sun	.1	.1	.0	9	1.4%	1.6%	.0%	1.3%
Hewlett-Packard	.0	.0	.0	3	.4%	.4%	.0%	.4%
Other Companies	2.1	2.0	.0	368	28.3%	35.6%	.0%	57.3%
All Companies	7.4	5.7	.8	643	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	7.4	5.7	.8	643	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	4.6	4.1	.0	616	62.4%	72.9%	.0%	95.8%
All Turnkey & SW Companies	2.8	1.5	.8	27	37.6%	27.1%	100.0%	4.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 18
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: China
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	.7	.5	.1	30	30.7%	28.5%	55.0%	28.3%
Digital	.5	.4	.0	4	22.9%	23.8%	.0%	3.3%
Intergraph	.4	.2	.1	4	15.2%	10.5%	35.0%	3.3%
Sun	.1	.1	.0	5	2.2%	2.9%	.0%	4.3%
Other Companies	.6	.5	.0	54	24.7%	30.8%	.0%	50.6%
All Companies	2.3	1.7	.2	108	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	2.3	1.7	.2	108	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.3	1.2	.0	98	57.1%	66.9%	.0%	90.8%
All Turnkey & SW Companies	1.0	.6	.2	10	42.9%	33.1%	100.0%	9.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 19
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: China
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Digital	.8	.6	.0	7	21.4%	27.4%	.0%	6.5%
IBM	.7	.4	.1	20	17.5%	19.5%	12.0%	19.1%
Computervision	.7	.3	.3	5	17.2%	11.9%	30.4%	5.2%
Dazix	.3	.1	.2	3	7.9%	3.5%	21.7%	2.7%
Racal-Redac	.2	.1	.2	2	6.3%	3.1%	16.3%	1.8%
Mentor Graphics	.2	.1	.1	2	4.5%	3.5%	9.8%	2.0%
Hewlett-Packard	.1	.1	.0	11	3.2%	4.4%	.0%	10.4%
Intergraph	.1	.0	.0	1	2.9%	1.8%	1.1%	1.0%
Other Companies	.5	.4	.0	33	12.7%	19.5%	.0%	31.4%
All Companies	3.8	2.3	.9	106	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	3.5	2.2	.8	104	93.7%	96.9%	83.7%	98.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.2	.1	.2	2	6.3%	3.1%	16.3%	1.8%
All Hardware Companies	1.6	1.3	.0	86	42.6%	58.8%	.0%	81.2%
All Turnkey & SW Companies	2.2	.9	.9	20	57.4%	41.2%	100.0%	18.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 20
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: China
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Digital	.2	.1	.0	1	20.2%	27.1%	.0%	3.6%
Dazix	.2	.0	.1	1	17.9%	8.3%	41.7%	3.5%
Mentor Graphics	.1	.1	.1	2	15.5%	12.5%	29.2%	4.3%
Hewlett-Packard	.1	.1	.0	7	9.5%	14.6%	.0%	18.2%
Intergraph	.0	.0	.0	0	4.8%	2.1%	.0%	.8%
Racal-Redac	.0	.0	.0	0	4.8%	2.1%	12.5%	.9%
IBM	.0	.0	.0	7	3.6%	6.3%	.0%	16.4%
Other Companies	.1	.1	.0	13	11.9%	18.8%	.0%	32.4%
All Companies	.8	.5	.2	40	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	.8	.5	.2	40	95.2%	97.9%	87.5%	99.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	4.8%	2.1%	12.5%	.9%
All Hardware Companies	.4	.4	.0	37	51.2%	75.0%	.0%	90.4%
All Turnkey & SW Companies	.4	.1	.2	4	48.8%	25.0%	100.0%	9.6%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 21
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: China
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	.2	.1	.0	1	76.2%	80.0%	.0%	40.8%
Hewlett-Packard	.0	.0	.0	2	9.5%	6.7%	.0%	49.4%
Mentor Graphics	.0	.0	.0	0	9.5%	6.7%	100.0%	6.1%
Other Companies	.0	.0	.0	0	4.8%	6.7%	.0%	.0%
All Companies	.2	.2	.0	3	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	.2	.2	.0	3	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.2	.1	.0	3	90.5%	93.3%	.0%	93.9%
All Turnkey & SW Companies	.0	.0	.0	0	9.5%	6.7%	100.0%	6.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 22
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: China
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Computervision	.7	.3	.3	5	23.8%	16.6%	41.8%	8.9%
IBM	.6	.4	.1	13	23.1%	25.2%	16.4%	21.8%
Digital	.5	.4	.0	4	17.6%	22.7%	.0%	6.6%
Racal-Redac	.2	.1	.1	2	7.3%	3.7%	17.9%	2.5%
Dazix	.2	.0	.1	1	5.5%	2.5%	14.9%	2.3%
Intergraph	.1	.0	.0	1	2.6%	1.8%	1.5%	1.2%
Hewlett-Packard	.0	.0	.0	2	.7%	1.2%	.0%	3.3%
Mentor Graphics	.0	.0	.0	0	.7%	.6%	1.5%	.4%
Other Companies	.4	.3	.0	20	13.6%	20.9%	.0%	32.5%
All Companies	2.7	1.6	.7	62	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	2.5	1.6	.6	60	92.7%	96.3%	82.1%	97.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.2	.1	.1	2	7.3%	3.7%	17.9%	2.5%
All Hardware Companies	1.0	.8	.0	46	36.3%	50.9%	.0%	74.5%
All Turnkey & SW Companies	1.7	.8	.7	16	63.7%	49.1%	100.0%	25.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 23
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Hong Kong
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
IBM	21.4	14.4	3.6	573	46.8%	46.3%	46.0%	27.8%
Computervision	5.4	2.2	2.4	45	11.9%	7.2%	30.8%	2.2%
Digital	2.9	2.1	.0	21	6.3%	6.9%	.0%	1.0%
Silicon Graphics	2.8	2.5	.0	70	6.1%	8.0%	.0%	3.4%
Intergraph	1.4	.8	.3	15	3.1%	2.4%	3.4%	.7%
Sun	1.1	1.0	.0	92	2.3%	3.1%	.0%	4.5%
Mentor Graphics	.9	.3	.4	11	1.9%	1.1%	5.5%	.5%
Hewlett-Packard	.8	.7	.0	75	1.8%	2.2%	.0%	3.6%
Dazix	.6	.2	.4	6	1.4%	.6%	5.2%	.3%
Racal-Redac	.5	.1	.3	4	1.1%	.5%	4.1%	.2%
Valid	.1	.0	.1	0	.2%	.0%	.8%	.0%
Other Companies	5.2	5.0	.0	849	11.3%	16.1%	.0%	41.2%
All Companies	45.6	31.1	7.8	2,061	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	45.1	30.9	7.4	2,057	98.9%	99.5%	95.9%	99.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.5	.1	.3	4	1.1%	.5%	4.1%	.2%
All Hardware Companies	16.5	14.5	.0	1,775	36.1%	46.8%	.0%	86.1%
All Turnkey & SW Companies	29.1	16.5	7.8	286	63.9%	53.2%	100.0%	13.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 24
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Hong Kong
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Computervision	4.0	1.6	1.8	28	27.0%	17.8%	48.7%	8.5%
Silicon Graphics	2.8	2.5	.0	70	18.7%	28.5%	.0%	21.0%
IBM	1.8	1.2	.3	16	12.2%	13.2%	9.0%	4.8%
Intergraph	1.1	.6	.2	12	7.7%	7.3%	5.3%	3.7%
Mentor Graphics	.9	.3	.4	11	5.8%	3.9%	11.4%	3.3%
Sun	.9	.8	.0	83	5.8%	8.8%	.0%	24.9%
Hewlett-Packard	.7	.6	.0	70	4.9%	7.0%	.0%	21.1%
Dazix	.6	.2	.4	6	4.2%	2.1%	10.6%	1.7%
Digital	.6	.5	.0	21	4.2%	5.2%	.0%	6.2%
Racal-Redac	.5	.1	.3	4	3.2%	1.6%	8.0%	1.1%
Valid	.1	.0	.1	0	.5%	.1%	1.6%	.1%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	14.7	8.8	3.8	334	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	14.2	8.6	3.5	330	96.8%	98.4%	92.0%	98.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.5	.1	.3	4	3.2%	1.6%	8.0%	1.1%
All Hardware Companies	5.4	4.6	.0	255	36.8%	52.8%	.0%	76.4%
All Turnkey & SW Companies	9.3	4.1	3.8	79	63.2%	47.2%	100.0%	23.6%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 25
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Hong Kong
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	17.7	11.5	3.2	186	72.8%	70.5%	84.3%	61.0%
Digital	2.3	1.7	.0	0	9.2%	10.3%	.0%	.0%
Computervision	1.4	.7	.5	17	5.8%	4.2%	13.6%	5.6%
Intergraph	.3	.1	.0	2	1.1%	.7%	.8%	.8%
Sun	.2	.2	.0	9	.9%	1.2%	.0%	3.1%
Hewlett-Packard	.1	.1	.0	4	.3%	.5%	.0%	1.4%
Silicon Graphics	.0	.0	.0	0	.1%	.0%	.0%	.0%
Other Companies	2.1	1.9	.0	83	8.6%	11.8%	.0%	27.3%
All Companies	24.3	16.3	3.8	305	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	24.3	16.3	3.8	305	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	4.7	3.9	.0	98	19.2%	23.7%	.0%	32.1%
All Turnkey & SW Companies	19.7	12.4	3.8	207	80.8%	76.3%	100.0%	67.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 26
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Hong Kong
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	1.8	1.8	.0	371	28.0%	28.9%	.0%	26.1%
Computervision	.0	.0	.0	0	.6%	.0%	23.5%	.0%
Intergraph	.0	.0	.0	0	.6%	.0%	17.6%	.0%
Racal-Redac	.0	.0	.0	0	.3%	.0%	11.8%	.0%
Other Companies	3.1	3.1	.0	765	46.8%	50.7%	.0%	53.8%
All Companies	6.6	6.1	.2	1,423	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	6.5	6.1	.2	1,423	99.7%	100.0%	88.2%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.3%	.0%	11.8%	.0%
All Hardware Companies	6.4	6.1	.0	1,423	97.3%	100.0%	.0%	100.0%
All Turnkey & SW Companies	.2	.0	.2	0	2.7%	.0%	100.0%	.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 27
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Hong Kong
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
IBM	17.8	11.8	3.1	376	57.9%	56.2%	61.0%	34.5%
Computervision	3.8	1.6	1.7	32	12.5%	7.5%	34.1%	2.9%
Silicon Graphics	2.4	2.2	.0	61	7.8%	10.4%	.0%	5.6%
Digital	1.4	1.1	.0	10	4.6%	5.0%	.0%	.9%
Sun	.5	.5	.0	45	1.7%	2.2%	.0%	4.2%
Intergraph	.4	.2	.1	4	1.3%	1.0%	1.6%	.4%
Hewlett-Packard	.3	.3	.0	29	1.0%	1.3%	.0%	2.6%
Mentor Graphics	.0	.0	.0	0	.1%	.0%	.2%	.0%
Other Companies	2.5	2.4	.0	372	8.1%	11.3%	.0%	34.1%
All Companies	30.7	21.0	5.0	1,091	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	30.7	21.0	5.0	1,091	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	9.3	8.2	.0	879	30.1%	38.8%	.0%	80.6%
All Turnkey & SW Companies	21.5	12.9	5.0	212	69.9%	61.2%	100.0%	19.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 28
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Hong Kong
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	2.2	1.6	.3	146	30.1%	28.8%	37.2%	20.8%
Computervision	.9	.4	.4	8	12.6%	6.9%	51.3%	1.1%
Digital	.6	.5	.0	4	8.1%	8.0%	.0%	.6%
Intergraph	.4	.2	.1	4	5.2%	3.4%	9.0%	.6%
Silicon Graphics	.4	.3	.0	9	4.9%	5.5%	.0%	1.2%
Sun	.1	.1	.0	9	1.4%	1.6%	.0%	1.2%
Hewlett-Packard	.1	.1	.0	9	1.2%	1.4%	.0%	1.2%
Other Companies	2.0	2.0	.0	408	27.8%	35.4%	.0%	58.3%
All Companies	7.3	5.6	.8	699	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	7.3	5.6	.8	699	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	4.4	4.0	.0	671	60.3%	71.7%	.0%	96.0%
All Turnkey & SW Companies	2.9	1.6	.8	28	39.7%	28.3%	100.0%	4.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 29
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Hong Kong
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	.7	.5	.1	30	37.6%	37.4%	50.0%	36.6%
Intergraph	.5	.3	.1	5	27.0%	20.6%	40.9%	6.2%
Digital	.2	.2	.0	2	12.7%	12.2%	.0%	1.9%
Sun	.1	.1	.0	5	2.6%	3.8%	.0%	5.6%
Hewlett-Packard	.0	.0	.0	1	.5%	.8%	.0%	.9%
Other Companies	.3	.3	.0	32	14.8%	20.6%	.0%	38.6%
All Companies	1.9	1.3	.2	83	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1.9	1.3	.2	83	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.7	.6	.0	72	39.2%	48.9%	.0%	86.1%
All Turnkey & SW Companies	1.2	.7	.2	12	60.8%	51.1%	100.0%	13.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 30
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Hong Kong
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	.8	.3	.4	11	14.6%	10.5%	24.1%	5.7%
IBM	.7	.5	.1	20	11.8%	14.7%	6.3%	10.9%
Computervision	.7	.3	.3	5	11.4%	8.6%	16.1%	2.9%
Digital	.6	.5	.0	5	11.3%	14.7%	.0%	2.9%
Dazix	.6	.2	.4	6	10.9%	5.8%	23.0%	3.0%
Racal-Redac	.5	.1	.3	4	8.6%	4.5%	18.4%	2.0%
Hewlett-Packard	.4	.3	.0	37	6.9%	10.5%	.0%	19.5%
Sun	.4	.4	.0	34	6.9%	11.2%	.0%	18.0%
Intergraph	.2	.1	.0	2	2.6%	2.6%	1.1%	.9%
Valid	.1	.0	.1	0	1.4%	.3%	3.4%	.2%
Other Companies	.4	.4	.0	37	6.3%	11.2%	.0%	19.5%
All Companies	5.7	3.1	1.7	188	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	5.2	3.0	1.4	184	91.4%	95.5%	81.6%	98.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.5	.1	.3	4	8.6%	4.5%	18.4%	2.0%
All Hardware Companies	2.1	1.7	.0	153	36.3%	54.6%	.0%	81.7%
All Turnkey & SW Companies	3.6	1.4	1.7	34	63.7%	45.4%	100.0%	18.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 31
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Hong Kong
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
Company	Revenue	Revenue	Revenue	Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	.7	.3	.3	9	33.3%	26.0%	47.1%	10.8%
Dazix	.3	.1	.2	3	15.7%	8.7%	28.6%	3.5%
Hewlett-Packard	.2	.2	.0	23	12.1%	19.2%	.0%	28.7%
Digital	.2	.2	.0	2	11.6%	16.3%	.0%	2.5%
Racal-Redac	.1	.0	.1	1	4.5%	1.9%	8.6%	.9%
Intergraph	.1	.0	.0	1	3.0%	2.9%	1.4%	.9%
Valid	.0	.0	.0	0	2.0%	1.0%	2.9%	.3%
IBM	.0	.0	.0	7	1.5%	2.9%	.0%	8.4%
Other Companies	.2	.2	.0	22	7.6%	14.4%	.0%	28.2%
All Companies	2.0	1.0	.7	79	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1.9	1.0	.6	79	95.5%	98.1%	91.4%	99.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.1	.0	.1	1	4.5%	1.9%	8.6%	.9%
All Hardware Companies	.7	.6	.0	66	35.9%	58.7%	.0%	83.5%
All Turnkey & SW Companies	1.3	.4	.7	13	64.1%	41.3%	100.0%	16.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 32
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Hong Kong
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Digital	.2	.1	.0	1	47.1%	54.5%	.0%	14.9%
Mentor Graphics	.1	.0	.0	1	23.5%	13.6%	66.7%	11.1%
Hewlett-Packard	.1	.1	.0	6	20.6%	27.3%	.0%	69.4%
Valid	.0	.0	.0	0	5.9%	.0%	33.3%	1.1%
Other Companies	.0	.0	.0	0	2.9%	4.5%	.0%	.0%
All Companies	.3	.2	.1	9	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	.3	.2	.1	9	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.2	.2	.0	8	70.6%	86.4%	.0%	87.7%
All Turnkey & SW Companies	.1	.0	.1	1	29.4%	13.6%	100.0%	12.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 33
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Hong Kong
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Computervision	.7	.3	.3	5	19.3%	14.4%	28.6%	5.5%
IBM	.6	.4	.1	14	19.0%	23.0%	11.2%	13.9%
Racal-Redac	.4	.1	.3	3	11.9%	6.4%	26.5%	3.1%
Sun	.4	.4	.0	34	11.6%	18.7%	.0%	34.0%
Dazix	.3	.1	.2	3	9.2%	4.8%	20.4%	2.8%
Digital	.3	.2	.0	2	7.4%	9.1%	.0%	2.1%
Intergraph	.1	.1	.0	1	2.7%	2.7%	1.0%	.9%
Mentor Graphics	.1	.0	.1	1	2.7%	1.6%	5.1%	1.2%
Hewlett-Packard	.1	.1	.0	8	2.4%	3.7%	.0%	7.7%
Valid	.0	.0	.0	0	.6%	.0%	2.0%	.1%
Other Companies	.2	.2	.0	14	6.0%	10.2%	.0%	14.4%
All Companies	3.4	1.9	1.0	100	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	3.0	1.8	.7	96	88.1%	93.6%	73.5%	96.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.4	.1	.3	3	11.9%	6.4%	26.5%	3.1%
All Hardware Companies	1.1	.9	.0	79	33.0%	48.7%	.0%	79.7%
All Turnkey & SW Companies	2.3	1.0	1.0	20	67.0%	51.3%	100.0%	20.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 34
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	426.2	287.0	71.1	11,416	14.9%	17.6%	8.0%	16.2%
Fujitsu	305.9	177.9	92.3	6,850	10.7%	10.9%	10.4%	9.7%
NEC	265.0	186.4	57.4	12,950	9.2%	11.4%	6.4%	18.4%
Nihon Unisys	181.0	125.9	20.7	1,550	6.3%	7.7%	2.3%	2.2%
Hitachi	180.0	95.2	66.8	4,800	6.3%	5.8%	7.5%	6.8%
Mutoh Industries	99.0	51.2	36.9	2,500	3.5%	3.1%	4.1%	3.6%
Hewlett-Packard	98.4	67.2	20.2	3,998	3.4%	4.1%	2.3%	5.7%
Seiko	92.6	54.4	20.5	997	3.2%	3.3%	2.3%	1.4%
Toshiba	86.3	43.1	34.5	1,800	3.0%	2.6%	3.9%	2.6%
Hitachi Zosen Info Systems	82.7	42.2	32.2	750	2.9%	2.6%	3.6%	1.1%
Computervision	81.0	33.6	36.2	681	2.8%	2.1%	4.1%	1.0%
Mentor Graphics	79.3	32.5	39.7	1,034	2.8%	2.0%	4.5%	1.5%
Mitsubishi Electric	72.0	52.8	11.5	1,400	2.5%	3.2%	1.3%	2.0%
Digital	61.8	46.4	.0	448	2.2%	2.8%	.0%	.6%
Zuken	58.2	21.9	32.1	353	2.0%	1.3%	3.6%	.5%
Sun	51.0	45.9	.0	4,398	1.8%	2.8%	.0%	6.3%
Sharp	44.2	19.0	20.8	250	1.5%	1.2%	2.3%	.4%
Cadence	43.8	.0	39.5	0	1.5%	.0%	4.4%	.0%
ARGO GRAPHICS	36.0	25.3	8.5	660	1.3%	1.6%	1.0%	.9%
Hakuto	36.0	19.4	14.4	880	1.3%	1.2%	1.6%	1.3%
Silicon Graphics	32.3	29.2	.0	817	1.1%	1.8%	.0%	1.2%
C. Itoh Techno-Science	29.5	11.8	14.8	650	1.0%	.7%	1.7%	.9%
Info. Services Int'l. Dentsu	29.5	1.3	20.3	45	1.0%	.1%	2.3%	.1%
Tokyo Electron	29.0	9.9	13.3	107	1.0%	.6%	1.5%	.2%
Valid	29.0	7.0	19.8	145	1.0%	.4%	2.2%	.2%
Wacom	27.8	11.9	13.1	610	1.0%	.7%	1.5%	.9%
Dazix	26.1	7.7	16.3	238	.9%	.5%	1.8%	.3%
Sumisho Electronics	26.0	20.5	4.2	680	.9%	1.3%	.5%	1.0%
Intergraph	25.3	13.5	5.0	259	.9%	.8%	.6%	.4%
Sumitomo Denko Workstation	25.0	22.8	.0	1,158	.9%	1.4%	.0%	1.6%
Mitsui Engineering	23.4	16.7	4.4	155	.8%	1.0%	.5%	.2%
ARC/YAMAGIWA	21.6	13.0	6.5	116	.8%	.8%	.7%	.2%
CADIX	21.6	8.7	10.8	150	.8%	.5%	1.2%	.2%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 34
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Racal-Redac	21.6	6.4	13.7	167	.8%	.4%	1.5%	.2%
Toyo	18.0	10.8	5.9	180	.6%	.7%	.7%	.3%
Marubeni Hytech	14.3	.0	14.3	0	.5%	.0%	1.6%	.0%
Uchida Yoko	14.0	7.0	5.6	220	.5%	.4%	.6%	.3%
SDRC	13.6	.0	13.6	0	.5%	.0%	1.5%	.0%
Century Research Center	13.4	5.9	6.1	71	.5%	.4%	.7%	.1%
Graphtec Engineering	12.9	6.5	5.1	0	.5%	.4%	.6%	.0%
Design Automation	10.8	.0	9.7	0	.4%	.0%	1.1%	.0%
Andor	9.3	1.6	7.4	76	.3%	.1%	.8%	.1%
Kanematsu Computer Systems	9.3	5.3	3.7	186	.3%	.3%	.4%	.3%
Sony	8.8	7.6	.0	532	.3%	.5%	.0%	.8%
McDonnell Douglas	8.7	4.7	2.6	139	.3%	.3%	.3%	.2%
INS Engineering	8.3	5.8	1.7	75	.3%	.4%	.2%	.1%
Omron	7.2	3.6	2.9	200	.3%	.2%	.3%	.3%
Schlumberger (Applicon)	7.2	3.0	3.5	66	.2%	.2%	.4%	.1%
Sumisho Electronic Systems	6.6	.0	5.7	317	.2%	.0%	.6%	.5%
Kanematsu Semiconductor	6.5	3.3	2.5	60	.2%	.2%	.3%	.1%
Nihon Itek	6.3	3.5	2.4	35	.2%	.2%	.3%	.0%
CPU	5.9	.0	5.6	309	.2%	.0%	.6%	.4%
Technovision	3.6	.0	3.6	0	.1%	.0%	.4%	.0%
Silvar-Lisco	3.2	.0	2.7	0	.1%	.0%	.3%	.0%
Kubota Computer	2.2	1.5	.7	300	.1%	.1%	.1%	.4%
Kyocera	2.2	.9	1.1	10	.1%	.1%	.1%	.0%
Sophia Systems	1.7	.4	1.1	20	.1%	.0%	.1%	.0%
ISICAD	1.4	.6	.6	14	.0%	.0%	.1%	.0%
Ricoh	1.1	.0	1.0	0	.0%	.0%	.1%	.0%
Pasco	.9	.4	.5	12	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 34 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Other Companies	147.0	84.6	50.7	7,000	5.1%	5.2%	5.7%	10.0%
All Companies	2,868.0	1,628.6	890.8	70,286	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1,205.8	669.3	372.3	32,914	42.0%	41.1%	41.8%	46.8%
All Asian-Based Companies	1,640.7	953.0	504.8	37,204	57.2%	58.5%	56.7%	52.9%
All European-Based Companies	21.6	6.4	13.7	167	.8%	.4%	1.5%	.2%
All Hardware Companies	283.8	246.0	.0	23,948	9.9%	15.1%	.0%	34.1%
All Turnkey & SW Companies	2,584.3	1,382.7	890.8	46,338	90.1%	84.9%	100.0%	65.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 35
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Fujitsu	122.4	74.9	35.2	2,932	8.4%	9.8%	6.7%	10.5%
NEC	108.2	56.3	43.3	5,008	7.4%	7.4%	8.2%	17.9%
Hewlett-Packard	96.5	65.7	20.2	3,902	6.6%	8.6%	3.8%	13.9%
Hitachi Zosen Info Systems	81.9	41.8	31.9	740	5.6%	5.5%	6.0%	2.6%
Hitachi	81.0	40.5	32.4	1,529	5.6%	5.3%	6.1%	5.5%
Mentor Graphics	79.3	32.5	39.7	1,034	5.4%	4.2%	7.5%	3.7%
Seiko	77.7	44.8	17.4	952	5.3%	5.9%	3.3%	3.4%
Toshiba	62.4	31.2	24.9	581	4.3%	4.1%	4.7%	2.1%
Computervision	59.4	23.4	27.7	425	4.1%	3.1%	5.2%	1.5%
Mitsubishi Electric	50.4	41.8	4.5	561	3.5%	5.5%	.9%	2.0%
Nihon Unisys	48.0	34.1	4.8	451	3.3%	4.5%	.9%	1.6%
Zuken	47.6	17.6	26.6	254	3.3%	2.3%	5.0%	.9%
Sharp	44.2	19.0	20.8	250	3.0%	2.5%	3.9%	.9%
Sun	40.8	36.7	.0	3,951	2.8%	4.8%	.0%	14.1%
Mutoh Industries	40.2	20.1	13.7	499	2.8%	2.6%	2.6%	1.8%
Cadence	38.0	.0	34.2	0	2.6%	.0%	6.5%	.0%
IBM	35.6	23.0	6.5	320	2.4%	3.0%	1.2%	1.1%
Silicon Graphics	32.1	29.2	.0	817	2.2%	3.8%	.0%	2.9%
C. Itoh Techno-Science	29.5	11.8	14.8	650	2.0%	1.5%	2.8%	2.3%
Tokyo Electron	29.0	9.9	13.3	107	2.0%	1.3%	2.5%	.4%
Valid	29.0	7.0	19.8	145	2.0%	.9%	3.7%	.5%
Dazix	26.1	7.7	16.3	238	1.8%	1.0%	3.1%	.9%
Info. Services Int'l. Dentsu	25.4	1.0	18.5	20	1.7%	.1%	3.5%	.1%
Sumitomo Denko Workstation	25.0	22.8	.0	1,158	1.7%	3.0%	.0%	4.1%
Mitsui Engineering	22.0	15.4	4.4	136	1.5%	2.0%	.8%	.5%
CADIX	21.6	8.7	10.8	150	1.5%	1.1%	2.0%	.5%
Sumisho Electronics	21.0	17.4	2.3	125	1.4%	2.3%	.4%	.4%
Racal-Redac	20.5	6.3	12.8	158	1.4%	.8%	2.4%	.6%
Intergraph	20.1	11.3	3.6	215	1.4%	1.5%	.7%	.8%
ARGO GRAPHICS	14.4	13.5	.0	660	1.0%	1.8%	.0%	2.4%
Uchida Yoko	14.0	7.0	5.6	220	1.0%	.9%	1.1%	.8%
Digital	13.6	10.2	.0	448	.9%	1.3%	.0%	1.6%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 35 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Toyo	12.2	7.5	3.9	47	.8%	1.0%	.7%	.2%
Century Research Center	11.8	5.9	4.7	71	.8%	.8%	.9%	.3%
Graphtec Engineering	11.6	5.8	4.6	0	.8%	.8%	.9%	.0%
SDRC	10.9	.0	10.9	0	.7%	.0%	2.1%	.0%
Sony	8.8	7.6	.0	532	.6%	1.0%	.0%	1.9%
Omron	7.2	3.6	2.9	200	.5%	.5%	.5%	.7%
Schlumberger (Applicon)	7.2	3.0	3.5	66	.5%	.4%	.7%	.2%
McDonnell Douglas	6.8	3.7	2.0	100	.5%	.5%	.4%	.4%
Marubeni Hytech	6.7	.0	6.7	0	.5%	.0%	1.3%	.0%
Sumisho Electronic Systems	6.6	.0	5.7	264	.5%	.0%	1.1%	.9%
Nihon Itek	6.3	3.5	2.4	35	.4%	.5%	.5%	.1%
Kanematsu Semiconductor	5.1	2.3	2.2	60	.3%	.3%	.4%	.2%
INS Engineering	3.6	2.5	.7	25	.2%	.3%	.1%	.1%
Silvar-Lisco	2.9	.0	2.4	0	.2%	.0%	.5%	.0%
Kanematsu Computer Systems	2.6	1.8	.4	30	.2%	.2%	.1%	.1%
Kyocera	2.2	.9	1.1	10	.2%	.1%	.2%	.0%
ISICAD	1.2	.6	.4	14	.1%	.1%	.1%	.1%
Ricoh	1.1	.0	1.0	0	.1%	.0%	.2%	.0%
Kubota Computer	1.0	.7	.3	50	.1%	.1%	.1%	.2%
Pasco	.7	.3	.4	8	.0%	.0%	.1%	.0%
Hakuto	.4	.2	.1	5	.0%	.0%	.0%	.0%
Sophia Systems	.3	.1	.2	2	.0%	.0%	.0%	.0%
Other Companies	59.9	33.5	20.2	1,107	4.1%	4.4%	3.8%	4.0%
All Companies	1,457.9	765.0	528.8	27,975	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	575.7	277.6	228.9	12,393	39.5%	36.3%	43.3%	44.3%
All Asian-Based Companies	861.7	481.2	287.1	15,425	59.1%	62.9%	54.3%	55.1%
All European-Based Companies	20.5	6.3	12.8	158	1.4%	.8%	2.4%	.6%
All Hardware Companies	120.9	105.6	.0	7,640	8.3%	13.8%	.0%	27.3%
All Turnkey & SW Companies	1,337.0	659.4	528.8	20,336	91.7%	86.2%	100.0%	72.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 36
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Japan
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
IBM	354.0	229.2	64.6	3,714	37.7%	38.3%	33.8%	34.2%
Fujitsu	137.6	77.7	39.3	1,630	14.6%	13.0%	20.5%	15.0%
Nihon Unisys	133.0	91.9	15.9	1,099	14.2%	15.3%	8.3%	10.1%
NEC	58.2	45.0	8.6	1,397	6.2%	7.5%	4.5%	12.9%
Digital	48.2	36.2	.0	0	5.1%	6.0%	.0%	.0%
Hitachi	37.8	29.9	4.1	204	4.0%	5.0%	2.1%	1.9%
ARC/YAMAGIWA	21.6	13.0	6.5	116	2.3%	2.2%	3.4%	1.1%
Computervision	21.1	10.2	7.9	256	2.2%	1.7%	4.1%	2.4%
Seiko	14.9	9.6	3.2	44	1.6%	1.6%	1.7%	.4%
Mitsubishi Electric	14.4	6.5	4.3	45	1.5%	1.1%	2.2%	.4%
Zuken	10.6	4.3	5.5	100	1.1%	.7%	2.9%	.9%
Sun	10.2	9.2	.0	447	1.1%	1.5%	.0%	4.1%
Toshiba	9.7	4.8	3.9	138	1.0%	.8%	2.0%	1.3%
Mutoh Industries	5.9	2.1	1.4	8	.6%	.4%	.7%	.1%
Cadence	5.8	.0	5.3	0	.6%	.0%	2.7%	.0%
Toyo	5.8	3.4	2.0	133	.6%	.6%	1.0%	1.2%
Marubeni Hytech	5.7	.0	5.7	0	.6%	.0%	3.0%	.0%
Intergraph	4.6	2.3	.7	44	.5%	.4%	.4%	.4%
INS Engineering	4.3	3.0	.9	7	.5%	.5%	.4%	.1%
SDRC	2.7	.0	2.7	0	.3%	.0%	1.4%	.0%
Info. Services Int'l. Dentsu	2.1	.0	.7	0	.2%	.0%	.4%	.0%
McDonnell Douglas	2.0	1.1	.6	39	.2%	.2%	.3%	.4%
Hewlett-Packard	1.9	1.6	.0	96	.2%	.3%	.0%	.9%
Century Research Center	1.5	.0	1.4	0	.2%	.0%	.7%	.0%
Kanematsu Semiconductor	1.4	1.0	.3	0	.2%	.2%	.2%	.0%
Kubota Computer	1.2	.8	.4	250	.1%	.1%	.2%	2.3%
Hitachi Zosen Info Systems	.8	.5	.3	10	.1%	.1%	.1%	.1%
Silvar-Lisco	.3	.0	.3	0	.0%	.0%	.1%	.0%
Silicon Graphics	.3	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 36 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Japan
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Other Companies	38.0	31.9	2.7	1,392	4.0%	5.3%	1.4%	12.8%
All Companies	939.6	598.8	191.4	10,846	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	515.1	325.7	103.1	5,828	54.8%	54.4%	53.9%	53.7%
All Asian-Based Companies	424.5	273.1	88.2	5,018	45.2%	45.6%	46.1%	46.3%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	91.7	75.2	.0	1,692	9.8%	12.6%	.0%	15.6%
All Turnkey & SW Companies	847.9	523.6	191.4	9,154	90.2%	87.4%	100.0%	84.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 37
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
NEC	98.6	85.2	5.6	6,544	21.0%	32.2%	3.3%	20.8%
Hitachi	61.2	24.8	30.3	3,067	13.0%	9.4%	17.8%	9.7%
Mutoh Industries	52.9	29.0	21.8	1,994	11.2%	10.9%	12.8%	6.3%
Fujitsu	45.9	25.3	17.8	2,288	9.8%	9.6%	10.4%	7.3%
IBM	36.6	34.8	.0	7,381	7.8%	13.1%	.0%	23.5%
Hakuto	35.6	19.3	14.3	875	7.6%	7.3%	8.4%	2.8%
Wacom	27.8	11.9	13.1	610	5.9%	4.5%	7.7%	1.9%
ARGO GRAPHICS	21.6	11.8	8.5	0	4.6%	4.4%	5.0%	.0%
Toshiba	14.2	7.1	5.7	1,080	3.0%	2.7%	3.3%	3.4%
Design Automation	10.8	.0	9.7	0	2.3%	.0%	5.7%	.0%
Andor	9.3	1.6	7.4	76	2.0%	.6%	4.3%	.2%
Mitsubishi Electric	7.2	4.5	2.7	794	1.5%	1.7%	1.6%	2.5%
Kanematsu Computer Systems	6.7	3.5	3.3	156	1.4%	1.3%	1.9%	.5%
CPU	5.9	.0	5.6	309	1.3%	.0%	3.3%	1.0%
Sumisho Electronics	5.0	3.1	1.9	555	1.1%	1.2%	1.1%	1.8%
Technovision	3.6	.0	3.6	0	.8%	.0%	2.1%	.0%
Info. Services Int'l. Dentsu	2.1	.3	1.1	25	.4%	.1%	.6%	.1%
Marubeni Hytech	1.9	.0	1.9	0	.4%	.0%	1.1%	.0%
Mitsui Engineering	1.4	1.3	.0	19	.3%	.5%	.0%	.1%
Sophia Systems	1.4	.3	.9	18	.3%	.1%	.5%	.1%
Graphtec Engineering	1.3	.7	.5	0	.3%	.3%	.3%	.0%
Racal-Redac	1.1	.1	1.0	9	.2%	.0%	.6%	.0%
Intergraph	.7	.0	.6	0	.1%	.0%	.4%	.0%
Computervision	.6	.0	.6	0	.1%	.0%	.3%	.0%
INS Engineering	.4	.3	.1	43	.1%	.1%	.0%	.1%
ISICAD	.2	.0	.2	0	.0%	.0%	.1%	.0%
Pasco	.2	.1	.1	4	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 37 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	49.1	19.2	27.9	4,500	10.4%	7.2%	16.3%	14.3%
All Companies	470.5	264.8	170.6	31,464	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	114.9	66.1	40.3	14,694	24.4%	24.9%	23.6%	46.7%
All Asian-Based Companies	354.5	198.7	129.4	16,761	75.3%	75.0%	75.8%	53.3%
All European-Based Companies	1.1	.1	1.0	9	.2%	.0%	.6%	.0%
All Hardware Companies	71.2	65.2	.0	14,616	15.1%	24.6%	.0%	46.5%
All Turnkey & SW Companies	399.3	199.7	170.6	16,848	84.9%	75.4%	100.0%	53.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 38
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
IBM	355.3	236.1	61.2	7,529	21.7%	24.1%	13.5%	19.3%
NEC	161.7	111.5	37.3	6,965	9.9%	11.4%	8.2%	17.8%
Nihon Unisys	161.1	112.1	18.4	1,380	9.8%	11.4%	4.1%	3.5%
Hitachi	135.0	68.3	53.2	3,962	8.2%	7.0%	11.7%	10.1%
Fujitsu	122.4	69.6	38.5	2,740	7.5%	7.1%	8.5%	7.0%
Hitachi Zosen Info Systems	74.4	38.0	29.0	675	4.5%	3.9%	6.4%	1.7%
Mutoh Industries	71.3	37.4	27.1	1,942	4.3%	3.8%	6.0%	5.0%
Computervision	57.5	23.8	25.8	482	3.5%	2.4%	5.7%	1.2%
Toshiba	57.0	28.5	22.8	1,527	3.5%	2.9%	5.0%	3.9%
Hewlett-Packard	52.8	35.5	11.5	1,978	3.2%	3.6%	2.5%	5.1%
ARGO GRAPHICS	36.0	25.3	8.5	660	2.2%	2.6%	1.9%	1.7%
Hakuto	36.0	19.4	14.4	880	2.2%	2.0%	3.2%	2.3%
Digital	34.0	25.5	.0	232	2.1%	2.6%	.0%	.6%
Seiko	32.6	19.9	6.6	419	2.0%	2.0%	1.5%	1.1%
Info. Services Int'l. Dentsu	29.5	1.3	20.3	45	1.8%	.1%	4.5%	.1%
Mitsubishi Electric	28.8	21.1	4.6	560	1.8%	2.2%	1.0%	1.4%
Silicon Graphics	28.1	25.6	.0	716	1.7%	2.6%	.0%	1.8%
Tokyo Electron	24.7	8.4	11.3	91	1.5%	.9%	2.5%	.2%
Sharp	23.9	10.3	11.2	135	1.5%	1.0%	2.5%	.3%
Sumisho Electronics	20.0	16.0	3.0	411	1.2%	1.6%	.7%	1.1%
Sumitomo Denko Workstation	20.0	18.2	.0	926	1.2%	1.9%	.0%	2.4%
Sun	15.9	14.3	.0	1,369	1.0%	1.5%	.0%	3.5%
Toyo	15.3	9.2	5.0	153	.9%	.9%	1.1%	.4%
Mitsui Engineering	14.2	10.2	2.5	97	.9%	1.0%	.6%	.2%
SDRC	13.6	.0	13.6	0	.8%	.0%	3.0%	.0%
Graphtec Engineering	12.5	6.3	4.9	0	.8%	.6%	1.1%	.0%
Design Automation	10.8	.0	9.7	0	.7%	.0%	2.1%	.0%
C. Itoh Techno-Science	10.0	4.0	5.0	221	.6%	.4%	1.1%	.6%
Schlumberger (Applicon)	7.2	3.0	3.5	66	.4%	.3%	.8%	.2%
McDonnell Douglas	7.0	3.8	2.1	111	.4%	.4%	.5%	.3%
Wacom	7.0	3.0	3.3	53	.4%	.3%	.7%	.1%
Andor	6.9	1.2	5.5	54	.4%	.1%	1.2%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 38 (Continued)
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Intergraph	6.8	3.6	1.4	69	.4%	.4%	.3%	.2%
Nihon Itek	5.6	3.1	2.1	31	.3%	.3%	.5%	.1%
Omron	5.4	2.7	2.2	150	.3%	.3%	.5%	.4%
Sony	5.1	4.4	.0	296	.3%	.5%	.0%	.8%
Sumisho Electronic Systems	4.6	.0	4.0	245	.3%	.0%	.9%	.6%
Century Research Center	2.6	.5	1.8	6	.2%	.1%	.4%	.0%
CADIX	2.2	.9	1.1	15	.1%	.1%	.2%	.0%
Mentor Graphics	1.6	.7	.8	21	.1%	.1%	.2%	.1%
Kubota Computer	1.5	1.0	.5	264	.1%	.1%	.1%	.7%
Ricoh	1.1	.0	1.0	0	.1%	.0%	.2%	.0%
ISICAD	.5	.2	.2	6	.0%	.0%	.0%	.0%
Other Companies	64.3	33.9	25.3	3,095	3.9%	3.5%	5.6%	7.9%
All Companies	1,639.7	979.2	453.4	39,067	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	678.7	417.4	163.5	17,216	41.4%	42.6%	36.1%	44.1%
All Asian-Based Companies	961.0	561.8	289.9	21,851	58.6%	57.4%	63.9%	55.9%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	144.5	125.0	.0	11,584	8.8%	12.8%	.0%	29.7%
All Turnkey & SW Companies	1,495.3	854.2	453.4	27,483	91.2%	87.2%	100.0%	70.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 39
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Fujitsu	91.8	52.2	28.9	2,055	25.8%	24.3%	29.1%	16.4%
IBM	44.0	32.3	5.7	2,910	12.4%	15.0%	5.7%	23.2%
NEC	42.4	33.8	5.2	2,686	11.9%	15.7%	5.2%	21.4%
ARC/YAMAGIWA	21.6	13.0	6.5	116	6.1%	6.0%	6.5%	.9%
Nihon Unisys	19.9	13.8	2.3	170	5.6%	6.4%	2.3%	1.4%
Mutoh Industries	19.8	9.9	7.0	397	5.6%	4.6%	7.1%	3.2%
Toshiba	18.1	9.1	7.3	169	5.1%	4.2%	7.3%	1.3%
Hitachi	18.0	9.1	7.1	528	5.1%	4.2%	7.2%	4.2%
Computervision	13.8	5.8	6.1	116	3.9%	2.7%	6.2%	.9%
Kanematsu Computer Systems	9.3	5.3	3.7	186	2.6%	2.5%	3.7%	1.5%
Hitachi Zosen Info Systems	7.4	3.8	2.9	68	2.1%	1.8%	2.9%	.5%
Mitsubishi Electric	7.2	5.3	1.2	140	2.0%	2.5%	1.2%	1.1%
Intergraph	6.8	3.6	1.4	69	1.9%	1.7%	1.4%	.5%
Century Research Center	6.5	3.3	2.6	39	1.8%	1.5%	2.6%	.3%
Digital	6.1	4.6	.0	42	1.7%	2.1%	.0%	.3%
CPU	5.9	.0	5.6	309	1.7%	.0%	5.7%	2.5%
Silicon Graphics	4.2	3.6	.0	101	1.2%	1.7%	.0%	.8%
INS Engineering	4.0	2.8	.8	68	1.1%	1.3%	.8%	.5%
Sumisho Electronics	3.6	2.7	.8	173	1.0%	1.3%	.8%	1.4%
Technovision	3.6	.0	3.6	0	1.0%	.0%	3.6%	.0%
C. Itoh Techno-Science	3.5	1.4	1.8	78	1.0%	.7%	1.8%	.6%
Sun	2.9	2.6	.0	249	.8%	1.2%	.0%	2.0%
Toyo	2.7	1.6	.9	27	.8%	.8%	.9%	.2%
Sumitomo Denko Workstation	2.5	2.3	.0	116	.7%	1.1%	.0%	.9%
Hewlett-Packard	2.2	1.9	.0	202	.6%	.9%	.0%	1.6%
Sumisho Electronic Systems	2.0	.0	1.7	28	.6%	.0%	1.7%	.2%
Andor	1.8	.3	1.4	16	.5%	.1%	1.4%	.1%
McDonnell Douglas	1.5	.8	.4	24	.4%	.4%	.4%	.2%
Uchida Yoko	1.4	.7	.6	22	.4%	.3%	.6%	.2%
Mitsui Engineering	1.2	.9	.2	7	.3%	.4%	.2%	.1%
Sony	.9	.8	.0	54	.3%	.4%	.0%	.4%
ISICAD	.8	.3	.4	8	.2%	.1%	.4%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 39 (Continued)
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Nihon Itek	.7	.4	.3	4	.2%	.2%	.3%	.0%
Kubota Computer	.5	.3	.2	25	.1%	.2%	.2%	.2%
Graphtec Engineering	.4	.2	.2	0	.1%	.1%	.2%	.0%
Other Companies	34.8	17.7	14.9	1,855	9.8%	8.2%	15.0%	14.8%
All Companies	355.3	214.9	99.2	12,548	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	110.0	70.1	25.4	5,838	31.0%	32.6%	25.6%	46.5%
All Asian-Based Companies	245.3	144.8	73.8	6,709	69.0%	67.4%	74.4%	53.5%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	44.5	39.5	.0	5,327	12.5%	18.4%	.0%	42.5%
All Turnkey & SW Companies	310.8	175.4	99.2	7,221	87.5%	81.6%	100.0%	57.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 40
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Fujitsu	30.6	17.4	9.6	685	19.1%	17.4%	23.9%	19.8%
Mitsubishi Electric	28.8	21.1	4.6	560	17.9%	21.1%	11.4%	16.2%
Hitachi	18.0	11.9	4.3	206	11.2%	11.9%	10.7%	5.9%
IBM	13.9	9.6	2.1	558	8.6%	9.6%	5.3%	16.1%
Intergraph	9.1	4.8	1.8	92	5.7%	4.8%	4.5%	2.7%
Mitsui Engineering	8.1	5.6	1.6	50	5.0%	5.6%	4.1%	1.5%
Mutoh Industries	7.9	3.9	2.8	161	4.9%	3.9%	6.9%	4.6%
Digital	6.3	4.7	.0	43	3.9%	4.7%	.0%	1.2%
NEC	5.3	3.0	1.9	260	3.3%	3.0%	4.6%	7.5%
CADIX	4.3	1.7	2.2	30	2.7%	1.7%	5.4%	.9%
INS Engineering	4.3	3.0	.9	7	2.7%	3.0%	2.1%	.2%
Uchida Yoko	4.2	2.1	1.7	66	2.6%	2.1%	4.2%	1.9%
Century Research Center	2.3	1.1	.9	14	1.4%	1.1%	2.3%	.4%
Toshiba	1.7	.9	.7	16	1.1%	.9%	1.7%	.5%
Sun	1.4	1.3	.0	122	.9%	1.3%	.0%	3.5%
Sumitomo Denko Workstation	1.3	1.1	.0	58	.8%	1.1%	.0%	1.7%
Pasco	.9	.4	.5	12	.6%	.4%	1.1%	.3%
Sumisho Electronics	.8	.6	.2	45	.5%	.6%	.4%	1.3%
Andor	.3	.1	.2	4	.2%	.1%	.6%	.1%
C. Itoh Techno-Science	.3	.1	.2	7	.2%	.1%	.4%	.2%
McDonnell Douglas	.2	.1	.1	4	.1%	.1%	.2%	.1%
Hewlett-Packard	.2	.1	.0	17	.1%	.1%	.0%	.5%
Kubota Computer	.2	.1	.1	8	.1%	.1%	.1%	.2%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 40 (Continued)
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	18.0	12.1	4.2	505	11.2%	12.1%	10.5%	14.6%
All Companies	160.5	100.3	40.2	3,467	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	45.7	28.5	9.6	1,396	28.5%	28.5%	23.8%	40.3%
All Asian-Based Companies	114.7	71.7	30.7	2,071	71.5%	71.5%	76.2%	59.7%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	16.4	14.1	.0	1,118	10.2%	14.1%	.0%	32.2%
All Turnkey & SW Companies	144.0	86.2	40.2	2,349	89.8%	85.9%	100.0%	67.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 41
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	77.8	31.9	38.9	1,013	10.9%	9.5%	13.1%	6.7%
Fujitsu	61.2	38.7	15.4	1,370	8.6%	11.6%	5.2%	9.0%
Seiko	59.9	34.5	13.9	578	8.4%	10.3%	4.7%	3.8%
Zuken	58.2	21.9	32.1	353	8.2%	6.6%	10.8%	2.3%
NEC	55.7	38.2	13.0	3,039	7.8%	11.4%	4.4%	20.0%
Cadence	43.8	.0	39.5	0	6.2%	.0%	13.2%	.0%
Hewlett-Packard	43.2	29.7	8.7	1,802	6.1%	8.9%	2.9%	11.9%
Sun	30.8	27.8	.0	2,658	4.3%	8.3%	.0%	17.5%
Valid	29.0	7.0	19.8	145	4.1%	2.1%	6.6%	1.0%
Dazix	26.1	7.7	16.3	238	3.7%	2.3%	5.5%	1.6%
Racal-Redac	21.6	6.4	13.7	167	3.0%	1.9%	4.6%	1.1%
Wacom	20.9	9.0	9.8	558	2.9%	2.7%	3.3%	3.7%
Sharp	20.3	8.7	9.6	115	2.9%	2.6%	3.2%	.8%
C. Itoh Techno-Science	15.7	6.3	7.8	345	2.2%	1.9%	2.6%	2.3%
Digital	15.4	11.6	.0	132	2.2%	3.5%	.0%	.9%
CADIX	15.1	6.1	7.6	105	2.1%	1.8%	2.5%	.7%
Marubeni Hytech	14.3	.0	14.3	0	2.0%	.0%	4.8%	.0%
IBM	13.1	8.9	2.1	418	1.8%	2.7%	.7%	2.8%
Computervision	9.7	4.1	4.3	82	1.4%	1.2%	1.4%	.5%
Toshiba	9.5	4.7	3.8	88	1.3%	1.4%	1.3%	.6%
Hitachi	9.0	5.9	2.2	103	1.3%	1.8%	.7%	.7%
Uchida Yoko	8.4	4.2	3.4	132	1.2%	1.3%	1.1%	.9%
Mitsubishi Electric	7.2	5.3	1.2	140	1.0%	1.6%	.4%	.9%
Kanematsu Semiconductor	6.5	3.3	2.5	60	.9%	1.0%	.9%	.4%
Tokyo Electron	4.4	1.5	2.0	16	.6%	.4%	.7%	.1%
Silvar-Lisco	3.2	.0	2.7	0	.4%	.0%	.9%	.0%
Sony	2.8	2.4	.0	182	.4%	.7%	.0%	1.2%
Intergraph	2.7	1.5	.5	28	.4%	.4%	.2%	.2%
Kyocera	2.2	.9	1.1	10	.3%	.3%	.4%	.1%
Century Research Center	2.0	1.0	.8	12	.3%	.3%	.3%	.1%
Omron	1.8	.9	.7	50	.3%	.3%	.2%	.3%
Sophia Systems	1.7	.4	1.1	20	.2%	.1%	.4%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 41 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Sumisho Electronics	1.6	1.2	.3	50	.2%	.4%	.1%	.3%
Sumitomo Denko Workstation	1.3	1.1	.0	58	.2%	.3%	.0%	.4%
Hitachi Zosen Info Systems	.8	.4	.3	7	.1%	.1%	.1%	.0%
Andor	.3	.0	.3	2	.0%	.0%	.1%	.0%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.0%
Other Companies	29.9	20.9	6.3	1,545	4.2%	6.3%	2.1%	10.2%
All Companies	712.5	334.3	298.1	15,204	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	371.3	153.3	173.9	8,464	52.1%	45.8%	58.3%	55.7%
All Asian-Based Companies	319.7	174.7	110.5	6,573	44.9%	52.2%	37.1%	43.2%
All European-Based Companies	21.6	6.4	13.7	167	3.0%	1.9%	4.6%	1.1%
All Hardware Companies	78.4	67.4	.0	5,919	11.0%	20.1%	.0%	38.9%
All Turnkey & SW Companies	634.1	266.9	298.1	9,285	89.0%	79.9%	100.0%	61.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 42
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	61.9	25.4	31.0	806	21.4%	19.3%	24.4%	12.1%
Hewlett-Packard	33.5	22.8	7.1	1,317	11.6%	17.4%	5.6%	19.8%
NEC	26.5	17.7	6.7	1,424	9.2%	13.5%	5.3%	21.4%
Fujitsu	24.5	13.9	7.7	548	8.5%	10.6%	6.1%	8.2%
Wacom	20.9	9.0	9.8	199	7.2%	6.8%	7.7%	3.0%
Seiko	18.2	9.1	5.5	123	6.3%	7.0%	4.3%	1.9%
Valid	14.5	3.5	9.9	73	5.0%	2.6%	7.8%	1.1%
Marubeni Hytech	14.3	.0	14.3	0	5.0%	.0%	11.3%	.0%
Dazix	13.1	3.8	8.2	119	4.5%	2.9%	6.4%	1.8%
Sun	12.5	11.2	.0	1,074	4.3%	8.6%	.0%	16.2%
Zuken	9.9	3.7	5.5	53	3.4%	2.8%	4.4%	.8%
C. Itoh Techno-Science	8.0	3.2	4.0	176	2.8%	2.4%	3.1%	2.6%
Cadence	6.8	.0	6.1	0	2.3%	.0%	4.8%	.0%
Digital	6.4	4.8	.0	54	2.2%	3.6%	.0%	.8%
Racal-Redac	4.0	1.2	2.5	31	1.4%	.9%	2.0%	.5%
Tokyo Electron	1.7	.6	.8	6	.6%	.5%	.6%	.1%
Kanematsu Semiconductor	1.4	.8	.5	8	.5%	.6%	.4%	.1%
Sophia Systems	1.4	.3	.9	16	.5%	.3%	.7%	.2%
Century Research Center	1.0	.5	.4	6	.4%	.4%	.3%	.1%
Intergraph	1.0	.5	.2	10	.3%	.4%	.1%	.2%
Sony	1.0	.8	.0	63	.3%	.6%	.0%	.9%
Silvar-Lisco	.9	.0	.7	0	.3%	.0%	.6%	.0%
Toshiba	.9	.4	.3	8	.3%	.3%	.3%	.1%
Sumisho Electronics	.8	.6	.2	45	.3%	.4%	.1%	.7%
IBM	.7	.7	.0	150	.3%	.5%	.0%	2.3%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 42 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	8.1	6.1	1.3	514	2.8%	4.7%	1.0%	7.7%
All Companies	288.7	131.1	127.0	6,646	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	197.1	83.0	92.4	4,294	68.3%	63.3%	72.7%	64.6%
All Asian-Based Companies	87.5	46.9	32.1	2,321	30.3%	35.8%	25.3%	34.9%
All European-Based Companies	4.0	1.2	2.5	31	1.4%	.9%	2.0%	.5%
All Hardware Companies	32.7	28.2	.0	2,496	11.3%	21.5%	.0%	37.5%
All Turnkey & SW Companies	256.0	102.9	127.0	4,151	88.7%	78.5%	100.0%	62.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 43
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Cadence	37.1	.0	33.4	0	28.6%	.0%	58.2%	.0%
Seiko	34.9	21.3	7.1	366	26.9%	39.1%	12.4%	15.9%
Fujitsu	12.2	10.8	.0	274	9.4%	19.9%	.0%	11.9%
Sun	11.4	10.3	.0	985	8.8%	18.9%	.0%	42.8%
Valid	7.3	1.7	4.9	36	5.6%	3.2%	8.6%	1.6%
Mentor Graphics	7.1	2.9	3.6	93	5.5%	5.4%	6.2%	4.0%
C. Itoh Techno-Science	6.8	2.7	3.4	150	5.2%	5.0%	5.9%	6.5%
NEC	2.7	1.4	1.1	123	2.0%	2.5%	1.8%	5.3%
Silvar-Lisco	2.3	.0	2.0	0	1.8%	.0%	3.5%	.0%
Digital	2.2	1.7	.0	19	1.7%	3.1%	.0%	.8%
Kyocera	2.2	.9	1.1	10	1.7%	1.7%	2.0%	.4%
Newlett-Packard	1.5	1.2	.0	133	1.1%	2.3%	.0%	5.8%
Sony	1.0	.9	.0	70	.8%	1.6%	.0%	3.0%
Other Companies	3.0	2.7	.0	250	2.3%	4.9%	.0%	10.9%
All Companies	129.7	54.5	57.4	2,300	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	78.8	20.1	49.2	1,485	60.8%	37.0%	85.8%	64.6%
All Asian-Based Companies	50.8	34.3	8.2	815	39.2%	63.0%	14.2%	35.4%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	18.4	16.1	.0	1,416	14.2%	29.6%	.0%	61.6%
All Turnkey & SW Companies	111.3	38.3	57.4	884	85.8%	70.4%	100.0%	38.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 44
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Zuken	48.3	18.3	26.6	301	16.4%	12.3%	23.4%	4.8%
NEC	26.5	19.1	5.3	1,493	9.0%	12.8%	4.7%	23.9%
Fujitsu	24.5	13.9	7.7	548	8.3%	9.4%	6.8%	8.8%
Sharp	20.3	8.7	9.6	115	6.9%	5.9%	8.4%	1.8%
Racal-Redac	17.6	5.2	11.2	136	6.0%	3.5%	9.8%	2.2%
CADIX	15.1	6.1	7.6	105	5.1%	4.1%	6.7%	1.7%
Dazix	13.1	3.8	8.2	119	4.4%	2.6%	7.2%	1.9%
IBM	12.4	8.2	2.1	269	4.2%	5.5%	1.9%	4.3%
Computervision	9.7	4.1	4.3	82	3.3%	2.7%	3.8%	1.3%
Hitachi	9.0	5.9	2.2	103	3.1%	4.0%	1.9%	1.6%
Mentor Graphics	8.7	3.6	4.4	114	3.0%	2.4%	3.8%	1.8%
Toshiba	8.6	4.3	3.5	80	2.9%	2.9%	3.0%	1.3%
Uchida Yoko	8.4	4.2	3.4	132	2.9%	2.8%	3.0%	2.1%
Hewlett-Packard	8.2	5.7	1.6	352	2.8%	3.8%	1.4%	5.6%
Valid	7.3	1.7	4.9	36	2.5%	1.2%	4.3%	.6%
Mitsubishi Electric	7.2	5.3	1.2	140	2.4%	3.6%	1.0%	2.2%
Sun	7.0	6.3	.0	600	2.4%	4.2%	.0%	9.6%
Digital	6.8	5.1	.0	58	2.3%	3.4%	.0%	.9%
Seiko	6.8	4.1	1.4	88	2.3%	2.7%	1.2%	1.4%
Kanematsu Semiconductor	5.1	2.5	2.1	52	1.7%	1.7%	1.8%	.8%
Tokyo Electron	2.6	.9	1.2	10	.9%	.6%	1.1%	.2%
Omron	1.8	.9	.7	50	.6%	.6%	.6%	.8%
Intergraph	1.7	1.0	.3	18	.6%	.6%	.3%	.3%
Sumitomo Denko Workstation	1.3	1.1	.0	58	.4%	.8%	.0%	.9%
Century Research Center	1.0	.5	.4	6	.3%	.3%	.4%	.1%
C. Itoh Techno-Science	.9	.4	.4	20	.3%	.2%	.4%	.3%
Sony	.9	.8	.0	49	.3%	.5%	.0%	.8%
Hitachi Zosen Info Systems	.8	.4	.3	7	.3%	.3%	.3%	.1%
Sumisho Electronics	.8	.6	.1	5	.3%	.4%	.1%	.1%
Sophia Systems	.3	.1	.2	4	.1%	.1%	.2%	.1%
Andor	.3	.0	.3	2	.1%	.0%	.2%	.0%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 44 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Japan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	18.8	12.1	5.0	781	6.4%	8.1%	4.4%	12.5%
All Companies	294.2	148.8	113.7	6,258	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	95.3	50.1	32.3	2,684	32.4%	33.7%	28.4%	42.9%
All Asian-Based Companies	181.3	93.5	70.2	3,437	61.6%	62.8%	61.8%	54.9%
All European-Based Companies	17.6	5.2	11.2	136	6.0%	3.5%	9.8%	2.2%
All Hardware Companies	27.3	23.0	.0	2,007	9.3%	15.5%	.0%	32.1%
All Turnkey & SW Companies	266.9	125.7	113.7	4,250	90.7%	84.5%	100.0%	67.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 45
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Korea
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	32.0	21.5	5.3	857	37.5%	40.5%	26.7%	30.4%
Computervision	7.6	3.1	3.4	64	8.9%	5.9%	16.9%	2.3%
Valid	6.0	1.4	4.1	30	7.0%	2.7%	20.3%	1.1%
Digital	5.9	4.4	.0	43	6.9%	8.3%	.0%	1.5%
Silicon Graphics	4.6	4.2	.0	117	5.4%	7.8%	.0%	4.1%
Zuken	4.4	1.7	2.4	27	5.1%	3.1%	12.1%	.9%
Seiko	3.5	2.1	.7	19	4.0%	4.0%	3.5%	.7%
Sun	2.9	2.6	.0	245	3.3%	4.8%	.0%	8.7%
Intergraph	1.9	1.0	.3	19	2.2%	1.9%	1.7%	.7%
Mentor Graphics	1.4	.6	.7	18	1.6%	1.0%	3.4%	.6%
Racal-Redac	1.1	.3	.7	8	1.3%	.6%	3.4%	.3%
Dazix	.9	.3	.6	8	1.1%	.5%	2.9%	.3%
Hewlett-Packard	.8	.7	.0	74	.9%	1.3%	.0%	2.6%
Other Companies	7.3	6.9	.0	936	8.6%	13.0%	.0%	33.2%
All Companies	85.3	53.2	20.0	2,818	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	76.3	49.1	16.2	2,763	89.5%	92.3%	81.0%	98.1%
All Asian-Based Companies	7.8	3.8	3.1	46	9.2%	7.1%	15.6%	1.6%
All European-Based Companies	1.1	.3	.7	8	1.3%	.6%	3.4%	.3%
All Hardware Companies	26.8	23.3	.0	2,317	31.4%	43.9%	.0%	82.2%
All Turnkey & SW Companies	58.5	29.8	20.0	501	68.6%	56.1%	100.0%	17.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 46
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Korea
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Valid	6.0	1.4	4.1	30	16.3%	7.7%	30.7%	4.6%
Computervision	5.5	2.2	2.6	40	15.1%	11.6%	19.5%	6.1%
Silicon Graphics	4.6	4.2	.0	117	12.4%	22.1%	.0%	18.1%
Zuken	3.6	1.3	2.0	19	9.7%	7.1%	15.2%	3.0%
Seiko	2.7	1.6	.5	17	7.3%	8.6%	4.1%	2.6%
IBM	2.7	1.7	.5	24	7.2%	9.2%	3.7%	3.7%
Sun	2.3	2.0	.0	220	6.2%	10.9%	.0%	34.1%
Intergraph	1.5	.9	.3	16	4.0%	4.5%	2.0%	2.5%
Mentor Graphics	1.4	.6	.7	18	3.7%	2.9%	5.1%	2.7%
Digital	1.3	1.0	.0	43	3.6%	5.2%	.0%	6.7%
Racal-Redac	1.0	.3	.6	8	2.8%	1.6%	4.8%	1.2%
Dazix	.9	.3	.6	8	2.5%	1.4%	4.4%	1.3%
Hewlett-Packard	.7	.6	.0	70	2.0%	3.2%	.0%	10.8%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	36.8	18.8	13.2	646	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	29.5	15.5	10.0	602	80.2%	82.7%	75.9%	93.2%
All Asian-Based Companies	6.3	3.0	2.6	36	17.0%	15.7%	19.3%	5.6%
All European-Based Companies	1.0	.3	.6	8	2.8%	1.6%	4.8%	1.2%
All Hardware Companies	9.6	8.3	.0	464	26.2%	44.1%	.0%	71.8%
All Turnkey & SW Companies	27.2	10.5	13.2	182	73.8%	55.9%	100.0%	28.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 47
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Korea
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	26.5	17.2	4.8	278	65.8%	63.2%	76.8%	54.1%
Digital	4.6	3.4	.0	0	11.4%	12.6%	.0%	.0%
Computervision	2.0	1.0	.7	24	4.9%	3.5%	11.7%	4.6%
Zuken	.8	.3	.4	8	2.0%	1.2%	6.5%	1.5%
Seiko	.8	.5	.2	3	1.9%	1.8%	2.5%	.5%
Sun	.6	.5	.0	25	1.4%	1.9%	.0%	4.8%
Intergraph	.3	.2	.0	3	.8%	.6%	.6%	.6%
Hewlett-Packard	.1	.1	.0	4	.2%	.3%	.0%	.8%
Silicon Graphics	.0	.0	.0	0	.1%	.0%	.0%	.0%
Other Companies	4.2	3.9	.0	166	10.5%	14.2%	.0%	32.3%
All Companies	40.4	27.2	6.3	515	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	38.8	26.4	5.7	505	96.1%	97.0%	91.0%	98.0%
All Asian-Based Companies	1.6	.8	.6	10	3.9%	3.0%	9.0%	2.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	9.5	7.9	.0	197	23.6%	29.0%	.0%	38.3%
All Turnkey & SW Companies	30.8	19.3	6.3	318	76.4%	71.0%	100.0%	61.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 48
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Korea
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	2.8	2.6	.0	555	34.0%	36.4%	.0%	33.5%
Computervision	.1	.0	.1	0	.6%	.0%	10.4%	.0%
Intergraph	.1	.0	.0	0	.6%	.0%	8.3%	.0%
Racal-Redac	.1	.0	.1	0	.6%	.0%	10.4%	.0%
Other Companies	3.1	3.1	.0	770	38.0%	43.1%	.0%	46.4%
All Companies	8.1	7.2	.5	1,657	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	8.1	7.2	.4	1,656	99.4%	100.0%	89.6%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.1	.0	.1	0	.6%	.0%	10.4%	.0%
All Hardware Companies	7.6	7.2	.0	1,656	94.0%	100.0%	.0%	100.0%
All Turnkey & SW Companies	.5	.0	.5	0	6.0%	.0%	100.0%	.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 49
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Korea
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	26.6	17.7	4.6	565	58.3%	56.7%	62.7%	44.7%
Computervision	5.4	2.2	2.4	45	11.8%	7.1%	32.8%	3.6%
Silicon Graphics	4.0	3.7	.0	102	8.8%	11.7%	.0%	8.1%
Digital	2.8	2.1	.0	19	6.1%	6.7%	.0%	1.5%
Sun	1.1	1.0	.0	91	2.3%	3.0%	.0%	7.2%
Intergraph	.5	.3	.1	5	1.1%	.8%	1.2%	.4%
Hewlett-Packard	.3	.3	.0	29	.7%	.9%	.0%	2.3%
Mentor Graphics	.0	.0	.0	0	.1%	.0%	.1%	.0%
Other Companies	3.1	2.8	.0	261	6.7%	9.1%	.0%	20.6%
All Companies	45.7	31.2	7.3	1,264	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	45.7	31.2	7.3	1,264	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	14.0	12.2	.0	950	30.7%	38.9%	.0%	75.2%
All Turnkey & SW Companies	31.7	19.1	7.3	314	69.3%	61.1%	100.0%	24.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 50
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Korea
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	3.3	2.4	.4	218	32.6%	31.2%	37.5%	22.7%
Computervision	1.3	.5	.6	11	12.6%	6.8%	50.9%	1.1%
Digital	.7	.5	.0	5	6.5%	6.5%	.0%	.5%
Silicon Graphics	.6	.5	.0	14	5.9%	6.6%	.0%	1.5%
Intergraph	.5	.3	.1	5	5.0%	3.5%	8.0%	.5%
Sun	.2	.2	.0	17	2.0%	2.3%	.0%	1.8%
Hewlett-Packard	.1	.1	.0	9	.9%	1.0%	.0%	.9%
Other Companies	2.6	2.6	.0	541	25.7%	33.0%	.0%	56.2%
All Companies	10.1	7.8	1.1	963	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	10.1	7.8	1.1	963	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	5.9	5.4	.0	922	58.6%	70.2%	.0%	95.8%
All Turnkey & SW Companies	4.2	2.3	1.1	41	41.4%	29.8%	100.0%	4.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 51
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Korea
UNITS: Millions of Dollars/Actual Units

					---------- Market Share ----------			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	1.0	.7	.2	43	32.5%	31.6%	50.0%	35.1%
Intergraph	.7	.4	.1	7	20.9%	15.6%	40.6%	5.5%
Digital	.6	.5	.0	4	20.0%	20.8%	.0%	3.5%
Sun	.1	.1	.0	7	2.8%	3.5%	.0%	6.0%
Hewlett-Packard	.0	.0	.0	1	.3%	.4%	.0%	.6%
Other Companies	.6	.6	.0	50	19.4%	25.1%	.0%	40.3%
All Companies	3.2	2.3	.3	124	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	3.2	2.3	.3	124	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.6	1.4	.0	108	49.7%	58.9%	.0%	86.8%
All Turnkey & SW Companies	1.6	1.0	.3	16	50.3%	41.1%	100.0%	13.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 52
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Korea
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Valid	6.0	1.4	4.1	30	22.8%	12.1%	36.1%	6.4%
Zuken	4.4	1.7	2.4	27	16.7%	13.9%	21.5%	5.7%
Seiko	3.5	2.1	.7	19	13.2%	17.8%	6.2%	4.2%
Digital	1.8	1.3	.0	15	6.8%	11.3%	.0%	3.3%
Sun	1.5	1.4	.0	130	5.8%	11.4%	.0%	27.8%
Mentor Graphics	1.3	.5	.7	17	5.0%	4.5%	5.9%	3.7%
Racal-Redac	1.1	.3	.7	8	4.1%	2.6%	6.0%	1.8%
IBM	1.0	.7	.2	31	3.7%	5.6%	1.4%	6.5%
Dazix	.9	.3	.6	8	3.5%	2.2%	5.2%	1.8%
Computervision	.9	.4	.4	8	3.5%	3.3%	3.6%	1.6%
Hewlett-Packard	.4	.3	.0	36	1.5%	2.8%	.0%	7.8%
Intergraph	.2	.1	.0	2	.7%	.9%	.3%	.4%
Other Companies	1.0	1.0	.0	84	3.9%	8.0%	.0%	18.0%
All Companies	26.2	11.9	11.2	467	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	17.3	7.8	7.4	413	66.0%	65.7%	66.2%	88.4%
All Asian-Based Companies	7.8	3.8	3.1	46	29.9%	31.7%	27.8%	9.9%
All European-Based Companies	1.1	.3	.7	8	4.1%	2.6%	6.0%	1.8%
All Hardware Companies	5.2	4.4	.0	337	19.9%	36.9%	.0%	72.1%
All Turnkey & SW Companies	21.0	7.5	11.2	130	80.1%	63.1%	100.0%	27.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 53
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Korea
UNITS: Millions of Dollars/Actual Units

					---------- Market Share ----------			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Valid	3.0	.7	2.0	15	33.9%	21.1%	44.4%	8.1%
Mentor Graphics	1.1	.4	.5	14	11.9%	12.6%	11.5%	7.4%
Zuken	.7	.3	.4	4	8.4%	8.2%	9.2%	2.1%
Digital	.7	.5	.0	6	7.6%	14.7%	.0%	3.1%
Sun	.6	.5	.0	51	6.7%	15.5%	.0%	27.3%
Dazix	.5	.1	.3	4	5.2%	3.8%	6.3%	2.3%
Hewlett-Packard	.2	.2	.0	23	2.7%	5.9%	.0%	12.3%
Racal-Redac	.2	.1	.1	2	2.3%	1.8%	2.6%	.8%
IBM	.1	.1	.0	12	.7%	1.5%	.0%	6.3%
Intergraph	.1	.0	.0	1	.7%	.9%	.2%	.4%
Other Companies	.3	.3	.0	36	3.6%	9.1%	.0%	19.6%
All Companies	8.8	3.4	4.6	185	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	7.9	3.1	4.1	180	89.3%	90.0%	88.2%	97.0%
All Asian-Based Companies	.7	.3	.4	4	8.4%	8.2%	9.2%	2.1%
All European-Based Companies	.2	.1	.1	2	2.3%	1.8%	2.6%	.8%
All Hardware Companies	2.0	1.7	.0	146	22.8%	50.1%	.0%	78.7%
All Turnkey & SW Companies	6.8	1.7	4.6	39	77.2%	49.9%	100.0%	21.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 54
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Korea
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Seiko	3.5	2.1	.7	19	53.5%	60.1%	37.6%	21.7%
Valid	1.5	.4	1.0	7	23.3%	10.3%	54.3%	8.3%
Sun	.5	.5	.0	45	8.2%	13.4%	.0%	50.6%
Digital	.4	.3	.0	3	6.0%	8.5%	.0%	3.7%
Mentor Graphics	.1	.1	.1	2	1.9%	1.4%	3.2%	1.8%
Hewlett-Packard	.1	.1	.0	6	1.1%	1.7%	.0%	6.7%
Other Companies	.2	.1	.0	6	2.5%	4.0%	.0%	6.3%
All Companies	6.5	3.5	1.9	90	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	3.0	1.4	1.2	70	46.5%	39.9%	62.4%	78.3%
All Asian-Based Companies	3.5	2.1	.7	19	53.5%	60.1%	37.6%	21.7%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.2	1.0	.0	61	18.0%	27.9%	.0%	67.9%
All Turnkey & SW Companies	5.3	2.5	1.9	29	82.0%	72.1%	100.0%	32.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 55
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Korea
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Zuken	3.6	1.4	2.0	23	33.2%	27.7%	41.8%	11.8%
Valid	1.5	.4	1.0	7	13.7%	7.3%	21.1%	3.9%
Computervision	.9	.4	.4	8	8.3%	7.9%	8.4%	4.0%
IBM	.9	.6	.2	19	8.3%	12.3%	3.3%	9.9%
Racal-Redac	.9	.3	.6	7	8.0%	5.1%	11.7%	3.5%
Digital	.7	.5	.0	6	6.7%	10.9%	.0%	3.2%
Dazix	.5	.1	.3	4	4.2%	2.6%	6.1%	2.2%
Sun	.4	.4	.0	34	3.6%	7.1%	.0%	17.6%
Mentor Graphics	.2	.1	.1	2	1.4%	1.2%	1.5%	1.0%
Intergraph	.1	.1	.0	1	1.2%	1.6%	.4%	.7%
Hewlett-Packard	.1	.1	.0	8	.7%	1.4%	.0%	3.9%
Other Companies	.5	.5	.0	42	4.9%	10.1%	.0%	21.9%
All Companies	11.0	5.0	4.8	192	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	6.4	3.3	2.2	163	58.8%	67.3%	46.6%	84.7%
All Asian-Based Companies	3.6	1.4	2.0	23	33.2%	27.7%	41.8%	11.8%
All European-Based Companies	.9	.3	.6	7	8.0%	5.1%	11.7%	3.5%
All Hardware Companies	2.0	1.7	.0	130	18.6%	34.1%	.0%	67.7%
All Turnkey & SW Companies	8.9	3.3	4.8	62	81.4%	65.9%	100.0%	32.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 56
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Singapore
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	10.7	7.2	1.8	286	41.1%	41.3%	38.9%	28.3%
Computervision	3.2	1.4	1.5	27	12.4%	7.7%	31.7%	2.7%
Digital	2.5	1.8	.0	18	9.5%	10.2%	.0%	1.8%
Silicon Graphics	1.4	1.3	.0	35	5.3%	7.2%	.0%	3.5%
Sun	1.3	1.2	.0	113	5.1%	6.8%	.0%	11.3%
Mentor Graphics	.7	.3	.3	9	2.6%	1.5%	7.4%	.9%
Intergraph	.6	.3	.1	6	2.4%	1.9%	2.8%	.6%
Racal-Redac	.5	.1	.3	4	1.9%	.8%	7.0%	.4%
Hewlett-Packard	.5	.4	.0	42	1.7%	2.1%	.0%	4.1%
Dazix	.3	.1	.2	3	1.2%	.5%	4.4%	.3%
Valid	.2	.0	.1	1	.6%	.2%	2.2%	.1%
Other Companies	2.9	2.7	.0	344	11.0%	15.4%	.0%	34.1%
All Companies	26.0	17.5	4.6	1,008	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	25.5	17.3	4.3	1,004	98.1%	99.2%	93.0%	99.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.5	.1	.3	4	1.9%	.8%	7.0%	.4%
All Hardware Companies	10.3	8.8	.0	855	39.6%	50.4%	.0%	84.9%
All Turnkey & SW Companies	15.7	8.7	4.6	152	60.4%	49.6%	100.0%	15.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 57
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Singapore
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Computervision	2.4	.9	1.1	17	25.6%	17.1%	45.5%	6.9%
Silicon Graphics	1.4	1.3	.0	35	14.7%	22.9%	.0%	14.1%
Sun	1.1	.9	.0	102	11.4%	17.2%	.0%	41.1%
IBM	.9	.6	.2	8	9.6%	10.5%	6.1%	3.2%
Mentor Graphics	.7	.3	.3	9	7.2%	4.8%	13.8%	3.6%
Digital	.5	.4	.0	18	5.8%	7.0%	.0%	7.2%
Intergraph	.5	.3	.1	5	5.2%	5.3%	3.7%	2.1%
Racal-Redac	.5	.1	.3	4	5.1%	2.6%	12.2%	1.4%
Hewlett-Packard	.4	.3	.0	39	4.3%	6.1%	.0%	15.8%
Dazix	.3	.1	.2	3	3.2%	1.5%	8.1%	1.1%
Valid	.2	.0	.1	1	1.7%	.7%	4.1%	.3%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	9.3	5.5	2.5	248	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	8.8	5.3	2.2	244	94.9%	97.4%	87.8%	98.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.5	.1	.3	4	5.1%	2.6%	12.2%	1.4%
All Hardware Companies	3.7	3.1	.0	201	39.6%	56.5%	.0%	81.0%
All Turnkey & SW Companies	5.6	2.4	2.5	47	60.4%	43.5%	100.0%	19.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 58
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Singapore
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	8.9	5.8	1.6	93	63.5%	60.4%	81.9%	49.4%
Digital	1.9	1.4	.0	0	13.7%	14.7%	.0%	.0%
Computervision	.8	.4	.3	10	6.0%	4.4%	15.6%	5.4%
Sun	.3	.2	.0	12	1.9%	2.5%	.0%	6.1%
Intergraph	.1	.0	.0	1	.8%	.4%	1.0%	.6%
Hewlett-Packard	.1	.0	.0	2	.4%	.3%	.0%	1.3%
Silicon Graphics	.0	.0	.0	0	.1%	.0%	.0%	.0%
Other Companies	1.8	1.6	.0	69	12.6%	16.6%	.0%	36.5%
All Companies	14.0	9.5	2.0	188	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	14.0	9.5	2.0	188	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	4.0	3.3	.0	83	28.7%	34.1%	.0%	44.2%
All Turnkey & SW Companies	10.0	6.3	2.0	105	71.3%	65.9%	100.0%	55.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 59
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Singapore
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	.9	.9	.0	184	33.1%	35.4%	.0%	32.3%
Intergraph	.0	.0	.0	0	1.1%	.0%	16.7%	.0%
Computervision	.0	.0	.0	0	.7%	.0%	16.7%	.0%
Recal-Redac	.0	.0	.0	0	.7%	.0%	16.7%	.0%
Other Companies	1.1	1.1	.0	275	40.0%	44.7%	.0%	48.1%
All Companies	2.8	2.5	.1	571	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	2.7	2.5	.1	571	99.3%	100.0%	83.3%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.7%	.0%	16.7%	.0%
All Hardware Companies	2.6	2.5	.0	571	95.3%	100.0%	.0%	100.0%
All Turnkey & SW Companies	.1	.0	.1	0	4.7%	.0%	100.0%	.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 60
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Singapore
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	8.9	5.9	1.5	188	53.9%	52.8%	57.1%	41.7%
Computervision	2.3	1.0	1.0	19	14.0%	8.6%	38.4%	4.3%
Digital	1.4	1.0	.0	9	8.2%	9.0%	.0%	2.1%
Silicon Graphics	1.2	1.1	.0	31	7.3%	9.8%	.0%	6.8%
Sun	.3	.3	.0	24	1.8%	2.2%	.0%	5.4%
Hewlett-Packard	.2	.2	.0	17	1.1%	1.4%	.0%	3.7%
Intergraph	.2	.1	.0	2	1.0%	.8%	.7%	.4%
Mentor Graphics	.0	.0	.0	0	.1%	.0%	.4%	.0%
Other Companies	1.4	1.3	.0	108	8.5%	11.5%	.0%	23.9%
All Companies	16.5	11.2	2.7	451	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	16.5	11.2	2.7	451	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	5.4	4.6	.0	342	32.6%	41.1%	.0%	75.8%
All Turnkey & SW Companies	11.1	6.6	2.7	109	67.4%	58.9%	100.0%	24.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 61
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Singapore
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	1.1	.8	.1	73	29.6%	29.1%	31.1%	20.7%
Computervision	.6	.2	.2	5	14.8%	8.4%	53.3%	1.3%
Digital	.3	.2	.0	2	7.5%	7.3%	.0%	.5%
Intergraph	.2	.1	.1	2	4.8%	3.3%	11.1%	.5%
Silicon Graphics	.2	.2	.0	4	4.8%	5.5%	.0%	1.2%
Hewlett-Packard	.1	.0	.0	5	1.6%	1.5%	.0%	1.5%
Sun	.0	.0	.0	3	1.1%	1.1%	.0%	.8%
Other Companies	1.0	1.0	.0	205	26.9%	35.3%	.0%	58.4%
All Companies	3.7	2.8	.5	351	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	3.7	2.8	.5	351	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	2.2	1.9	.0	336	58.6%	70.2%	.0%	95.8%
All Turnkey & SW Companies	1.5	.8	.5	15	41.4%	29.8%	100.0%	4.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 62
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Singapore
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	.3	.3	.1	13	30.4%	31.6%	41.7%	31.1%
Digital	.2	.2	.0	2	21.4%	20.3%	.0%	3.9%
Intergraph	.2	.1	.1	2	19.6%	15.2%	41.7%	5.2%
Sun	.0	.0	.0	2	1.8%	2.5%	.0%	4.5%
Other Companies	.2	.2	.0	19	21.4%	27.8%	.0%	45.3%
All Companies	1.1	.8	.1	42	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1.1	.8	.1	42	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.6	.5	.0	36	50.9%	59.5%	.0%	87.2%
All Turnkey & SW Companies	.6	.3	.1	5	49.1%	40.5%	100.0%	12.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 63
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Singapore
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Sun	1.0	.9	.0	84	20.7%	32.2%	.0%	51.5%
Mentor Graphics	.7	.3	.3	9	14.0%	9.5%	25.0%	5.3%
Digital	.6	.4	.0	5	12.5%	15.0%	.0%	3.0%
Racal-Redac	.5	.1	.3	4	10.4%	5.1%	24.2%	2.3%
Computervision	.4	.2	.2	3	8.2%	5.9%	13.6%	2.0%
IBM	.4	.3	.1	12	7.8%	9.2%	4.5%	7.1%
Dazix	.3	.1	.2	3	6.3%	2.9%	15.2%	1.7%
Hewlett-Packard	.2	.2	.0	19	4.4%	5.9%	.0%	11.7%
Valid	.2	.0	.1	1	3.4%	1.5%	7.6%	.5%
Intergraph	.1	.0	.0	0	1.1%	1.1%	.8%	.3%
Other Companies	.2	.2	.0	12	4.7%	7.3%	.0%	7.3%
All Companies	4.7	2.7	1.3	164	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	4.2	2.6	1.0	160	89.6%	94.9%	75.8%	97.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.5	.1	.3	4	10.4%	5.1%	24.2%	2.3%
All Hardware Companies	2.2	1.8	.0	140	46.3%	65.6%	.0%	85.7%
All Turnkey & SW Companies	2.5	.9	1.3	23	53.7%	34.4%	100.0%	14.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 64
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Singapore
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Sun	.6	.5	.0	51	29.5%	43.8%	.0%	63.1%
Mentor Graphics	.5	.2	.3	7	26.5%	17.4%	47.3%	8.6%
Digital	.3	.2	.0	2	13.0%	16.5%	.0%	2.8%
Dazix	.2	.0	.1	1	7.5%	3.3%	18.2%	1.7%
Hewlett-Packard	.1	.1	.0	12	6.5%	9.1%	.0%	15.3%
Racal-Redac	.1	.0	.1	1	4.5%	1.7%	10.9%	.9%
Valid	.1	.0	.1	0	4.0%	1.7%	10.9%	.5%
IBM	.0	.0	.0	3	1.0%	1.7%	.0%	4.2%
Other Companies	.0	.0	.0	0	1.0%	1.7%	.0%	.0%
All Companies	2.0	1.2	.6	80	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1.9	1.2	.5	79	95.5%	98.3%	89.1%	99.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.1	.0	.1	1	4.5%	1.7%	10.9%	.9%
All Hardware Companies	1.1	.9	.0	71	53.0%	75.2%	.0%	88.2%
All Turnkey & SW Companies	.9	.3	.6	9	47.0%	24.8%	100.0%	11.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 65
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Singapore
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Digital	.1	.0	.0	1	36.4%	40.0%	.0%	13.1%
Mentor Graphics	.1	.0	.0	1	27.3%	20.0%	60.0%	16.4%
Valid	.0	.0	.0	0	18.2%	10.0%	40.0%	4.1%
Hewlett-Packard	.0	.0	.0	3	13.6%	20.0%	.0%	63.2%
Other Companies	.0	.0	.0	0	4.5%	10.0%	.0%	.0%
All Companies	.2	.1	.1	5	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	.2	.1	.1	5	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.1	.1	.0	4	54.5%	70.0%	.0%	79.3%
All Turnkey & SW Companies	.1	.0	.1	1	45.5%	30.0%	100.0%	20.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 66
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Singapore
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Racal-Redac	.4	.1	.3	3	15.9%	8.5%	36.1%	3.9%
Computervision	.4	.2	.2	3	15.5%	11.3%	25.0%	4.2%
Sun	.4	.4	.0	34	15.5%	24.6%	.0%	42.9%
IBM	.4	.2	.1	8	13.9%	16.2%	8.3%	10.6%
Digital	.3	.2	.0	2	10.0%	12.0%	.0%	2.7%
Dazix	.2	.0	.1	1	6.0%	2.8%	13.9%	1.8%
Mentor Graphics	.1	.0	.0	1	2.8%	2.1%	5.6%	1.2%
Hewlett-Packard	.1	.0	.0	4	2.0%	2.1%	.0%	4.9%
Intergraph	.1	.0	.0	0	2.0%	2.1%	1.4%	.6%
Valid	.0	.0	.0	0	1.6%	.7%	2.8%	.3%
Other Companies	.2	.2	.0	12	7.6%	12.0%	.0%	15.1%
All Companies	2.5	1.4	.7	79	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	2.1	1.3	.5	76	84.1%	91.5%	63.9%	96.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.4	.1	.3	3	15.9%	8.5%	36.1%	3.9%
All Hardware Companies	1.0	.8	.0	66	40.2%	57.0%	.0%	83.6%
All Turnkey & SW Companies	1.5	.6	.7	13	59.8%	43.0%	100.0%	16.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 67
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Taiwan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	21.4	14.4	3.6	573	38.5%	42.3%	25.9%	29.1%
Computervision	5.4	2.2	2.4	45	9.7%	6.6%	17.4%	2.3%
Valid	4.8	1.2	3.3	24	8.6%	3.4%	23.7%	1.2%
Digital	3.5	2.7	.0	26	6.4%	7.9%	.0%	1.3%
Silicon Graphics	2.8	2.5	.0	70	5.0%	7.3%	.0%	3.6%
Dazix	2.5	.7	1.5	22	4.4%	2.2%	11.2%	1.1%
Mentor Graphics	2.0	.8	1.0	26	3.6%	2.4%	7.3%	1.3%
Newlett-Packard	1.7	1.4	.0	156	3.1%	4.2%	.0%	7.9%
Intergraph	1.4	.8	.3	15	2.6%	2.2%	1.9%	.7%
Sun	1.1	1.0	.0	92	1.9%	2.8%	.0%	4.7%
Racal-Redac	.6	.2	.4	5	1.2%	.6%	3.0%	.3%
Other Companies	4.8	4.5	.0	656	8.6%	13.3%	.0%	33.3%
All Companies	55.6	34.1	13.8	1,969	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	55.0	33.9	13.4	1,964	98.8%	99.4%	97.0%	99.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.6	.2	.4	5	1.2%	.6%	3.0%	.3%
All Hardware Companies	17.5	15.2	.0	1,625	31.4%	44.6%	.0%	82.5%
All Turnkey & SW Companies	38.2	18.9	13.8	344	68.6%	55.4%	100.0%	17.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 68
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Taiwan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Valid	4.8	1.2	3.3	24	19.3%	9.6%	33.5%	4.9%
Computervision	4.0	1.6	1.8	28	16.0%	13.1%	18.8%	5.9%
Silicon Graphics	2.8	2.5	.0	70	11.1%	21.0%	.0%	14.5%
Dazix	2.5	.7	1.5	22	10.0%	6.2%	15.8%	4.6%
Mentor Graphics	2.0	.8	1.0	26	8.2%	7.0%	10.4%	5.5%
IBM	1.8	1.2	.3	16	7.2%	9.7%	3.5%	3.3%
Hewlett-Packard	1.5	1.3	.0	147	6.2%	10.7%	.0%	30.4%
Intergraph	1.1	.6	.2	12	4.6%	5.4%	2.1%	2.5%
Sun	.9	.8	.0	83	3.4%	6.5%	.0%	17.2%
Digital	.8	.6	.0	26	3.2%	5.0%	.0%	5.4%
Racal-Redac	.6	.2	.4	5	2.4%	1.7%	3.9%	1.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	24.7	11.9	9.8	483	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	24.1	11.7	9.4	478	97.6%	98.3%	96.1%	99.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.6	.2	.4	5	2.4%	1.7%	3.9%	1.0%
All Hardware Companies	6.5	5.5	.0	347	26.2%	46.0%	.0%	71.8%
All Turnkey & SW Companies	18.2	6.4	9.8	136	73.8%	54.0%	100.0%	28.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 69
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Taiwan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	17.8	11.5	3.2	186	69.9%	67.1%	84.3%	57.2%
Digital	2.7	2.1	.0	0	10.8%	12.1%	.0%	.0%
Computervision	1.4	.7	.5	17	5.6%	4.0%	13.6%	5.2%
Intergraph	.3	.1	.0	2	1.0%	.6%	.8%	.8%
Sun	.2	.2	.0	9	.9%	1.1%	.0%	2.9%
Hewlett-Packard	.2	.2	.0	9	.7%	.9%	.0%	2.8%
Silicon Graphics	.0	.0	.0	0	.1%	.0%	.0%	.0%
Other Companies	2.5	2.3	.0	99	10.0%	13.4%	.0%	30.4%
All Companies	25.4	17.1	3.8	326	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	25.4	17.1	3.8	326	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	5.7	4.7	.0	119	22.4%	27.5%	.0%	36.4%
All Turnkey & SW Companies	19.7	12.4	3.8	207	77.6%	72.5%	100.0%	63.6%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 70
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Taiwan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	1.8	1.8	.0	371	33.4%	34.9%	.0%	32.0%
Computervision	.0	.0	.0	0	.7%	.0%	21.1%	.0%
Intergraph	.0	.0	.0	0	.7%	.0%	15.8%	.0%
Racal-Redac	.0	.0	.0	0	.7%	.0%	15.8%	.0%
Other Companies	2.2	2.2	.0	557	40.5%	44.5%	.0%	48.0%
All Companies	5.5	5.0	.2	1,160	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	5.5	5.0	.2	1,160	99.3%	100.0%	84.2%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.7%	.0%	15.8%	.0%
All Hardware Companies	5.3	5.0	.0	1,160	96.2%	100.0%	.0%	100.0%
All Turnkey & SW Companies	.2	.0	.2	0	3.8%	.0%	100.0%	.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 71
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Taiwan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	17.8	11.8	3.1	376	57.0%	55.7%	60.8%	42.6%
Computervision	3.8	1.6	1.7	32	12.3%	7.5%	34.0%	3.6%
Silicon Graphics	2.4	2.2	.0	61	7.7%	10.3%	.0%	6.9%
Digital	2.0	1.5	.0	14	6.5%	7.1%	.0%	1.6%
Hewlett-Packard	.7	.6	.0	62	2.2%	2.7%	.0%	7.0%
Sun	.5	.5	.0	45	1.7%	2.2%	.0%	5.1%
Intergraph	.4	.2	.1	4	1.3%	1.0%	1.6%	.4%
Mentor Graphics	.0	.0	.0	1	.1%	.0%	.4%	.1%
Other Companies	2.2	2.0	.0	183	7.0%	9.5%	.0%	20.7%
All Companies	31.2	21.2	5.0	884	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	31.2	21.2	5.0	884	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	9.7	8.3	.0	671	31.1%	39.3%	.0%	76.0%
All Turnkey & SW Companies	21.5	12.9	5.0	212	68.9%	60.7%	100.0%	24.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 72
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Taiwan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	2.2	1.6	.3	146	32.4%	31.2%	37.2%	21.3%
Computervision	.9	.4	.4	8	13.3%	7.4%	51.3%	1.1%
Intergraph	.4	.2	.1	4	5.5%	3.6%	9.0%	.6%
Silicon Graphics	.4	.3	.0	9	5.2%	5.9%	.0%	1.3%
Digital	.3	.2	.0	2	4.6%	4.6%	.0%	.3%
Hewlett-Packard	.2	.2	.0	19	3.0%	3.2%	.0%	2.8%
Sun	.1	.1	.0	9	1.4%	1.7%	.0%	1.3%
Other Companies	1.8	1.7	.0	386	25.5%	33.0%	.0%	56.4%
All Companies	6.9	5.3	.8	685	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	6.9	5.3	.8	685	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	4.0	3.6	.0	656	57.5%	69.3%	.0%	95.8%
All Turnkey & SW Companies	2.9	1.6	.8	29	42.5%	30.7%	100.0%	4.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 73
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Taiwan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	.7	.5	.1	30	39.7%	39.8%	50.0%	38.2%
Intergraph	.5	.3	.1	5	28.5%	22.0%	40.9%	6.5%
Digital	.2	.1	.0	1	10.1%	10.6%	.0%	1.5%
Sun	.1	.1	.0	5	2.8%	4.1%	.0%	5.8%
Hewlett-Packard	.0	.0	.0	2	1.1%	.8%	.0%	2.0%
Other Companies	.2	.2	.0	29	12.8%	17.9%	.0%	35.8%
All Companies	1.8	1.2	.2	80	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1.8	1.2	.2	80	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.6	.6	.0	68	35.8%	45.5%	.0%	85.5%
All Turnkey & SW Companies	1.2	.7	.2	12	64.2%	54.5%	100.0%	14.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 74
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Taiwan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Valid	4.8	1.2	3.3	24	30.3%	18.0%	42.2%	7.4%
Dazix	2.5	.7	1.5	22	15.6%	11.6%	19.9%	7.0%
Mentor Graphics	2.0	.8	1.0	26	12.6%	12.8%	12.8%	8.1%
Digital	1.0	.8	.0	9	6.5%	12.5%	.0%	2.7%
Hewlett-Packard	.8	.7	.0	74	5.1%	10.5%	.0%	23.0%
IBM	.7	.5	.1	20	4.3%	7.2%	1.4%	6.4%
Computervision	.7	.3	.3	5	4.1%	4.2%	3.6%	1.7%
Racal-Redac	.6	.2	.4	5	4.1%	3.1%	5.3%	1.5%
Sun	.4	.4	.0	34	2.5%	5.5%	.0%	10.5%
Intergraph	.2	.1	.0	2	1.0%	1.3%	.3%	.5%
Other Companies	.6	.6	.0	59	3.7%	8.6%	.0%	18.3%
All Companies	15.8	6.4	7.7	321	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	15.1	6.2	7.3	316	95.9%	96.9%	94.7%	98.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.6	.2	.4	5	4.1%	3.1%	5.3%	1.5%
All Hardware Companies	3.2	2.7	.0	229	20.2%	41.8%	.0%	71.5%
All Turnkey & SW Companies	12.6	3.7	7.7	92	79.8%	58.2%	100.0%	28.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 75
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Taiwan
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Valid	2.4	.6	1.6	12	31.1%	20.3%	39.2%	7.8%
Mentor Graphics	1.6	.7	.8	21	20.5%	23.1%	19.0%	13.4%
Dazix	1.2	.4	.8	11	16.0%	13.2%	18.5%	7.3%
Hewlett-Packard	.5	.4	.0	46	6.5%	14.9%	.0%	30.0%
Digital	.4	.3	.0	4	5.5%	11.7%	.0%	2.3%
Racal-Redac	.1	.0	.1	1	1.6%	1.4%	1.7%	.6%
Intergraph	.1	.0	.0	1	.8%	1.1%	.2%	.4%
IBM	.0	.0	.0	7	.4%	1.1%	.0%	4.3%
Other Companies	.3	.2	.0	34	3.3%	8.2%	.0%	22.0%
All Companies	7.7	2.8	4.2	154	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	7.6	2.8	4.1	153	98.4%	98.6%	98.3%	99.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.1	.0	.1	1	1.6%	1.4%	1.7%	.6%
All Hardware Companies	1.3	1.1	.0	108	16.9%	39.1%	.0%	70.3%
All Turnkey & SW Companies	6.4	1.7	4.2	46	83.1%	60.9%	100.0%	29.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 76
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Taiwan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Valid	1.2	.3	.8	6	64.3%	43.3%	84.5%	25.6%
Digital	.2	.2	.0	2	12.4%	25.4%	.0%	8.4%
Mentor Graphics	.2	.1	.1	2	9.7%	11.9%	9.3%	10.2%
Hewlett-Packard	.1	.1	.0	12	7.6%	16.4%	.0%	52.9%
Other Companies	.0	.0	.0	0	1.1%	3.0%	.0%	.0%
All Companies	1.9	.7	1.0	23	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1.9	.7	1.0	23	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.4	.3	.0	15	21.1%	44.8%	.0%	63.8%
All Turnkey & SW Companies	1.5	.4	1.0	8	78.9%	55.2%	100.0%	36.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

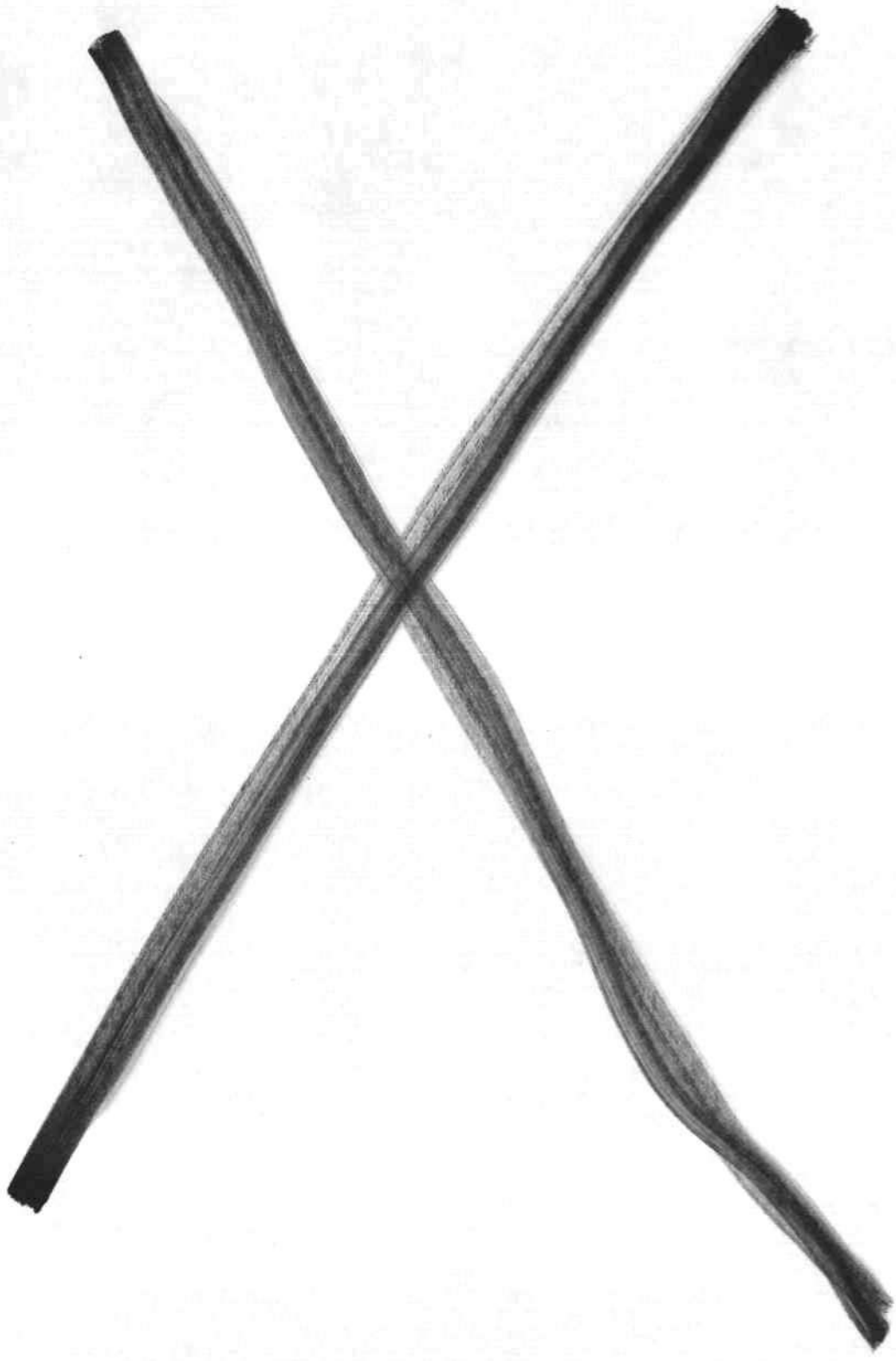
Market Share

TABLE NUMBER: 77
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Taiwan
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Dazix	1.2	.4	.8	11	19.8%	12.7%	29.5%	7.8%
Valid	1.2	.3	.8	6	19.1%	10.0%	31.4%	4.2%
Computervision	.7	.3	.3	5	10.5%	9.3%	10.7%	3.8%
IBM	.6	.4	.1	14	10.3%	14.8%	4.2%	9.6%
Racal-Redac	.5	.2	.3	4	8.4%	5.5%	13.0%	2.8%
Sun	.4	.4	.0	34	6.3%	12.0%	.0%	23.5%
Digital	.4	.3	.0	3	6.1%	10.3%	.0%	2.2%
Mentor Graphics	.2	.1	.1	3	3.5%	3.1%	4.2%	2.0%
Hewlett-Packard	.2	.1	.0	15	2.7%	4.8%	.0%	10.7%
Intergraph	.1	.1	.0	1	1.4%	1.7%	.4%	.6%
Other Companies	.3	.3	.0	25	5.1%	10.3%	.0%	17.4%
All Companies	6.2	2.9	2.6	144	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	5.7	2.8	2.3	140	91.6%	94.5%	87.0%	97.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.5	.2	.3	4	8.4%	5.5%	13.0%	2.8%
All Hardware Companies	1.5	1.3	.0	106	24.0%	43.6%	.0%	74.0%
All Turnkey & SW Companies	4.7	1.6	2.6	37	76.0%	56.4%	100.0%	26.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May



Market Share

TABLE NUMBER: 1
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	589.0	403.5	94.2	20,113	13.8%	16.4%	8.7%	14.2%
Computervision	458.0	211.1	108.9	3,851	10.7%	8.6%	10.1%	2.7%
Digital	359.8	269.4	.0	2,612	8.4%	10.9%	.0%	1.8%
Hewlett-Packard	352.6	254.6	30.6	20,462	8.2%	10.3%	2.8%	14.5%
Intergraph	288.4	151.8	56.7	2,944	6.7%	6.2%	5.2%	2.1%
Compaq	139.0	139.0	.0	23,166	3.2%	5.6%	.0%	16.4%
Siemens	127.1	75.0	38.1	2,819	3.0%	3.0%	3.5%	2.0%
Mentor Graphics	105.8	30.7	52.1	1,400	2.5%	1.2%	4.8%	1.0%
Control Data	93.7	66.5	11.2	1,000	2.2%	2.7%	1.0%	.7%
McDonnell Douglas	86.9	46.6	31.6	1,499	2.0%	1.9%	2.9%	1.1%
Schlumberger (Applicon)	70.4	26.4	22.6	738	1.6%	1.1%	2.1%	.5%
Sun	66.3	59.7	.0	4,450	1.5%	2.4%	.0%	3.1%
Autodesk	57.9	.0	57.9	0	1.4%	.0%	5.4%	.0%
Dazix	55.3	21.0	22.2	551	1.3%	.9%	2.0%	.4%
PAFEC	51.4	.0	51.4	0	1.2%	.0%	4.8%	.0%
Matra Datavision	51.3	30.8	15.4	356	1.2%	1.3%	1.4%	.3%
Apple Computer	49.9	43.9	.0	9,600	1.2%	1.8%	.0%	6.8%
Norsk Data	47.7	24.0	13.9	521	1.1%	1.0%	1.3%	.4%
Racal-Redac	46.0	.2	37.8	163	1.1%	.0%	3.5%	.1%
Valid	43.5	10.9	23.5	0	1.0%	.4%	2.2%	.0%
Dassault	31.6	.0	26.2	0	.7%	.0%	2.4%	.0%
ISICAD	31.2	13.1	13.3	334	.7%	.5%	1.2%	.2%
Cisigraph	29.3	11.7	10.6	327	.7%	.5%	1.0%	.2%
Ferranti	28.0	17.9	5.4	252	.7%	.7%	.5%	.2%
ItalCad	24.0	12.2	8.9	250	.6%	.5%	.8%	.2%
Investronica SA	23.6	18.9	2.4	943	.6%	.8%	.2%	.7%
STI-Straessle	20.3	9.2	10.0	137	.5%	.4%	.9%	.1%
Silicon Graphics	19.1	17.0	.0	569	.4%	.7%	.0%	.4%
Wiechers Datentechnik	17.0	8.5	8.5	400	.4%	.3%	.8%	.3%
SDRC	15.8	.0	15.8	0	.4%	.0%	1.5%	.0%
Syssc	15.6	7.0	4.1	116	.4%	.3%	.4%	.1%
ICL	15.4	9.5	4.2	432	.4%	.4%	.4%	.3%
Ziegler	15.0	.6	13.7	495	.4%	.0%	1.3%	.4%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 1
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mannesmann PROCAD	15.0	7.5	4.5	200	.4%	.3%	.4%	.1%
Unisys	14.6	5.7	7.0	275	.3%	.2%	.6%	.2%
Olivetti	13.8	4.1	6.0	2,303	.3%	.2%	.6%	1.6%
ABB Cade International	13.6	7.5	3.2	5	.3%	.3%	.3%	.0%
Engineering Computer Services	13.5	5.4	4.6	247	.3%	.2%	.4%	.2%
Calay	13.5	4.2	6.8	134	.3%	.2%	.6%	.1%
Fides Industrielle Automation	13.2	2.6	9.2	62	.3%	.1%	.9%	.0%
Westward	13.0	13.0	.0	760	.3%	.5%	.0%	.5%
Silicon Compiler Systems	13.0	.0	8.7	0	.3%	.0%	.8%	.0%
Exapt	12.4	8.2	2.9	212	.3%	.3%	.3%	.1%
Secmai	12.4	7.4	2.6	101	.3%	.3%	.2%	.1%
CADAM	12.3	.0	11.0	0	.3%	.0%	1.0%	.0%
Vero International Software	12.3	.0	12.3	0	.3%	.0%	1.1%	.0%
Datagraph	12.2	9.8	2.4	50	.3%	.4%	.2%	.0%
Cimlinc	12.1	5.1	4.4	1,048	.3%	.2%	.4%	.7%
ISYKON Software	11.7	6.4	4.1	220	.3%	.3%	.4%	.2%
CAD Lab	11.5	.0	9.3	0	.3%	.0%	.9%	.0%
Cimatron	11.1	5.1	4.9	331	.3%	.2%	.5%	.2%
t2 Solutions	10.9	5.8	3.6	102	.3%	.2%	.3%	.1%
Cadence	10.1	.0	8.5	0	.2%	.0%	.8%	.0%
MacNeal-Schwendler	9.5	.0	9.0	0	.2%	.0%	.8%	.0%
Star Informatic	9.3	4.2	2.8	394	.2%	.2%	.3%	.3%
Scientific Calc.	9.1	2.0	4.6	42	.2%	.1%	.4%	.0%
Auto-Trol	8.5	3.3	2.2	100	.2%	.1%	.2%	.1%
ESRI	8.5	.0	7.5	0	.2%	.0%	.7%	.0%
Zycad	7.9	5.5	.2	38	.2%	.2%	.0%	.0%
DAT Standard Information syste	7.7	.0	7.7	0	.2%	.0%	.7%	.0%
LPKF	7.5	4.5	2.3	750	.2%	.2%	.2%	.5%
Cadtronic	7.5	5.7	1.0	51	.2%	.2%	.1%	.0%
European Silicon Systems	7.3	1.8	5.5	40	.2%	.1%	.5%	.0%
V:I Technology	7.2	.4	5.7	24	.2%	.0%	.5%	.0%
Rotring EURCAD	6.7	4.1	2.6	200	.2%	.2%	.2%	.1%
Gerber Systems	6.1	3.7	1.5	85	.1%	.1%	.1%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 1
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
PDA Engineering	5.6	.0	5.6	0	.1%	.0%	.5%	.0%
Framesoft	5.5	.0	6.1	24	.1%	.0%	.6%	.0%
Radan Computational	5.4	3.2	1.6	220	.1%	.1%	.1%	.2%
Synercom	5.3	.0	3.2	0	.1%	.0%	.3%	.0%
Aucotec	5.2	2.0	2.6	578	.1%	.1%	.2%	.4%
LSI Logic	5.0	.5	3.7	19	.1%	.0%	.3%	.0%
Technische Computer Systeme	4.8	1.4	3.3	128	.1%	.1%	.3%	.1%
Albert Nestler	4.6	1.4	2.1	151	.1%	.1%	.2%	.1%
Xilinx	4.5	.0	4.1	0	.1%	.0%	.4%	.0%
Teradyne	4.0	.0	3.2	0	.1%	.0%	.3%	.0%
Robocom	4.0	.0	4.0	0	.1%	.0%	.4%	.0%
BATISOFT	4.0	.6	3.0	227	.1%	.0%	.3%	.2%
Superdraft	4.0	.2	3.6	0	.1%	.0%	.3%	.0%
Serbi	3.8	.0	3.8	0	.1%	.0%	.4%	.0%
Pathtrace	3.8	1.0	2.5	88	.1%	.0%	.2%	.1%
Marcus Computer Systems	3.7	2.0	1.1	125	.1%	.1%	.1%	.1%
Genrad	3.6	.6	2.4	0	.1%	.0%	.2%	.0%
Datagraphic	3.6	1.6	1.3	60	.1%	.1%	.1%	.0%
Intercad	3.3	1.6	1.0	168	.1%	.1%	.1%	.1%
Silvar-Lisco	3.2	.0	1.8	0	.1%	.0%	.2%	.0%
BETRONEX	3.1	.0	3.1	0	.1%	.0%	.3%	.0%
Manufacturing Consultants	3.0	.0	2.6	0	.1%	.0%	.2%	.0%
Assigraph	2.9	.0	2.3	35	.1%	.0%	.2%	.0%
Philips International	2.9	1.0	1.4	10	.1%	.0%	.1%	.0%
ALS Design	2.9	.3	2.3	50	.1%	.0%	.2%	.0%
Swanson Analysis	2.8	.0	2.8	0	.1%	.0%	.3%	.0%
Gable CAD Systems	2.8	1.7	1.1	23	.1%	.1%	.1%	.0%
Academi Systems	1.9	.4	1.3	23	.0%	.0%	.1%	.0%
Catalpa	1.7	.5	.9	14	.0%	.0%	.1%	.0%
XAO Industrie	1.7	.6	1.0	91	.0%	.0%	.1%	.1%
Sycotronic AG	1.6	.0	1.3	3	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 1 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compiegne Science Industrie	1.5	.0	.8	0	.0%	.0%	.1%	.0%
DECAD	1.4	.1	1.0	11	.0%	.0%	.1%	.0%
FEGS	1.2	.0	1.0	0	.0%	.0%	.1%	.0%
Vision 3D	1.2	.6	.4	0	.0%	.0%	.0%	.0%
Data I/O	1.1	.0	1.0	0	.0%	.0%	.1%	.0%
CAD-UL	1.1	.3	.8	40	.0%	.0%	.1%	.0%
ACERI SA	.8	.3	.3	14	.0%	.0%	.0%	.0%
ICAD	.6	.0	.5	0	.0%	.0%	.0%	.0%
Computational Mechanics	.5	.0	.5	0	.0%	.0%	.0%	.0%
Other Companies	375.6	315.0	35.3	30,913.1	8.8%	12.8%	3.3%	21.9%
All Companies	4,279.7	2,460.6	1,080.5	141,285.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	3,418.9	2,103.7	680.6	125,743	79.9%	85.5%	63.0%	89.0%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	860.8	356.9	399.9	15,541.9	20.1%	14.5%	37.0%	11.0%
All Hardware Companies	1,213.0	1,049.9	.0	102,233.8	28.3%	42.7%	.0%	72.4%
All Turnkey & SW Companies	3,066.7	1,410.7	1,080.5	39,051.4	71.7%	57.3%	100.0%	27.6%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 2
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Computervision	387.0	178.3	92.1	2,345	17.7%	16.5%	13.9%	6.2%
Hewlett-Packard	295.0	207.2	30.6	11,756	13.5%	19.1%	4.6%	31.2%
Intergraph	228.8	125.8	41.1	2,448	10.4%	11.6%	6.2%	6.5%
Siemens	115.2	68.0	34.5	2,680	5.3%	6.3%	5.2%	7.1%
Mentor Graphics	105.8	30.7	52.1	1,400	4.8%	2.8%	7.8%	3.7%
Digital	79.1	58.8	.0	2,612	3.6%	5.4%	.0%	6.9%
Sun	66.3	59.7	.0	4,450	3.0%	5.5%	.0%	11.8%
McDonnell Douglas	61.8	33.2	22.5	695	2.8%	3.1%	3.4%	1.8%
Schlumberger (Applicon)	61.7	23.2	19.8	576	2.8%	2.1%	3.0%	1.5%
Dazix	55.3	21.0	22.2	551	2.5%	1.9%	3.3%	1.5%
Matra Datavision	51.3	30.8	15.4	0	2.3%	2.8%	2.3%	.0%
IBM	47.1	30.5	8.6	424	2.2%	2.8%	1.3%	1.1%
PAFEC	46.6	.0	46.6	0	2.1%	.0%	7.0%	.0%
Racal-Redac	44.8	.2	36.7	155	2.0%	.0%	5.5%	.4%
Valid	43.5	10.9	23.5	0	2.0%	1.0%	3.5%	.0%
Control Data	31.8	22.6	3.8	585	1.5%	2.1%	.6%	1.6%
ISICAD	27.1	13.1	9.2	334	1.2%	1.2%	1.4%	.9%
Cisigraph	26.4	10.6	9.5	318	1.2%	1.0%	1.4%	.8%
ItalCad	24.0	12.2	8.9	250	1.1%	1.1%	1.3%	.7%
Norsk Data	20.5	10.4	5.7	300	.9%	1.0%	.9%	.8%
Silicon Graphics	18.0	16.0	.0	535	.8%	1.5%	.0%	1.4%
STI-Straessle	15.8	7.2	7.8	117	.7%	.7%	1.2%	.3%
ICL	15.4	9.5	4.2	432	.7%	.9%	.6%	1.1%
Mannesmann PROCAD	15.0	7.5	4.5	200	.7%	.7%	.7%	.5%
ABB Cade International	13.6	7.5	3.2	5	.6%	.7%	.5%	.0%
Calay	13.5	4.2	6.8	134	.6%	.4%	1.0%	.4%
Silicon Compiler Systems	13.0	.0	8.7	0	.6%	.0%	1.3%	.0%
SDRC	12.7	.0	12.7	0	.6%	.0%	1.9%	.0%
Unisys	12.5	4.8	6.1	222	.6%	.4%	.9%	.6%
Secmai	12.2	7.3	2.6	99	.6%	.7%	.4%	.3%
Cimlinc	12.1	5.1	4.4	1,048	.6%	.5%	.7%	2.8%
ISYKON Software	11.7	6.4	4.1	220	.5%	.6%	.6%	.6%
CAD Lab	10.9	.0	8.7	0	.5%	.0%	1.3%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 2
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
t2 Solutions	10.9	5.8	3.6	102	.5%	.5%	.5%	.3%
Dassault	10.5	.0	9.0	0	.5%	.0%	1.4%	.0%
Cimatron	10.0	4.6	4.4	298	.5%	.4%	.7%	.8%
Star Informatic	9.3	4.2	2.8	394	.4%	.4%	.4%	1.0%
Auto-Trol	8.5	3.3	2.2	100	.4%	.3%	.3%	.3%
Westward	7.8	7.8	.0	417	.4%	.7%	.0%	1.1%
Cadence	7.3	.0	6.2	0	.3%	.0%	.9%	.0%
Engineering Computer Services	7.3	2.9	2.5	78	.3%	.3%	.4%	.2%
Scientific Calc.	6.8	1.8	3.2	33	.3%	.2%	.5%	.1%
VLSI Technology	6.2	.4	4.9	20	.3%	.0%	.7%	.1%
Gerber Systems	6.1	3.7	1.5	85	.3%	.3%	.2%	.2%
European Silicon Systems	5.8	1.5	4.4	27	.3%	.1%	.7%	.1%
Framesoft	5.5	.0	6.1	24	.3%	.0%	.9%	.1%
Radan Computational	5.4	3.2	1.6	220	.2%	.3%	.2%	.6%
Wiechers Datentechnik	5.1	2.6	2.5	120	.2%	.2%	.4%	.3%
Technische Computer Systeme	4.8	1.4	3.3	128	.2%	.1%	.5%	.3%
LSI Logic	4.5	.5	3.4	17	.2%	.0%	.5%	.0%
Albert Nestler	4.2	1.3	2.0	123	.2%	.1%	.3%	.3%
Sysscan	3.8	1.7	1.0	0	.2%	.2%	.1%	.0%
ESRI	3.3	.0	2.8	0	.2%	.0%	.4%	.0%
Exapt	3.1	1.4	1.3	69	.1%	.1%	.2%	.2%
PDA Engineering	3.1	.0	3.1	0	.1%	.0%	.5%	.0%
Synercom	3.0	.0	1.8	0	.1%	.0%	.3%	.0%
Marcus Computer Systems	3.0	1.6	.9	100	.1%	.2%	.1%	.3%
Silvar-Lisco	2.9	.0	1.6	0	.1%	.0%	.2%	.0%
Genrad	2.8	.4	1.9	0	.1%	.0%	.3%	.0%
Rotring EURCAD	2.7	1.9	.9	91	.1%	.2%	.1%	.2%
Fides Industrielle Automation	2.6	.5	1.8	31	.1%	.0%	.3%	.1%
Gable CAD Systems	2.5	1.5	1.0	21	.1%	.1%	.2%	.1%
Assigraph	1.9	.0	1.5	0	.1%	.0%	.2%	.0%
Autodesk	1.8	.0	1.8	0	.1%	.0%	.3%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 2 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Catalpa	1.7	.5	.9	14	.1%	.0%	.1%	.0%
XAO Industrie	1.7	.6	1.0	91	.1%	.1%	.2%	.2%
Academi Systems	1.6	.3	1.1	19	.1%	.0%	.2%	.1%
CADAM	1.6	.0	1.4	0	.1%	.0%	.2%	.0%
DECAD	1.3	.1	1.0	10	.1%	.0%	.1%	.0%
Teradyne	1.2	.0	1.0	0	.1%	.0%	.1%	.0%
Manufacturing Consultants	1.1	.0	.9	0	.0%	.0%	.1%	.0%
Compiegne Science Industrie	1.1	.0	.5	0	.0%	.0%	.1%	.0%
MacNeal-Schwendler	1.0	.0	.9	0	.0%	.0%	.1%	.0%
Swanson Analysis	.9	.0	.9	0	.0%	.0%	.1%	.0%
Ferranti	.8	.3	.2	16	.0%	.0%	.0%	.0%
ICAD	.6	.0	.5	0	.0%	.0%	.1%	.0%
FEGS	.5	.0	.4	0	.0%	.0%	.1%	.0%
Aucotec	.3	.1	.1	29	.0%	.0%	.0%	.1%
Xilinx	.2	.0	.2	0	.0%	.0%	.0%	.0%
Serbi	.2	.0	.2	0	.0%	.0%	.0%	.0%
Data I/O	.1	.0	.1	0	.0%	.0%	.0%	.0%
Computational Mechanics	.1	.0	.1	0	.0%	.0%	.0%	.0%
Zycad	.1	.1	.0	0	.0%	.0%	.0%	.0%
Other Companies	17.6	4.1	11.7	167.9	.8%	.4%	1.8%	.4%
All Companies	2,191.5	1,082.2	664.4	37,733.8	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1,645.7	857.2	411.3	30,452	75.1%	79.2%	61.9%	80.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	545.8	225.0	253.1	7,281.8	24.9%	20.8%	38.1%	19.3%
All Hardware Companies	289.0	236.3	.0	15,599.4	13.2%	21.8%	.0%	41.3%
All Turnkey & SW Companies	1,902.5	845.9	664.4	22,134.4	86.8%	78.2%	100.0%	58.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 3
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Europe
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
IBM	468.6	303.4	85.6	4,917	33.6%	33.0%	38.6%	26.0%
Digital	280.7	210.6	.0	0	20.1%	22.9%	.0%	.0%
Computervision	66.4	30.7	15.8	1,383	4.8%	3.3%	7.1%	7.3%
Control Data	61.8	43.9	7.4	415	4.4%	4.8%	3.3%	2.2%
Intergraph	51.9	25.9	8.3	496	3.7%	2.8%	3.8%	2.6%
Ferranti	27.3	17.6	5.1	236	2.0%	1.9%	2.3%	1.2%
Norsk Data	26.8	13.6	8.0	179	1.9%	1.5%	3.6%	.9%
McDonnell Douglas	25.1	13.5	9.1	804	1.8%	1.5%	4.1%	4.3%
Dassault	21.1	.0	17.2	0	1.5%	.0%	7.8%	.0%
Siemens	12.0	7.0	3.6	139	.9%	.8%	1.6%	.7%
Sysscan	11.9	5.4	3.1	116	.9%	.6%	1.4%	.6%
Fides Industrielle Automation	10.6	2.1	7.4	31	.8%	.2%	3.3%	.2%
Exapt	9.3	6.8	1.6	143	.7%	.7%	.7%	.8%
Schlumberger (Applicon)	8.7	3.3	2.8	162	.6%	.4%	1.2%	.9%
MacNeal-Schwendler	8.2	.0	7.8	0	.6%	.0%	3.5%	.0%
Zycad	7.8	5.5	.2	37	.6%	.6%	.1%	.2%
Hewlett-Packard	7.6	6.4	.0	384	.5%	.7%	.0%	2.0%
PAFEC	4.8	.0	4.8	0	.3%	.0%	2.2%	.0%
ESRI	4.5	.0	4.0	0	.3%	.0%	1.8%	.0%
STI-Straessle	4.5	2.0	2.2	20	.3%	.2%	1.0%	.1%
SDRC	3.2	.0	3.2	0	.2%	.0%	1.4%	.0%
Cisigraph	2.9	1.2	1.1	9	.2%	.1%	.5%	.0%
Cadence	2.8	.0	2.3	0	.2%	.0%	1.1%	.0%
PDA Engineering	2.5	.0	2.5	0	.2%	.0%	1.1%	.0%
Scientific Calc.	2.3	.3	1.4	9	.2%	.0%	.6%	.0%
Synercom	2.3	.0	1.4	0	.2%	.0%	.6%	.0%
Unisys	2.1	.9	1.0	53	.1%	.1%	.4%	.3%
CADAM	2.0	.0	1.8	0	.1%	.0%	.8%	.0%
Teradyne	2.0	.0	1.6	0	.1%	.0%	.7%	.0%
Swanson Analysis	1.6	.0	1.6	0	.1%	.0%	.7%	.0%
Manufacturing Consultants	1.3	.0	1.1	0	.1%	.0%	.5%	.0%
Racal-Redac	1.2	.0	1.0	8	.1%	.0%	.5%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 3 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Europe
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Silicon Graphics	1.2	1.0	.0	34	.1%	.1%	.0%	.2%
VLSI Technology	1.1	.1	.9	4	.1%	.0%	.4%	.0%
Assigraph	1.0	.0	.8	35	.1%	.0%	.4%	.2%
Olivetti	1.0	.5	.4	73	.1%	.1%	.2%	.4%
FEGS	.7	.0	.6	0	.1%	.0%	.3%	.0%
Genrad	.7	.1	.5	0	.1%	.0%	.2%	.0%
LSI Logic	.5	.1	.4	2	.0%	.0%	.2%	.0%
Compiegne Science Industrie	.5	.0	.2	0	.0%	.0%	.1%	.0%
Computational Mechanics	.4	.0	.4	0	.0%	.0%	.2%	.0%
Silvar-Lisco	.3	.0	.2	0	.0%	.0%	.1%	.0%
Aucotec	.3	.1	.1	29	.0%	.0%	.1%	.2%
Gable CAD Systems	.2	.1	.1	2	.0%	.0%	.0%	.0%
DECAD	.1	.0	.0	1	.0%	.0%	.0%	.0%
Data I/O	.1	.0	.1	0	.0%	.0%	.0%	.0%
Framesoft	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	240.2	216.2	3.3	8,822.5	17.2%	23.6%	1.5%	46.7%
All Companies	1,393.7	918.1	221.7	18,899.4	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1,257.2	861.7	163.9	17,523	90.2%	93.9%	74.0%	92.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	136.5	56.4	57.7	1,376.7	9.8%	6.1%	26.0%	7.3%
All Hardware Companies	525.9	434.1	.0	9,234.7	37.7%	47.3%	.0%	48.9%
All Turnkey & SW Companies	867.8	484.0	221.7	9,664.7	62.3%	52.7%	100.0%	51.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 4
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					..... Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compaq	139.0	139.0	.0	23,166	20.0%	30.2%	.0%	27.4%
IBM	73.3	69.6	.0	14,772	10.5%	15.1%	.0%	17.5%
Autodesk	56.1	.0	56.1	0	8.1%	.0%	28.9%	.0%
Hewlett-Packard	50.0	41.0	.0	8,322	7.2%	8.9%	.0%	9.8%
Apple Computer	49.9	43.9	.0	9,600	7.2%	9.5%	.0%	11.3%
Investronica SA	23.6	18.9	2.4	943	3.4%	4.1%	1.2%	1.1%
Ziegler	15.0	.6	13.7	495	2.2%	.1%	7.0%	.6%
Olivetti	12.8	3.6	5.5	2,229	1.8%	.8%	2.8%	2.6%
Vero International Software	12.3	.0	12.3	0	1.8%	.0%	6.3%	.0%
Datagraph	12.2	9.8	2.4	50	1.8%	2.1%	1.3%	.1%
Wiechers Datentechnik	11.9	6.0	5.9	280	1.7%	1.3%	3.0%	.3%
CADAM	8.7	.0	7.8	0	1.2%	.0%	4.0%	.0%
Intergraph	7.7	.0	7.3	0	1.1%	.0%	3.7%	.0%
DAT Standard Information syste	7.7	.0	7.7	0	1.1%	.0%	4.0%	.0%
LPKF	7.5	4.5	2.3	750	1.1%	1.0%	1.2%	.9%
Cadtronic	7.5	5.7	1.0	51	1.1%	1.2%	.5%	.1%
Engineering Computer Services	6.2	2.5	2.1	169	.9%	.5%	1.1%	.2%
Westward	5.2	5.2	.0	343	.7%	1.1%	.0%	.4%
Aucotec	4.7	1.9	2.3	520	.7%	.4%	1.2%	.6%
Computervision	4.6	2.1	1.0	122	.7%	.5%	.5%	.1%
Xilinx	4.3	.0	3.9	0	.6%	.0%	2.0%	.0%
ISICAD	4.1	.0	4.1	0	.6%	.0%	2.1%	.0%
Robocom	4.0	.0	4.0	0	.6%	.0%	2.1%	.0%
BATISOFT	4.0	.6	3.0	227	.6%	.1%	1.5%	.3%
Rotring EURCAD	4.0	2.2	1.7	109	.6%	.5%	.9%	.1%
Superdraft	4.0	.2	3.6	0	.6%	.0%	1.8%	.0%
Pathtrace	3.8	1.0	2.5	88	.5%	.2%	1.3%	.1%
Serbi	3.6	.0	3.6	0	.5%	.0%	1.9%	.0%
Datagraphic	3.6	1.6	1.3	60	.5%	.4%	.7%	.1%
Intercad	3.3	1.6	1.0	168	.5%	.4%	.5%	.2%
BETRONEX	3.1	.0	3.1	0	.4%	.0%	1.6%	.0%
Philips International	2.9	1.0	1.4	10	.4%	.2%	.7%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 4 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					..... Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
ALS Design	2.9	.3	2.3	50	.4%	.1%	1.2%	.1%
Sycotronic AG	1.6	.0	1.3	3	.2%	.0%	.7%	.0%
European Silicon Systems	1.5	.4	1.1	13	.2%	.1%	.6%	.0%
Vision 3D	1.2	.6	.4	0	.2%	.1%	.2%	.0%
Cimatron	1.1	.5	.5	33	.2%	.1%	.3%	.0%
CAD-UL	1.1	.3	.8	40	.2%	.1%	.4%	.0%
Data I/O	1.0	.0	.8	0	.1%	.0%	.4%	.0%
ACERI SA	.8	.3	.3	14	.1%	.1%	.2%	.0%
Teradyne	.8	.0	.7	0	.1%	.0%	.3%	.0%
Marcus Computer Systems	.7	.4	.2	25	.1%	.1%	.1%	.0%
ESRI	.7	.0	.7	0	.1%	.0%	.4%	.0%
Manufacturing Consultants	.6	.0	.5	0	.1%	.0%	.3%	.0%
CAD Lab	.6	.0	.5	0	.1%	.0%	.3%	.0%
Norsk Data	.4	.1	.2	42	.1%	.0%	.1%	.0%
Albert Nestler	.4	.2	.1	28	.1%	.0%	.1%	.0%
Swanson Analysis	.3	.0	.3	0	.0%	.0%	.2%	.0%
Academi Systems	.3	.1	.2	3	.0%	.0%	.1%	.0%
MacNeal-Schwendler	.3	.0	.3	0	.0%	.0%	.1%	.0%
Secmai	.2	.1	.0	2	.0%	.0%	.0%	.0%
Genrad	.1	.0	.1	0	.0%	.0%	.0%	.0%
Racal-Redac	.1	.0	.1	0	.0%	.0%	.0%	.0%
Other Companies	117.8	94.7	20.3	21,922.7	17.0%	20.6%	10.5%	25.9%
All Companies	694.5	460.3	194.5	84,652.0	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	516.0	384.8	105.4	77,769	74.3%	83.6%	54.2%	91.9%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	178.6	75.5	89.1	6,883.4	25.7%	16.4%	45.8%	8.1%
All Hardware Companies	398.1	379.4	.0	77,399.7	57.3%	82.4%	.0%	91.4%
All Turnkey & SW Companies	296.5	80.8	194.5	7,252.3	42.7%	17.6%	100.0%	8.6%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 5
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
IBM	483.8	325.4	81.0	12,712	18.3%	20.7%	13.1%	16.0%
Computervision	403.0	186.2	95.9	3,389	15.3%	11.8%	15.5%	4.3%
Hewlett-Packard	223.2	161.6	22.1	11,936	8.5%	10.3%	3.6%	15.0%
Digital	194.2	145.7	.0	1,327	7.4%	9.3%	.0%	1.7%
Control Data	89.0	63.2	10.7	950	3.4%	4.0%	1.7%	1.2%
Intergraph	77.3	41.2	15.4	786	2.9%	2.6%	2.5%	1.0%
Compaq	73.7	73.7	.0	12,278	2.8%	4.7%	.0%	15.5%
Schlumberger (Applicon)	67.6	25.7	21.7	708	2.6%	1.6%	3.5%	.9%
Siemens	65.2	38.5	19.6	1,502	2.5%	2.4%	3.2%	1.9%
McDonnell Douglas	58.9	31.6	21.4	857	2.2%	2.0%	3.5%	1.1%
Matra Datavision	51.3	30.8	15.4	356	1.9%	2.0%	2.5%	.4%
PAFEC	42.6	.0	42.6	0	1.6%	.0%	6.9%	.0%
Norsk Data	39.7	20.0	11.4	521	1.5%	1.3%	1.9%	.7%
Sun	35.1	31.6	.0	2,358	1.3%	2.0%	.0%	3.0%
Cisigraph	29.3	11.7	10.6	327	1.1%	.7%	1.7%	.4%
Ferranti	28.0	17.9	5.4	252	1.1%	1.1%	.9%	.3%
Dassault	26.4	.0	22.0	0	1.0%	.0%	3.6%	.0%
Autodesk	23.7	.0	23.7	0	.9%	.0%	3.8%	.0%
Investronica SA	23.6	18.9	2.4	943	.9%	1.2%	.4%	1.2%
Apple Computer	22.5	19.8	.0	4,320	.9%	1.3%	.0%	5.4%
Silicon Graphics	19.1	17.0	.0	569	.7%	1.1%	.0%	.7%
Wiechers Datentechnik	17.0	8.5	8.5	400	.6%	.5%	1.4%	.5%
STI-Straessle	16.2	7.4	8.0	111	.6%	.5%	1.3%	.1%
SDRC	15.8	.0	15.8	0	.6%	.0%	2.6%	.0%
Mannesmann PROCAD	15.0	7.5	4.5	200	.6%	.5%	.7%	.3%
Unisys	14.6	5.7	7.0	275	.6%	.4%	1.1%	.3%
Engineering Computer Services	13.5	5.4	4.6	247	.5%	.3%	.7%	.3%
Fides Industrielle Automation	13.2	2.6	9.2	62	.5%	.2%	1.5%	.1%
ISICAD	12.5	5.5	5.0	140	.5%	.3%	.8%	.2%
Exapt	12.4	8.2	2.9	212	.5%	.5%	.5%	.3%
Vero International Software	12.3	.0	12.3	0	.5%	.0%	2.0%	.0%
Datagraph	12.2	9.8	2.4	50	.5%	.6%	.4%	.1%
Cimlinc	12.1	5.1	4.4	1,048	.5%	.3%	.7%	1.3%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 5
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
ItalCad	12.0	6.1	4.4	125	.5%	.4%	.7%	.2%
Westward	11.7	11.7	.0	684	.4%	.7%	.0%	.9%
ISYKON Software	11.7	6.4	4.1	220	.4%	.4%	.7%	.3%
Cimatron	11.1	5.1	4.9	331	.4%	.3%	.8%	.4%
ABB Cade International	9.5	5.4	2.3	4	.4%	.3%	.4%	.0%
MacNeal-Schwendler	9.5	.0	9.0	0	.4%	.0%	1.5%	.0%
CAD Lab	9.2	.0	7.4	0	.3%	.0%	1.2%	.0%
Olivetti	8.7	2.3	4.3	1,365	.3%	.1%	.7%	1.7%
Auto-Trol	8.5	3.3	2.2	100	.3%	.2%	.4%	.1%
DAT Standard Information syste	7.3	.0	7.3	0	.3%	.0%	1.2%	.0%
ICL	7.3	4.3	2.1	218	.3%	.3%	.3%	.3%
Gerber Systems	6.1	3.7	1.5	85	.2%	.2%	.2%	.1%
Ziegler	5.8	.2	5.3	193	.2%	.0%	.9%	.2%
PDA Engineering	5.6	.0	5.6	0	.2%	.0%	.9%	.0%
Framesoft	5.5	.0	6.1	24	.2%	.0%	1.0%	.0%
Technische Computer Systeme	4.8	1.4	3.3	128	.2%	.1%	.5%	.2%
CADAM	4.7	.0	4.2	0	.2%	.0%	.7%	.0%
Radan Computational	4.6	2.8	1.4	187	.2%	.2%	.2%	.2%
Albert Nestler	4.6	1.4	2.1	151	.2%	.1%	.3%	.2%
Rotring EURCAD	4.5	2.8	1.7	139	.2%	.2%	.3%	.2%
Superdraft	4.0	.2	3.6	0	.1%	.0%	.6%	.0%
Pathtrace	3.8	1.0	2.5	88	.1%	.1%	.4%	.1%
Marcus Computer Systems	3.7	2.0	1.1	125	.1%	.1%	.2%	.2%
Manufacturing Consultants	3.0	.0	2.6	0	.1%	.0%	.4%	.0%
Philips International	2.9	1.0	1.4	10	.1%	.1%	.2%	.0%
Swanson Analysis	2.8	.0	2.8	0	.1%	.0%	.5%	.0%
Intercad	2.3	1.2	.7	118	.1%	.1%	.1%	.1%
Mentor Graphics	2.1	.6	1.0	28	.1%	.0%	.2%	.0%
Serbi	1.9	.0	1.9	0	.1%	.0%	.3%	.0%
Robocom	1.9	.0	1.9	0	.1%	.0%	.3%	.0%
Catalpa	1.7	.5	.9	14	.1%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 5 (Continued)
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
XAO Industrie	1.7	.6	1.0	91	.1%	.0%	.2%	.1%
Compiegne Science Industrie	1.5	.0	.8	0	.1%	.0%	.1%	.0%
FEGS	1.2	.0	1.0	0	.0%	.0%	.2%	.0%
Vision 30	1.2	.6	.4	0	.0%	.0%	.1%	.0%
ACERI SA	.8	.3	.3	14	.0%	.0%	.1%	.0%
Cadtronic	.8	.6	.1	3	.0%	.0%	.0%	.0%
ICAD	.6	.0	.5	0	.0%	.0%	.1%	.0%
Computational Mechanics	.5	.0	.5	0	.0%	.0%	.1%	.0%
Other Companies	204.3	182.4	8.3	16,140.4	7.7%	11.6%	1.3%	20.3%
All Companies	2,639.2	1,573.9	618.0	79,422.5	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	2,085.2	1,331.3	368.0	70,123	79.0%	84.6%	59.5%	88.3%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	553.9	242.6	250.0	9,299.3	21.0%	15.4%	40.5%	11.7%
All Hardware Companies	676.6	587.8	.0	54,077.8	25.6%	37.3%	.0%	68.1%
All Turnkey & SW Companies	1,962.5	986.1	618.0	25,344.7	74.4%	62.7%	100.0%	31.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 6
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Intergraph	77.3	41.2	15.4	786	15.0%	12.7%	13.3%	2.7%
IBM	66.9	51.1	7.5	5,601	13.0%	15.7%	6.5%	19.0%
Hewlett-Packard	45.6	33.9	3.7	2,756	8.9%	10.4%	3.2%	9.3%
Digital	39.6	29.7	.0	270	7.7%	9.2%	.0%	.9%
Compaq	32.0	32.0	.0	5,328	6.2%	9.8%	.0%	18.1%
Autodesk	23.7	.0	23.7	0	4.6%	.0%	20.5%	.0%
Apple Computer	21.5	18.9	.0	4,128	4.2%	5.8%	.0%	14.0%
ISICAD	18.7	7.6	8.3	194	3.6%	2.3%	7.2%	.7%
Computervision	18.3	8.5	4.4	154	3.6%	2.6%	3.8%	.5%
McDonnell Douglas	17.7	9.5	6.4	309	3.4%	2.9%	5.5%	1.0%
t2 Solutions	10.9	5.8	3.6	102	2.1%	1.8%	3.1%	.3%
ItalCad	9.8	5.0	3.6	103	1.9%	1.5%	3.1%	.3%
Siemens	9.6	5.7	2.9	192	1.9%	1.7%	2.5%	.7%
Star Informatic	9.3	4.2	2.8	394	1.8%	1.3%	2.4%	1.3%
PAFEC	8.8	.0	8.8	0	1.7%	.0%	7.6%	.0%
Norsk Data	5.8	2.9	1.8	0	1.1%	.9%	1.5%	.0%
Cadtronic	4.5	3.5	.6	30	.9%	1.1%	.5%	.1%
Dassault	4.1	.0	3.4	0	.8%	.0%	2.9%	.0%
BATISOFT	4.0	.6	3.0	227	.8%	.2%	2.6%	.8%
Datagraphic	3.6	1.6	1.3	60	.7%	.5%	1.1%	.2%
Olivetti	3.4	1.3	1.1	638	.7%	.4%	1.0%	2.2%
Sun	3.3	3.0	.0	223	.6%	.9%	.0%	.8%
Gable CAD Systems	2.8	1.7	1.1	23	.5%	.5%	.9%	.1%
CAD Lab	2.3	.0	1.9	0	.4%	.0%	1.6%	.0%
Control Data	1.9	1.3	.2	20	.4%	.4%	.2%	.1%
Ziegler	1.8	.1	1.7	59	.4%	.0%	1.4%	.2%
Robocom	1.8	.0	1.8	0	.3%	.0%	1.6%	.0%
Serbi	1.0	.0	1.0	0	.2%	.0%	.8%	.0%
CADAM	.9	.0	.8	0	.2%	.0%	.7%	.0%
Raden Computational	.8	.5	.2	33	.2%	.1%	.2%	.1%
Schlumberger (Applicon)	.7	.2	.2	7	.1%	.1%	.2%	.0%
Westward	.7	.7	.0	38	.1%	.2%	.0%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 6 (Continued)
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Sycotronic AG	.5	.0	.4	1	.1%	.0%	.4%	.0%
DAT Standard Information syste	.4	.0	.4	0	.1%	.0%	.3%	.0%
Other Companies	61.3	54.4	3.9	7,821.1	11.9%	16.8%	3.4%	26.5%
All Companies	515.0	324.6	115.7	29,497.6	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	423.5	287.1	73.3	27,465	82.2%	88.5%	63.3%	93.1%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	91.5	37.5	42.4	2,032.4	17.8%	11.5%	36.7%	6.9%
All Hardware Companies	199.2	178.5	.0	25,079.0	38.7%	55.0%	.0%	85.0%
All Turnkey & SW Companies	315.8	146.0	115.7	4,418.6	61.3%	45.0%	100.0%	15.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 7
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Intergraph	103.3	55.0	20.6	1,050	32.2%	29.8%	27.2%	13.1%
Siemens	50.5	29.8	15.1	1,080	15.7%	16.1%	20.0%	13.5%
Digital	36.0	27.0	.0	246	11.2%	14.6%	.0%	3.1%
IBM	19.9	14.2	2.8	1,048	6.2%	7.7%	3.7%	13.1%
Sysscan	15.6	7.0	4.1	116	4.9%	3.8%	5.4%	1.4%
McDonnell Douglas	10.4	5.6	3.8	333	3.2%	3.0%	5.0%	4.1%
ESRI	8.5	.0	7.5	0	2.6%	.0%	9.9%	.0%
ICL	7.3	4.7	1.9	192	2.3%	2.6%	2.5%	2.4%
Compaq	7.0	7.0	.0	1,158	2.2%	3.8%	.0%	14.4%
Synercom	5.3	.0	3.2	0	1.6%	.0%	4.2%	.0%
Autodesk	5.2	.0	5.2	0	1.6%	.0%	6.9%	.0%
Computervision	4.6	2.1	1.1	39	1.4%	1.1%	1.4%	.5%
STI-Straessle	4.1	1.8	2.0	26	1.3%	1.0%	2.7%	.3%
Control Data	2.8	2.0	.3	30	.9%	1.1%	.5%	.4%
Apple Computer	2.5	2.2	.0	480	.8%	1.2%	.0%	6.0%
Cadtronic	2.2	1.7	.3	19	.7%	.9%	.4%	.2%
Norsk Data	2.2	1.1	.7	0	.7%	.6%	.9%	.0%
ItalCad	2.2	1.1	.8	23	.7%	.6%	1.1%	.3%
Olivetti	1.5	.4	.4	221	.5%	.2%	.6%	2.8%
Ziegler	1.3	.0	1.2	45	.4%	.0%	1.6%	.6%
Hewlett-Packard	.7	.6	.0	67	.2%	.3%	.0%	.8%
Robocom	.3	.0	.3	0	.1%	.0%	.4%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 7 (Continued)
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	27.8	21.1	4.3	1,848.8	8.7%	11.4%	5.7%	23.1%
All Companies	320.9	184.4	75.5	8,020.4	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	233.1	136.3	48.5	6,283	72.6%	73.9%	64.3%	78.3%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	87.8	48.1	27.0	1,737.4	27.4%	26.1%	35.7%	21.7%
All Hardware Companies	72.5	61.3	.0	4,665.8	22.6%	33.2%	.0%	58.2%
All Turnkey & SW Companies	248.4	123.1	75.5	3,354.6	77.4%	66.8%	100.0%	41.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 8
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	103.7	30.1	51.0	1,372	12.9%	8.0%	18.8%	5.6%
Digital	90.1	67.0	.0	768	11.2%	17.7%	.0%	3.2%
Hewlett-Packard	83.0	58.5	4.9	5,703	10.3%	15.5%	1.8%	23.4%
Dazix	55.3	21.0	22.2	551	6.9%	5.6%	8.2%	2.3%
Racal-Redac	46.0	.2	37.8	163	5.7%	.1%	13.9%	.7%
Valid	43.5	10.9	23.5	0	5.4%	2.9%	8.6%	.0%
Computervision	32.1	14.3	7.6	270	4.0%	3.8%	2.8%	1.1%
Intergraph	30.6	14.4	5.4	321	3.8%	3.8%	2.0%	1.3%
Sun	27.8	25.1	.0	1,869	3.5%	6.6%	.0%	7.7%
Compaq	26.4	26.4	.0	4,402	3.3%	7.0%	.0%	18.1%
IBM	18.4	12.8	2.8	752	2.3%	3.4%	1.0%	3.1%
Calay	13.5	4.2	6.8	134	1.7%	1.1%	2.5%	.6%
Silicon Compiler Systems	13.0	.0	8.7	0	1.6%	.0%	3.2%	.0%
Secmai	12.4	7.4	2.6	101	1.5%	2.0%	1.0%	.4%
Cadence	10.1	.0	8.5	0	1.3%	.0%	3.1%	.0%
Scientific Calc.	9.1	2.0	4.6	42	1.1%	.5%	1.7%	.2%
Zycad	7.9	5.5	.2	38	1.0%	1.5%	.1%	.2%
LPKF	7.5	4.5	2.3	750	.9%	1.2%	.8%	3.1%
European Silicon Systems	7.3	1.8	5.5	40	.9%	.5%	2.0%	.2%
VLSI Technology	7.2	.4	5.7	24	.9%	.1%	2.1%	.1%
CADAM	6.7	.0	6.0	0	.8%	.0%	2.2%	.0%
Ziegler	6.1	.2	5.5	198	.8%	.1%	2.0%	.8%
Autodesk	5.2	.0	5.2	0	.6%	.0%	1.9%	.0%
Aucotec	5.2	2.0	2.6	578	.6%	.5%	.9%	2.4%
LSI Logic	5.0	.5	3.7	19	.6%	.1%	1.4%	.1%
Xilinx	4.5	.0	4.1	0	.6%	.0%	1.5%	.0%
ABB Cade International	4.1	2.1	1.0	2	.5%	.6%	.4%	.0%
Teradyne	4.0	.0	3.2	0	.5%	.0%	1.2%	.0%
Genrad	3.6	.6	2.4	0	.5%	.1%	.9%	.0%
Apple Computer	3.5	3.1	.0	672	.4%	.8%	.0%	2.8%
Silvar-Lisco	3.2	.0	1.8	0	.4%	.0%	.7%	.0%
BETRONEX	3.1	.0	3.1	0	.4%	.0%	1.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 8 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					..... Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Assigraph	2.9	.0	2.3	35	.4%	.0%	.9%	.1%
ALS Design	2.9	.3	2.3	50	.4%	.1%	.8%	.2%
Rotring EURCAD	2.2	1.2	1.0	61	.3%	.3%	.4%	.3%
Schlumberger (Applicon)	2.1	.5	.7	22	.3%	.1%	.3%	.1%
Academi Systems	1.9	.4	1.3	23	.2%	.1%	.5%	.1%
Siemens	1.9	1.2	.6	44	.2%	.3%	.2%	.2%
DECAD	1.4	.1	1.0	11	.2%	.0%	.4%	.0%
Data I/O	1.1	.0	1.0	0	.1%	.0%	.4%	.0%
Sycotronic AG	1.1	.0	.9	2	.1%	.0%	.3%	.0%
CAD-UL	1.1	.3	.8	40	.1%	.1%	.3%	.2%
Dassault	1.1	.0	.9	0	.1%	.0%	.3%	.0%
Intercad	1.0	.5	.3	50	.1%	.1%	.1%	.2%
Serbi	1.0	.0	1.0	0	.1%	.0%	.4%	.0%
ICL	.8	.5	.2	21	.1%	.1%	.1%	.1%
Westward	.7	.7	.0	38	.1%	.2%	.0%	.2%
Olivetti	.3	.1	.1	78	.0%	.0%	.0%	.3%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
DAT Standard Information syste	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	82.3	57.1	18.8	5,102.9	10.2%	15.1%	6.9%	21.0%
All Companies	804.7	377.8	271.3	24,344.7	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	677.1	349.0	190.8	21,872	84.1%	92.4%	70.3%	89.8%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	127.6	28.8	80.5	2,472.7	15.9%	7.6%	29.7%	10.2%
All Hardware Companies	264.7	222.3	.0	18,411.3	32.9%	58.8%	.0%	75.6%
All Turnkey & SW Companies	540.0	155.4	271.3	5,933.5	67.1%	41.1%	100.0%	24.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 9
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	68.8	21.2	33.8	910	17.2%	10.8%	24.9%	6.9%
Dazix	44.3	17.7	17.7	441	11.1%	9.1%	13.0%	3.3%
Hewlett-Packard	39.9	30.7	2.4	2,710	10.0%	15.7%	1.8%	20.5%
Digital	36.0	27.1	.0	307	9.0%	13.8%	.0%	2.3%
Valid	30.5	7.6	16.4	0	7.6%	3.9%	12.1%	.0%
Sun	27.8	25.1	.0	1,869	7.0%	12.8%	.0%	14.2%
Compaq	11.8	11.8	.0	1,969	3.0%	6.0%	.0%	14.9%
Intergraph	11.0	6.0	1.9	115	2.7%	3.1%	1.4%	.9%
Computervision	9.2	4.2	2.2	77	2.3%	2.1%	1.6%	.6%
Racal-Redac	8.5	.2	7.0	33	2.1%	.1%	5.1%	.3%
Zycad	7.9	5.5	.2	38	2.0%	2.8%	.1%	.3%
Aucotec	5.2	2.0	2.6	578	1.3%	1.0%	1.9%	4.4%
Autodesk	4.6	.0	4.6	0	1.2%	.0%	3.4%	.0%
Xilinx	4.5	.0	4.1	0	1.1%	.0%	3.0%	.0%
LSI Logic	4.5	.4	3.3	17	1.1%	.2%	2.4%	.1%
VLSI Technology	4.4	.3	3.4	14	1.1%	.1%	2.5%	.1%
Teradyne	4.0	.0	3.2	0	1.0%	.0%	2.4%	.0%
Genrad	3.6	.6	2.4	0	.9%	.3%	1.8%	.0%
Silicon Compiler Systems	3.4	.0	2.3	0	.8%	.0%	1.7%	.0%
Cadence	3.1	.0	2.7	0	.8%	.0%	2.0%	.0%
Ziegler	3.1	.1	2.8	99	.8%	.1%	2.1%	.8%
Rotring EURCAD	2.2	1.2	1.0	61	.6%	.6%	.7%	.5%
Assigraph	1.9	.0	1.5	24	.5%	.0%	1.1%	.2%
Apple Computer	1.5	1.3	.0	288	.4%	.7%	.0%	2.2%
IBM	1.5	1.4	.0	295	.4%	.7%	.0%	2.2%
ALS Design	1.4	.1	1.1	25	.4%	.1%	.8%	.2%
Data I/O	1.1	.0	1.0	0	.3%	.0%	.7%	.0%
Secmai	1.1	.7	.2	10	.3%	.4%	.2%	.1%
Dassault	1.1	.0	.9	0	.3%	.0%	.7%	.0%
Intercad	1.0	.5	.3	50	.3%	.3%	.2%	.4%
Serbi	1.0	.0	1.0	0	.2%	.0%	.7%	.0%
Silvar-Lisco	.9	.0	.5	0	.2%	.0%	.4%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 9 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Westward	.7	.7	.0	38	.2%	.3%	.0%	.3%
Scientific Calc.	.3	.1	.2	1	.1%	.0%	.1%	.0%
Academi Systems	.1	.0	.1	1	.0%	.0%	.0%	.0%
DAT Standard Information syste	.0	.0	.0	0	.0%	.0%	.0%	.0%
Sycotronic AG	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	47.8	29.0	15.2	3,226.8	12.0%	14.8%	11.2%	24.4%
All Companies	399.4	195.5	135.9	13,198.1	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	370.7	189.1	117.0	12,242	92.8%	96.7%	86.0%	92.8%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	28.7	6.4	19.0	955.7	7.2%	3.3%	14.0%	7.2%
All Hardware Companies	133.4	115.4	.0	10,302.1	33.4%	59.0%	.0%	78.1%
All Turnkey & SW Companies	266.0	80.1	135.9	2,896.0	66.6%	41.0%	100.0%	21.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 10
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	14.4	10.8	.0	123	22.7%	46.5%	.0%	13.4%
Silicon Compiler Systems	9.6	.0	6.4	0	15.1%	.0%	23.5%	.0%
European Silicon Systems	7.3	1.8	5.5	40	11.5%	7.8%	20.0%	4.4%
Cadence	6.9	.0	5.8	0	10.9%	.0%	21.3%	.0%
Hewlett-Packard	6.9	5.8	.0	629	10.9%	24.9%	.0%	68.8%
Mentor Graphics	5.3	1.6	2.6	70	8.3%	6.9%	9.6%	7.6%
Valid	4.4	1.1	2.3	0	6.9%	4.6%	8.6%	.0%
VLSI Technology	2.9	.2	2.3	9	4.6%	.8%	8.4%	1.0%
Silvar-Lisco	2.3	.0	1.3	0	3.7%	.0%	4.8%	.0%
LSI Logic	.6	.1	.4	2	.9%	.3%	1.5%	.2%
Siemens	.1	.1	.0	3	.2%	.3%	.1%	.3%
Other Companies	2.7	1.8	.6	38.4	4.3%	7.9%	2.3%	4.2%
All Companies	63.5	23.3	27.4	915.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	56.0	21.4	21.9	872	88.3%	91.9%	79.9%	95.3%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	7.4	1.9	5.5	43.0	11.7%	8.1%	20.1%	4.7%
All Hardware Companies	22.8	18.0	.0	782.1	36.0%	77.2%	.0%	85.5%
All Turnkey & SW Companies	40.7	5.3	27.3	133.1	64.0%	22.8%	100.0%	14.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 11
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	39.7	29.1	.0	338	11.6%	18.3%	.0%	3.3%
Racal-Redac	37.5	.0	30.8	130	11.0%	.0%	28.5%	1.3%
Hewlett-Packard	36.2	22.0	2.4	2,363	10.6%	13.8%	2.2%	23.1%
Mentor Graphics	29.6	7.3	14.6	392	8.7%	4.6%	13.5%	3.8%
Computervision	22.9	10.1	5.4	193	6.7%	6.3%	5.0%	1.9%
Intergraph	19.6	8.4	3.5	206	5.7%	5.3%	3.2%	2.0%
IBM	16.9	11.4	2.8	457	5.0%	7.2%	2.6%	4.5%
Compaq	14.6	14.6	.0	2,432	4.3%	9.2%	.0%	23.8%
Calay	13.5	4.2	6.8	134	3.9%	2.6%	6.3%	1.3%
Secmai	11.2	6.7	2.4	92	3.3%	4.2%	2.2%	.9%
Dazix	11.1	3.3	4.4	110	3.2%	2.1%	4.1%	1.1%
Scientific Calc.	8.8	2.0	4.5	41	2.6%	1.2%	4.1%	.4%
Valid	8.7	2.2	4.7	0	2.5%	1.4%	4.3%	.0%
LPKF	7.5	4.5	2.3	750	2.2%	2.8%	2.1%	7.3%
CADAM	6.7	.0	6.0	0	2.0%	.0%	5.5%	.0%
ABB Cade International	4.1	2.1	1.0	2	1.2%	1.3%	.9%	.0%
BETRONEX	3.1	.0	3.1	0	.9%	.0%	2.8%	.0%
Ziegler	3.0	.1	2.7	99	.9%	.1%	2.5%	1.0%
Schlumberger (Applicon)	2.1	.5	.7	22	.6%	.3%	.6%	.2%
Apple Computer	2.0	1.8	.0	384	.6%	1.1%	.0%	3.8%
Academi Systems	1.8	.4	1.3	22	.5%	.2%	1.2%	.2%
Siemens	1.8	1.1	.5	41	.5%	.7%	.5%	.4%
ALS Design	1.4	.1	1.1	25	.4%	.1%	1.1%	.2%
DECAD	1.4	.1	1.0	11	.4%	.0%	.9%	.1%
CAD-UL	1.1	.3	.8	40	.3%	.2%	.7%	.4%
Sycotronic AG	1.1	.0	.9	2	.3%	.0%	.8%	.0%
Assigraph	1.0	.0	.8	11	.3%	.0%	.7%	.1%
ICL	.8	.5	.2	21	.2%	.3%	.2%	.2%
Autodesk	.6	.0	.6	0	.2%	.0%	.5%	.0%
Olivetti	.3	.1	.1	78	.1%	.1%	.1%	.8%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 11 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	31.7	26.3	3.0	1,837.6	9.3%	16.5%	2.7%	18.0%
All Companies	341.8	159.0	108.1	10,231.5	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	250.3	138.5	52.0	8,757	73.2%	87.1%	48.1%	85.6%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	91.5	20.5	56.0	1,474.1	26.8%	12.9%	51.9%	14.4%
All Hardware Companies	108.4	88.9	.0	7,327.1	31.7%	55.9%	.0%	71.6%
All Turnkey & SW Companies	233.4	70.1	108.1	2,904.4	68.3%	44.1%	100.0%	28.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 12
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Computervision	48.5	22.4	11.5	408	15.9%	12.3%	17.0%	3.2%
IBM	47.1	32.3	7.5	1,609	15.4%	17.8%	11.1%	12.8%
Hewlett-Packard	30.2	22.0	2.5	1,798	9.9%	12.1%	3.7%	14.3%
Intergraph	27.1	14.3	5.3	277	8.9%	7.8%	7.8%	2.2%
Digital	26.3	19.7	.0	191	8.6%	10.8%	.0%	1.5%
Mentor Graphics	11.0	3.2	5.4	146	3.6%	1.7%	8.0%	1.2%
Compaq	9.3	9.3	.0	1,552	3.0%	5.1%	.0%	12.3%
PAFEC	4.9	.0	4.9	0	1.6%	.0%	7.2%	.0%
Siemens	4.6	2.8	1.4	103	1.5%	1.5%	2.0%	.8%
Sun	4.6	4.2	.0	312	1.5%	2.3%	.0%	2.5%
Control Data	4.5	3.2	.5	48	1.5%	1.8%	.8%	.4%
McDonnell Douglas	4.4	2.4	1.6	65	1.4%	1.3%	2.4%	.5%
Apple Computer	4.3	3.8	.0	835	1.4%	2.1%	.0%	6.6%
Racal-Redac	3.7	.0	3.0	13	1.2%	.0%	4.4%	.1%
Autodesk	3.4	.0	3.4	0	1.1%	.0%	5.1%	.0%
Dazix	3.2	1.2	1.3	32	1.1%	.7%	1.9%	.3%
ISICAD	3.1	1.3	1.3	33	1.0%	.7%	1.9%	.3%
Valid	2.5	.6	1.3	0	.8%	.3%	1.9%	.0%
Ferranti	1.9	1.1	.5	17	.6%	.6%	.7%	.1%
Silicon Graphics	1.3	1.2	.0	39	.4%	.6%	.0%	.3%
Star Informatic	1.3	.6	.4	55	.4%	.3%	.6%	.4%
Framesoft	1.0	.0	1.2	5	.3%	.0%	1.7%	.0%
Calay	1.0	.3	.5	10	.3%	.2%	.7%	.1%
Norsk Data	1.0	.7	.1	447	.3%	.4%	.1%	3.6%
Investronica SA	.9	.8	.1	38	.3%	.4%	.1%	.3%
Matra Datavision	.9	.6	.3	117	.3%	.3%	.4%	.9%
Schlumberger (Applicon)	.9	.4	.3	10	.3%	.2%	.4%	.1%
Dassault	.9	.0	.7	0	.3%	.0%	1.1%	.0%
SDRC	.8	.0	.8	0	.3%	.0%	1.2%	.0%
Intercad	.8	.4	.2	40	.3%	.2%	.3%	.3%
ESRI	.7	.0	.6	0	.2%	.0%	.9%	.0%
Wiechers Datentechnik	.7	.3	.3	16	.2%	.2%	.5%	.1%
Cimatron	.7	.3	.3	17	.2%	.2%	.4%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 12
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Olivetti	.7	.2	.3	148	.2%	.1%	.5%	1.2%
Unisys	.6	.2	.4	20	.2%	.1%	.6%	.2%
Sysscan	.6	.4	.2	5	.2%	.2%	.2%	.0%
Cisigraph	.6	.2	.2	7	.2%	.1%	.3%	.1%
Gerber Systems	.6	.3	.1	8	.2%	.2%	.2%	.1%
DAT Standard Information syste	.5	.0	.5	0	.2%	.0%	.8%	.0%
Datagraph	.5	.4	.1	2	.2%	.2%	.1%	.0%
Exapt	.5	.3	.1	9	.2%	.2%	.2%	.1%
European Silicon Systems	.4	.1	.3	2	.1%	.1%	.5%	.0%
Westward	.4	.4	.0	23	.1%	.2%	.0%	.2%
Robocom	.4	.0	.4	0	.1%	.0%	.5%	.0%
CADAM	.3	.0	.3	0	.1%	.0%	.4%	.0%
Superdraft	.3	.1	.2	0	.1%	.0%	.3%	.0%
Sycotronic AG	.2	.0	.2	0	.1%	.0%	.3%	.0%
Technische Computer Systeme	.2	.1	.2	6	.1%	.0%	.3%	.1%
Secmai	.2	.1	.0	2	.1%	.1%	.1%	.0%
t2 Solutions	.2	.1	.1	2	.1%	.1%	.1%	.0%
XAO Industrie	.2	.1	.1	9	.1%	.0%	.1%	.1%
Ziegler	.2	.0	.1	5	.0%	.0%	.2%	.0%
Aucotec	.1	.0	.1	14	.0%	.0%	.1%	.1%
Pathtrace	.1	.0	.1	3	.0%	.0%	.1%	.0%
Catalpe	.1	.0	.0	0	.0%	.0%	.1%	.0%
CAD-UL	.1	.0	.1	2	.0%	.0%	.1%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.1%	.0%
BATISOFT	.0	.0	.0	2	.0%	.0%	.0%	.0%
BETRONEX	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 12 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	39.8	29.7	6.4	4,077.3	13.0%	16.3%	9.4%	32.4%
All Companies	305.6	182.0	67.9	12,581.5	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	275.1	171.5	51.0	11,459	90.0%	94.3%	75.0%	91.1%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	30.5	10.4	17.0	1,122.6	10.0%	5.7%	25.0%	8.9%
All Hardware Companies	97.7	85.2	.0	9,560.1	32.0%	46.8%	.0%	76.0%
All Turnkey & SW Companies	208.0	96.7	67.9	3,021.4	68.0%	53.2%	100.0%	24.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 13
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Computervision	41.0	18.9	9.8	249	26.0%	24.3%	21.4%	8.1%
Hewlett-Packard	25.4	18.0	2.5	1,077	16.1%	23.1%	5.5%	35.2%
Intergraph	21.5	11.8	3.9	230	13.6%	15.2%	8.5%	7.5%
Mentor Graphics	11.0	3.2	5.4	146	7.0%	4.1%	11.9%	4.8%
Digital	5.8	4.3	.0	191	3.7%	5.5%	.0%	6.2%
Sun	4.6	4.2	.0	312	2.9%	5.4%	.0%	10.2%
PAFEC	4.4	.0	4.4	0	2.8%	.0%	9.7%	.0%
Siemens	4.2	2.5	1.3	98	2.7%	3.2%	2.8%	3.2%
IBM	3.8	2.5	.7	34	2.4%	3.2%	1.5%	1.1%
McDonnell Douglas	3.7	2.0	1.3	42	2.3%	2.6%	2.9%	1.4%
Racal-Redac	3.6	.0	2.9	12	2.3%	.0%	6.4%	.4%
Dazix	3.2	1.2	1.3	32	2.0%	1.6%	2.8%	1.0%
ISICAD	2.7	1.3	.9	33	1.7%	1.7%	2.0%	1.1%
Valid	2.5	.6	1.3	0	1.6%	.8%	2.9%	.0%
Control Data	1.5	1.1	.2	28	1.0%	1.4%	.4%	.9%
Star Informatic	1.3	.6	.4	55	.8%	.7%	.9%	1.8%
Silicon Graphics	1.2	1.1	.0	37	.8%	1.4%	.0%	1.2%
Framesoft	1.0	.0	1.2	5	.7%	.0%	2.5%	.1%
Calay	1.0	.3	.5	10	.6%	.4%	1.1%	.3%
Matra Datavision	.9	.6	.3	0	.6%	.7%	.6%	.0%
Schlumberger (Applicon)	.8	.3	.3	7	.5%	.4%	.5%	.2%
SDRC	.7	.0	.7	0	.4%	.0%	1.4%	.0%
Cimatron	.6	.3	.3	15	.4%	.4%	.6%	.5%
Norsk Data	.6	.4	.0	258	.4%	.5%	.1%	8.4%
Gerber Systems	.6	.3	.1	8	.3%	.4%	.3%	.2%
Unisys	.6	.1	.3	19	.3%	.2%	.7%	.6%
Cisigraph	.5	.2	.2	6	.3%	.3%	.4%	.2%
European Silicon Systems	.4	.1	.3	2	.2%	.1%	.6%	.1%
Dassault	.3	.0	.2	0	.2%	.0%	.5%	.0%
ESRI	.3	.0	.2	0	.2%	.0%	.5%	.0%
Technische Computer Systeme	.2	.1	.2	6	.2%	.1%	.4%	.2%
Westward	.2	.2	.0	13	.1%	.3%	.0%	.4%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 13 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Secmai	.2	.1	.0	2	.1%	.2%	.1%	.1%
t2 Solutions	.2	.1	.1	2	.1%	.2%	.2%	.1%
Wiechers Datentechnik	.2	.1	.1	5	.1%	.1%	.2%	.2%
Exapt	.2	.1	.1	5	.1%	.1%	.2%	.1%
XAO Industrie	.2	.1	.1	9	.1%	.1%	.2%	.3%
Autodesk	.1	.0	.1	0	.1%	.0%	.2%	.0%
Catalpa	.1	.0	.0	0	.1%	.0%	.1%	.0%
Ferranti	.1	.0	.0	1	.0%	.0%	.0%	.0%
Aucotec	.0	.0	.0	1	.0%	.0%	.0%	.0%
Other Companies	6.7	1.1	4.1	110.5	4.3%	1.4%	8.9%	3.6%
All Companies	158.0	77.8	45.6	3,062.3	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	137.6	72.0	33.1	2,554	87.1%	92.6%	72.5%	83.4%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	20.4	5.8	12.5	508.6	12.9%	7.4%	27.5%	16.6%
All Hardware Companies	23.1	18.9	.0	1,308.7	14.6%	24.3%	.0%	42.7%
All Turnkey & SW Companies	134.8	58.9	45.6	1,753.6	85.4%	75.7%	100.0%	57.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 14
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	37.5	24.3	6.8	393	38.0%	36.8%	49.7%	25.0%
Digital	20.5	15.4	.0	0	20.8%	23.3%	.0%	.0%
Computervision	7.0	3.2	1.7	147	7.1%	4.9%	12.2%	9.3%
Intergraph	4.9	2.4	.8	47	5.0%	3.7%	5.7%	3.0%
Control Data	3.0	2.1	.4	20	3.0%	3.2%	2.6%	1.3%
Ferranti	1.9	1.1	.5	15	1.9%	1.6%	3.5%	1.0%
Hewlett-Packard	.8	.6	.0	38	.8%	1.0%	.0%	2.4%
McDonnell Douglas	.7	.4	.3	23	.7%	.6%	2.0%	1.5%
Sysscan	.6	.4	.2	5	.6%	.7%	1.1%	.3%
Dassault	.6	.0	.5	0	.6%	.0%	3.6%	.0%
Siemens	.5	.3	.1	5	.5%	.4%	.9%	.3%
PAFEC	.4	.0	.4	0	.4%	.0%	3.1%	.0%
Norsk Data	.4	.3	.0	151	.4%	.5%	.1%	9.6%
ESRI	.4	.0	.3	0	.4%	.0%	2.4%	.0%
Exapt	.3	.2	.1	5	.3%	.3%	.4%	.3%
SDRC	.2	.0	.2	0	.2%	.0%	1.2%	.0%
Schlumberger (Applicon)	.1	.0	.0	2	.1%	.1%	.3%	.1%
Racal-Redac	.1	.0	.1	1	.1%	.0%	.6%	.0%
Unisys	.1	.0	.1	1	.1%	.0%	.4%	.1%
Silicon Graphics	.1	.1	.0	2	.1%	.1%	.0%	.1%
Cisigraph	.1	.0	.0	0	.1%	.0%	.1%	.0%
Olivetti	.0	.0	.0	2	.0%	.0%	.1%	.1%
Aucotec	.0	.0	.0	1	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 14 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Other Companies	18.6	15.2	1.4	596.3	18.8%	22.9%	10.0%	37.9%
All Companies	98.5	66.1	13.8	1,572.5	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	93.7	63.8	11.9	1,270	95.1%	96.5%	86.4%	80.8%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	4.8	2.3	1.9	302.3	4.9%	3.5%	13.6%	19.2%
All Hardware Companies	37.5	30.8	.0	633.5	38.0%	46.6%	.0%	40.3%
All Turnkey & SW Companies	61.1	35.3	13.8	939.0	62.0%	53.4%	100.0%	59.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 15
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Compaq	9.3	9.3	.0	1,552	19.0%	24.5%	.0%	19.5%
IBM	5.9	5.6	.0	1,182	11.9%	14.6%	.0%	14.9%
Apple Computer	4.3	3.8	.0	835	8.8%	10.0%	.0%	10.5%
Hewlett-Packard	4.1	3.4	.0	682	8.4%	8.9%	.0%	8.6%
Autodesk	3.3	.0	3.3	0	6.8%	.0%	39.0%	.0%
Investronica SA	.9	.8	.1	38	1.9%	2.0%	1.1%	.5%
Intercad	.8	.4	.2	40	1.6%	1.0%	2.7%	.5%
Intergraph	.7	.0	.7	0	1.5%	.0%	7.8%	.0%
Olivetti	.6	.2	.3	146	1.3%	.5%	3.6%	1.8%
DAT Standard Information syste	.5	.0	.5	0	1.0%	.0%	6.0%	.0%
Datagraph	.5	.4	.1	2	1.0%	1.0%	1.2%	.0%
Computervision	.5	.2	.1	13	1.0%	.6%	1.2%	.2%
Wiechers Datentechnik	.5	.2	.2	11	1.0%	.6%	2.7%	.1%
ISICAD	.4	.0	.4	0	.8%	.0%	4.8%	.0%
Robocom	.4	.0	.4	0	.7%	.0%	4.2%	.0%
CADAM	.3	.0	.3	0	.7%	.0%	3.3%	.0%
Superdraft	.3	.1	.2	0	.6%	.1%	2.6%	.0%
Sycotronic AG	.2	.0	.2	0	.5%	.0%	2.2%	.0%
Westward	.2	.2	.0	10	.3%	.4%	.0%	.1%
Ziegler	.2	.0	.1	5	.3%	.0%	1.6%	.1%
Pathtrace	.1	.0	.1	3	.3%	.1%	1.1%	.0%
Aucotec	.1	.0	.1	13	.2%	.1%	.6%	.2%
European Silicon Systems	.1	.0	.1	1	.2%	.1%	.7%	.0%
CAD-UL	.1	.0	.1	2	.2%	.1%	.6%	.0%
Cimatron	.1	.0	.0	2	.1%	.1%	.4%	.0%
ESRI	.1	.0	.1	0	.1%	.0%	.7%	.0%
Serbi	.0	.0	.0	0	.1%	.0%	.5%	.0%
BATISOFT	.0	.0	.0	2	.1%	.0%	.2%	.0%
BETRONEX	.0	.0	.0	0	.1%	.0%	.4%	.0%
Racal-Redac	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 15 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	14.5	13.4	1.0	3,370.6	29.6%	35.3%	11.1%	42.4%
All Companies	49.1	38.1	8.6	7,946.6	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	43.8	35.8	6.0	7,635	89.1%	94.0%	70.4%	96.1%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	5.3	2.3	2.5	311.6	10.9%	6.0%	29.6%	3.9%
All Hardware Companies	37.0	35.5	.0	7,617.9	75.5%	93.2%	.0%	95.9%
All Turnkey & SW Companies	12.1	2.6	8.6	328.7	24.5%	6.8%	100.0%	4.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 16
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Computervision	42.7	19.7	10.2	359	23.1%	17.4%	26.7%	5.1%
IBM	38.7	26.0	6.5	1,017	20.9%	22.9%	17.0%	14.6%
Hewlett-Packard	18.8	13.7	1.8	1,026	10.2%	12.0%	4.8%	14.7%
Digital	14.2	10.6	.0	97	7.7%	9.4%	.0%	1.4%
Intergraph	7.3	3.9	1.4	74	3.9%	3.4%	3.8%	1.1%
Compaq	4.9	4.9	.0	823	2.7%	4.3%	.0%	11.8%
Control Data	4.3	3.0	.5	46	2.3%	2.7%	1.3%	.7%
McDonnell Douglas	4.3	2.3	1.6	62	2.3%	2.0%	4.1%	.9%
PAFEC	4.1	.0	4.1	0	2.2%	.0%	10.6%	.0%
Sun	2.5	2.2	.0	165	1.3%	1.9%	.0%	2.4%
Siemens	2.4	1.4	.7	56	1.3%	1.2%	1.9%	.8%
Apple Computer	2.0	1.7	.0	376	1.1%	1.5%	.0%	5.4%
Ferranti	1.9	1.1	.5	17	1.0%	.9%	1.3%	.2%
Autodesk	1.4	.0	1.4	0	.8%	.0%	3.7%	.0%
Silicon Graphics	1.3	1.2	.0	39	.7%	1.0%	.0%	.6%
ISICAD	1.3	.6	.5	14	.7%	.5%	1.3%	.2%
Framesoft	1.0	.0	1.2	5	.6%	.0%	3.0%	.1%
Norsk Data	1.0	.7	.1	447	.5%	.6%	.1%	6.4%
Investronica SA	.9	.8	.1	38	.5%	.7%	.2%	.5%
Matra Datavision	.9	.6	.3	117	.5%	.5%	.7%	1.7%
Schlumberger (Applicon)	.9	.3	.3	9	.5%	.3%	.8%	.1%
SDRC	.8	.0	.8	0	.4%	.0%	2.2%	.0%
Dassault	.7	.0	.6	0	.4%	.0%	1.7%	.0%
Wiechers Datentechnik	.7	.3	.3	16	.4%	.3%	.9%	.2%
Cimatron	.7	.3	.3	17	.4%	.3%	.8%	.2%
Unisys	.6	.2	.4	20	.3%	.1%	1.1%	.3%
Cisigraph	.6	.2	.2	7	.3%	.2%	.6%	.1%
Gerber Systems	.6	.3	.1	8	.3%	.3%	.3%	.1%
Intercad	.6	.3	.2	28	.3%	.2%	.4%	.4%
DAT Standard Information syste	.5	.0	.5	0	.3%	.0%	1.3%	.0%
Datagraph	.5	.4	.1	[illegible]	.3%	.3%	.3%	.0%
Exapt	.5	.3	.1	9	.3%	.3%	.3%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 16 (Continued)
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Olivetti	.4	.1	.2	74	.2%	.1%	.5%	1.1%
Westward	.4	.4	.0	21	.2%	.3%	.0%	.3%
Superdraft	.3	.1	.2	0	.2%	.0%	.6%	.0%
Technische Computer Systeme	.2	.1	.2	6	.1%	.1%	.4%	.1%
Mentor Graphics	.2	.1	.1	3	.1%	.1%	.3%	.0%
Robocom	.2	.0	.2	0	.1%	.0%	.4%	.0%
XAO Industrie	.2	.1	.1	9	.1%	.1%	.3%	.1%
Pathtrace	.1	.0	.1	3	.1%	.0%	.2%	.0%
Catalpa	.1	.0	.0	0	.0%	.0%	.1%	.0%
Ziegler	.1	.0	.1	2	.0%	.0%	.1%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.1%	.0%
Other Companies	19.5	15.8	2.3	1,968.9	10.5%	13.9%	5.9%	28.2%
All Companies	185.0	113.6	38.1	6,977.8	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	166.4	106.6	28.1	6,105	90.0%	93.8%	73.8%	87.5%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	18.5	7.1	10.0	872.5	10.0%	6.2%	26.2%	12.5%
All Hardware Companies	52.8	46.0	.0	4,819.9	28.5%	40.5%	.0%	69.1%
All Turnkey & SW Companies	132.2	67.6	38.1	2,158.0	71.5%	59.5%	100.0%	30.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 17
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
					Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Intergraph	7.3	3.9	1.4	74	18.8%	15.1%	19.9%	2.7%
IBM	5.4	4.1	.6	448	13.8%	16.0%	8.3%	16.4%
Newlett-Packard	3.9	2.9	.3	240	10.1%	11.4%	4.2%	8.8%
Digital	2.9	2.2	.0	20	7.5%	8.5%	.0%	.7%
Compaq	2.1	2.1	.0	357	5.5%	8.4%	.0%	13.0%
Computervision	1.9	.9	.5	16	5.0%	3.5%	6.4%	.6%
Apple Computer	1.9	1.6	.0	359	4.8%	6.4%	.0%	13.1%
ISICAD	1.9	.8	.8	19	4.8%	3.0%	11.5%	.7%
Autodesk	1.4	.0	1.4	0	3.6%	.0%	19.5%	.0%
Star Informatic	1.3	.6	.4	55	3.4%	2.3%	5.5%	2.0%
PAFEC	.8	.0	.8	0	2.1%	.0%	11.4%	.0%
Siemens	.4	.2	.1	7	.9%	.9%	1.5%	.3%
Olivetti	.3	.1	.1	69	.7%	.4%	1.7%	2.5%
Sun	.2	.2	.0	16	.6%	.8%	.0%	.6%
t2 Solutions	.2	.1	.1	2	.5%	.5%	1.0%	.1%
McDonnell Douglas	.2	.1	.1	3	.4%	.4%	.8%	.1%
Robocom	.2	.0	.2	0	.4%	.0%	2.2%	.0%
Dassault	.1	.0	.1	0	.3%	.0%	1.2%	.0%
Control Data	.1	.1	.0	1	.2%	.2%	.1%	.0%
Sycotronic AG	.1	.0	.1	0	.2%	.0%	.8%	.0%
BATISOFT	.0	.0	.0	2	.1%	.0%	.3%	.1%
Westward	.0	.0	.0	1	.1%	.1%	.0%	.0%
Ziegler	.0	.0	.0	1	.1%	.0%	.3%	.0%
DAT Standard Information syste	.0	.0	.0	0	.0%	.0%	.1%	.0%
Schlumberger (Applicon)	.0	.0	.0	0	.0%	.0%	.0%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 17 (Continued)
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	6.1	5.7	.2	1,050.0	15.8%	22.4%	3.0%	38.3%
All Companies	38.6	25.6	7.2	2,740.3	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	35.3	24.6	5.3	2,604	91.3%	96.0%	73.8%	95.0%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	3.4	1.0	1.9	136.5	8.7%	4.0%	26.2%	5.0%
All Hardware Companies	17.3	15.7	.0	2,416.0	44.7%	61.1%	.0%	88.2%
All Turnkey & SW Companies	21.4	10.0	7.2	324.3	55.3%	38.9%	100.0%	11.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 18
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Intergraph	9.7	5.2	1.9	99	44.3%	39.2%	43.4%	13.9%
Digital	2.6	2.0	.0	18	11.9%	15.0%	.0%	2.5%
Siemens	1.9	1.1	.6	40	8.5%	8.4%	12.6%	5.6%
IBM	1.6	1.1	.2	84	7.3%	8.7%	4.9%	11.8%
ESRI	.7	.0	.6	0	3.2%	.0%	13.9%	.0%
Sysscan	.6	.4	.2	5	2.7%	3.3%	3.4%	.7%
Computervision	.5	.2	.1	4	2.2%	1.7%	2.5%	.6%
Compaq	.5	.5	.0	78	2.1%	3.6%	.0%	11.0%
Autodesk	.3	.0	.3	0	1.4%	.0%	7.0%	.0%
Apple Computer	.2	.2	.0	42	1.0%	1.4%	.0%	5.9%
Control Data	.1	.1	.0	1	.6%	.8%	.4%	.2%
Hewlett-Packard	.1	.1	.0	7	.4%	.5%	.0%	.9%
Robocom	.0	.0	.0	0	.1%	.0%	.7%	.0%
Ziegler	.0	.0	.0	0	.0%	.0%	.2%	.1%
Other Companies	3.1	2.3	.5	330.8	14.1%	17.5%	11.0%	46.7%
All Companies	21.9	13.2	4.5	708.5	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	19.4	11.6	3.7	663	88.6%	88.2%	83.1%	93.6%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	2.5	1.6	.8	45.7	11.4%	11.8%	16.9%	6.4%
All Hardware Companies	6.2	5.3	.0	545.6	28.0%	40.3%	.0%	77.0%
All Turnkey & SW Companies	15.8	7.9	4.5	162.9	72.0%	59.7%	100.0%	23.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 19
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	10.8	3.1	5.3	143	17.9%	10.5%	29.3%	6.6%
Hewlett-Packard	7.4	5.3	.4	525	12.4%	18.0%	2.2%	24.4%
Digital	6.6	4.9	.0	56	11.0%	16.7%	.0%	2.6%
Racal-Redac	3.7	.0	3.0	13	6.1%	.1%	16.6%	.6%
Computervision	3.4	1.5	.8	29	5.6%	5.1%	4.4%	1.3%
Dazix	3.2	1.2	1.3	32	5.3%	4.1%	7.1%	1.5%
Intergraph	2.9	1.4	.5	30	4.8%	4.6%	2.8%	1.4%
Valid	2.5	.6	1.3	0	4.1%	2.1%	7.3%	.0%
Sun	2.0	1.8	.0	131	3.2%	5.9%	.0%	6.1%
Compaq	1.8	1.8	.0	295	2.9%	6.0%	.0%	13.7%
IBM	1.5	1.0	.2	60	2.5%	3.5%	1.2%	2.8%
Calay	1.0	.3	.5	10	1.6%	1.0%	2.8%	.5%
European Silicon Systems	.4	.1	.3	2	.7%	.4%	1.8%	.1%
CADAM	.3	.0	.3	0	.5%	.0%	1.5%	.0%
Autodesk	.3	.0	.3	0	.5%	.0%	1.7%	.0%
Apple Computer	.3	.3	.0	58	.5%	.9%	.0%	2.7%
Intercad	.2	.1	.1	12	.4%	.4%	.4%	.6%
Secmai	.2	.1	.0	2	.4%	.5%	.2%	.1%
Sycotronic AG	.2	.0	.1	0	.3%	.0%	.7%	.0%
Aucotec	.1	.0	.1	14	.2%	.1%	.3%	.7%
CAD-UL	.1	.0	.1	2	.1%	.1%	.3%	.1%
Ziegler	.1	.0	.1	2	.1%	.0%	.3%	.1%
BETRONEX	.0	.0	.0	0	.0%	.0%	.2%	.0%
Dassault	.0	.0	.0	0	.0%	.0%	.1%	.0%
Olivetti	.0	.0	.0	5	.0%	.0%	.1%	.2%
Schlumberger (Applicon)	.0	.0	.0	0	.0%	.0%	.0%	.0%
Westward	.0	.0	.0	1	.0%	.1%	.0%	.1%
Serbi	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 19 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	11.1	5.9	3.4	727.7	18.4%	20.0%	18.7%	33.8%
All Companies	60.1	29.5	18.2	2,154.9	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	54.0	28.8	13.8	2,087	89.9%	97.4%	76.2%	96.9%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	6.1	.8	4.3	67.9	10.1%	2.6%	23.8%	3.1%
All Hardware Companies	21.5	18.2	.0	1,778.7	35.7%	61.6%	.0%	82.5%
All Turnkey & SW Companies	38.6	11.3	18.2	376.2	64.3%	38.4%	100.0%	17.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 20
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	7.2	2.2	3.5	95	23.0%	13.4%	38.6%	6.8%
Hewlett-Packard	3.7	2.9	.2	258	11.8%	17.4%	2.2%	18.6%
Digital	2.6	2.0	.0	22	8.5%	12.1%	.0%	1.6%
Dazix	2.6	1.0	1.0	26	8.3%	6.3%	11.3%	1.8%
Sun	2.0	1.8	.0	131	6.3%	10.7%	.0%	9.4%
Valid	1.7	.4	.9	0	5.6%	2.6%	10.2%	.0%
Intergraph	1.0	.6	.2	11	3.3%	3.4%	2.0%	.8%
Computervision	1.0	.4	.2	8	3.1%	2.7%	2.5%	.6%
Compaq	.8	.8	.0	132	2.5%	4.8%	.0%	9.5%
Racal-Redac	.7	.0	.6	3	2.2%	.1%	6.1%	.2%
Autodesk	.3	.0	.3	0	.9%	.0%	3.1%	.0%
Intercad	.2	.1	.1	12	.7%	.7%	.8%	.9%
Apple Computer	.1	.1	.0	25	.4%	.7%	.0%	1.8%
Aucotec	.1	.0	.1	14	.4%	.2%	.5%	1.0%
IBM	.1	.1	.0	24	.4%	.7%	.0%	1.7%
Ziegler	.0	.0	.0	1	.1%	.0%	.3%	.1%
Dassault	.0	.0	.0	0	.1%	.0%	.2%	.0%
Westward	.0	.0	.0	1	.1%	.1%	.0%	.1%
Secmai	.0	.0	.0	0	.0%	.1%	.0%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.1%	.0%
Other Companies	6.9	3.9	2.0	628.0	22.1%	23.9%	22.1%	45.2%
All Companies	31.0	16.4	9.1	1,390.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	29.9	16.2	8.4	1,359	96.3%	98.7%	91.9%	97.8%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	1.1	.2	.7	30.9	3.7%	1.3%	8.1%	2.2%
All Hardware Companies	11.6	10.2	.0	1,188.5	37.4%	62.4%	.0%	85.5%
All Turnkey & SW Companies	19.4	6.2	9.1	201.8	62.6%	37.6%	100.0%	14.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 21
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Digital	1.1	.8	.0	9	23.2%	43.5%	.0%	10.7%
Hewlett-Packard	.7	.6	.0	61	14.8%	30.4%	.0%	72.8%
Mentor Graphics	.6	.2	.3	7	12.1%	8.7%	16.4%	8.7%
European Silicon Systems	.4	.1	.3	2	9.7%	6.0%	19.3%	2.9%
Valid	.3	.1	.1	0	5.5%	3.3%	7.6%	.0%
Other Companies	1.6	.2	1.0	4.2	34.7%	8.2%	56.7%	5.0%
All Companies	4.5	1.8	1.7	84.0	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	4.1	1.7	1.4	82	90.3%	94.0%	80.7%	97.1%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	.4	.1	.3	2.4	9.7%	6.0%	19.3%	2.9%
All Hardware Companies	1.8	1.5	.0	72.7	40.4%	79.3%	.0%	86.5%
All Turnkey & SW Companies	2.7	.4	1.7	11.3	59.6%	20.7%	100.0%	13.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 22
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Benelux
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Hewlett-Packard	3.1	1.9	.2	206	12.7%	16.9%	2.7%	30.2%
Mentor Graphics	3.1	.8	1.5	41	12.6%	6.6%	20.8%	6.0%
Racal-Redac	3.0	.0	2.5	10	12.2%	.0%	33.6%	1.5%
Digital	2.9	2.1	.0	25	11.8%	18.9%	.0%	3.6%
Computervision	2.4	1.1	.6	20	9.9%	9.4%	7.8%	3.0%
Intergraph	1.8	.8	.3	19	7.5%	7.0%	4.4%	2.8%
IBM	1.4	.9	.2	37	5.6%	8.1%	3.0%	5.4%
Calay	1.0	.3	.5	10	4.0%	2.6%	6.8%	1.4%
Compaq	1.0	1.0	.0	163	4.0%	8.6%	.0%	23.9%
Dazix	.6	.2	.3	6	2.6%	1.7%	3.6%	.9%
Valid	.5	.1	.3	0	2.0%	1.1%	3.6%	.0%
CADAM	.3	.0	.3	0	1.3%	.0%	3.8%	.0%
Secmai	.2	.1	.0	2	.9%	1.1%	.5%	.2%
Apple Computer	.2	.2	.0	33	.7%	1.3%	.0%	4.9%
Sycotronic AG	.2	.0	.1	0	.7%	.0%	1.8%	.0%
CAD-UL	.1	.0	.1	2	.3%	.2%	.7%	.3%
Autodesk	.0	.0	.0	0	.1%	.0%	.4%	.0%
BETRONEX	.0	.0	.0	0	.1%	.0%	.4%	.0%
Ziegler	.0	.0	.0	1	.1%	.0%	.4%	.1%
Olivetti	.0	.0	.0	5	.1%	.1%	.1%	.7%
Schlumberger (Applicon)	.0	.0	.0	0	.1%	.1%	.0%	.0%
Other Companies	2.6	1.9	.4	95.5	10.7%	16.3%	5.6%	14.0%
All Companies	24.5	11.3	7.3	680.6	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	20.0	10.9	4.1	646	81.6%	95.9%	55.6%	94.9%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	4.5	.5	3.3	34.6	18.4%	4.1%	44.4%	5.1%
All Hardware Companies	8.0	6.5	.0	517.5	32.8%	57.6%	.0%	76.0%
All Turnkey & SW Companies	16.5	4.8	7.3	163.1	67.2%	42.4%	100.0%	24.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 23
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: France
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	100.1	68.6	16.0	3,419	14.9%	17.5%	9.9%	15.3%
Computervision	95.3	43.9	22.7	801	14.2%	11.2%	14.0%	3.6%
Digital	62.3	46.6	.0	452	9.3%	11.9%	.0%	2.0%
Hewlett-Packard	40.0	29.3	3.2	2,435	6.0%	7.5%	2.0%	10.9%
Compaq	32.4	32.4	.0	5,398	4.8%	8.3%	.0%	24.2%
Intergraph	28.3	14.9	5.6	289	4.2%	3.8%	3.4%	1.3%
Cisigraph	23.2	9.3	8.3	259	3.4%	2.4%	5.1%	1.2%
Matra Datavision	22.6	13.6	6.8	10	3.4%	3.5%	4.2%	.0%
Mentor Graphics	15.9	4.6	7.8	210	2.4%	1.2%	4.8%	.9%
Apple Computer	15.3	13.4	.0	2,938	2.3%	3.4%	.0%	13.1%
Control Data	13.0	9.3	1.6	139	1.9%	2.4%	1.0%	.6%
Sun	12.6	11.3	.0	846	1.9%	2.9%	.0%	3.8%
Valid	11.4	2.8	6.1	0	1.7%	.7%	3.8%	.0%
McDonnell Douglas	10.6	5.7	3.9	154	1.6%	1.5%	2.4%	.7%
Secmai	9.6	5.7	2.0	80	1.4%	1.5%	1.2%	.4%
Dazix	7.9	3.0	3.2	79	1.2%	.8%	2.0%	.4%
PAFEC	6.5	.0	6.5	0	1.0%	.0%	4.0%	.0%
Autodesk	6.3	.0	6.3	0	.9%	.0%	3.9%	.0%
Racal-Redac	6.0	.0	4.9	21	.9%	.0%	3.0%	.1%
Schlumberger (Applicon)	5.8	2.2	1.9	61	.9%	.6%	1.2%	.3%
Dassault	5.8	.0	4.8	0	.9%	.0%	2.9%	.0%
Ferranti	5.8	4.3	.5	52	.9%	1.1%	.3%	.2%
Unisys	5.3	2.8	1.8	48	.8%	.7%	1.1%	.2%
Silicon Graphics	4.8	4.3	.0	143	.7%	1.1%	.0%	.6%
Framesoft	3.4	.0	3.8	15	.5%	.0%	2.3%	.1%
Star Informatic	3.3	1.5	1.0	138	.5%	.4%	.6%	.6%
Siemens	3.3	1.9	1.0	72	.5%	.5%	.6%	.3%
Datagraphic	3.2	1.5	1.2	54	.5%	.4%	.7%	.2%
Serbi	3.2	.0	3.2	0	.5%	.0%	2.0%	.0%
Vero International Software	2.7	.0	2.7	0	.4%	.0%	1.7%	.0%
Olivetti	2.7	.7	1.2	406	.4%	.2%	.7%	1.8%
SDRC	2.6	.0	2.6	0	.4%	.0%	1.6%	.0%
ICL	2.0	1.2	.6	59	.3%	.3%	.3%	.3%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 23
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: France
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
ALS Design	1.9	.2	1.6	34	.3%	.0%	1.0%	.2%
CADAM	1.7	.0	1.6	0	.3%	.0%	1.0%	.0%
Catalpa	1.6	.5	.9	8	.2%	.1%	.5%	.0%
ISICAD	1.6	.7	.7	17	.2%	.2%	.4%	.1%
XAO Industrie	1.5	.5	.9	82	.2%	.1%	.6%	.4%
Compiegne Science Industrie	1.5	.0	.7	0	.2%	.0%	.5%	.0%
DECAD	1.3	.1	.9	5	.2%	.0%	.6%	.0%
Datagraph	1.2	1.0	.2	5	.2%	.2%	.1%	.0%
Norsk Data	1.2	.9	.1	40	.2%	.2%	.0%	.2%
European Silicon Systems	1.1	.3	.8	6	.2%	.1%	.5%	.0%
Albert Nestler	1.0	.3	.5	32	.2%	.1%	.3%	.1%
Investronica SA	.9	.7	.1	36	.1%	.2%	.1%	.2%
ESRI	.9	.0	.8	0	.1%	.0%	.5%	.0%
Wiechers Datentechnik	.9	.4	.4	20	.1%	.1%	.3%	.1%
Superdraft	.8	.0	.7	0	.1%	.0%	.5%	.0%
Academi Systems	.7	.1	.5	8	.1%	.0%	.3%	.0%
CAD Lab	.6	.0	.5	0	.1%	.0%	.3%	.0%
Vision 3D	.6	.3	.2	0	.1%	.1%	.1%	.0%
Calay	.5	.2	.3	5	.1%	.0%	.2%	.0%
Fides Industrielle Automation	.3	.1	.2	3	.0%	.0%	.1%	.0%
DAT Standard Information syste	.2	.0	.2	0	.0%	.0%	.1%	.0%
t2 Solutions	.2	.1	.1	2	.0%	.0%	.0%	.0%
BETRONEX	.2	.0	.2	0	.0%	.0%	.1%	.0%
Gerber Systems	.2	.1	.0	3	.0%	.0%	.0%	.0%
Robocom	.2	.0	.2	0	.0%	.0%	.1%	.0%
Ziegler	.2	.0	.2	0	.0%	.0%	.1%	.0%
Aucotec	.1	.0	.1	11	.0%	.0%	.0%	.1%
Sycotronic AG	.1	.0	.1	0	.0%	.0%	.0%	.0%
Pathtrace	.1	.0	.0	2	.0%	.0%	.0%	.0%
BATISOFT	.0	.0	.0	1	.0%	.0%	.0%	.0%
FEGS	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 23 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: France
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	76.2	49.9	17.9	3,450.3	11.3%	12.8%	11.1%	15.4%
All Companies	672.3	391.3	162.1	22,345.8	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	551.2	345.9	104.2	20,881	82.0%	88.4%	64.3%	93.4%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	121.1	45.4	57.9	1,465.0	18.0%	11.6%	35.7%	6.6%
All Hardware Companies	212.3	184.6	.0	17,598.3	31.6%	47.2%	.0%	78.8%
All Turnkey & SW Companies	460.0	206.7	162.1	4,747.6	68.4%	52.8%	100.0%	21.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 24
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: France
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Computervision	80.5	37.1	19.2	488	23.5%	22.5%	18.1%	9.2%
Hewlett-Packard	33.7	24.1	3.2	1,512	9.8%	14.6%	3.0%	28.6%
Matra Datavision	22.6	13.6	6.8	0	6.6%	8.2%	6.4%	.0%
Intergraph	22.4	12.3	4.0	240	6.5%	7.5%	3.8%	4.5%
Cisigraph	20.9	8.3	7.5	251	6.1%	5.1%	7.1%	4.7%
Mentor Graphics	15.9	4.6	7.8	210	4.6%	2.8%	7.3%	4.0%
Digital	13.7	10.2	.0	452	4.0%	6.2%	.0%	8.5%
Sun	12.6	11.3	.0	846	3.7%	6.9%	.0%	16.0%
Valid	11.4	2.8	6.1	0	3.3%	1.7%	5.8%	.0%
Secmaf	9.5	5.7	2.0	78	2.8%	3.4%	1.9%	1.5%
McDonnell Douglas	8.9	4.8	3.2	100	2.6%	2.9%	3.1%	1.9%
IBM	8.0	5.2	1.5	72	2.3%	3.1%	1.4%	1.4%
Dazix	7.9	3.0	3.2	79	2.3%	1.8%	3.0%	1.5%
PAFEC	6.1	.0	6.1	0	1.8%	.0%	5.7%	.0%
Racal-Redac	5.8	.0	4.8	20	1.7%	.0%	4.5%	.4%
Schlumberger (Applicon)	5.1	1.9	1.7	48	1.5%	1.2%	1.6%	.9%
Unisys	4.7	2.4	1.6	31	1.4%	1.5%	1.5%	.6%
Silicon Graphics	4.5	4.0	.0	135	1.3%	2.4%	.0%	2.5%
Control Data	4.4	3.1	.5	81	1.3%	1.9%	.5%	1.5%
Framesoft	3.4	.0	3.8	15	1.0%	.0%	3.6%	.3%
Star Informatic	3.3	1.5	1.0	138	1.0%	.9%	.9%	2.6%
Siemens	2.9	1.7	.9	69	.9%	1.1%	.8%	1.3%
Dassault	2.4	.0	2.0	0	.7%	.0%	1.8%	.0%
SDRC	2.0	.0	2.0	0	.6%	.0%	1.9%	.0%
ICL	2.0	1.2	.6	59	.6%	.7%	.5%	1.1%
Catalpa	1.6	.5	.9	8	.5%	.3%	.8%	.1%
XAO Industrie	1.5	.5	.9	82	.4%	.3%	.9%	1.5%
ISICAD	1.4	.7	.5	17	.4%	.4%	.4%	.3%
DECAD	1.3	.1	.9	5	.4%	.0%	.8%	.1%
Compiegne Science Industrie	1.0	.0	.5	0	.3%	.0%	.5%	.0%
Albert Nestler	1.0	.3	.5	28	.3%	.2%	.5%	.5%
European Silicon Systems	.9	.2	.7	4	.3%	.1%	.6%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 24 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: France
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Norsk Data	.7	.5	.0	25	.2%	.3%	.0%	.5%
Academi Systems	.6	.1	.4	7	.2%	.1%	.4%	.1%
CAD Lab	.6	.0	.4	0	.2%	.0%	.4%	.0%
Calay	.5	.2	.3	5	.1%	.1%	.2%	.1%
ESRI	.3	.0	.3	0	.1%	.0%	.3%	.0%
Wiechers Datentechnik	.3	.1	.1	6	.1%	.1%	.1%	.1%
Ferranti	.3	.1	.1	5	.1%	.1%	.1%	.1%
t2 Solutions	.2	.1	.1	2	.1%	.1%	.1%	.0%
Autodesk	.2	.0	.2	0	.1%	.0%	.2%	.0%
Serbi	.2	.0	.2	0	.1%	.0%	.2%	.0%
Gerber Systems	.2	.1	.0	3	.1%	.1%	.0%	.0%
Fides Industrielle Automation	.1	.0	.0	1	.0%	.0%	.0%	.0%
Aucotec	.0	.0	.0	1	.0%	.0%	.0%	.0%
Other Companies	15.9	2.6	9.9	175.6	4.6%	1.6%	9.3%	3.3%
All Companies	343.1	165.1	106.1	5,295.8	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	253.8	130.3	64.9	4,488	74.0%	78.9%	61.2%	84.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	89.4	34.8	41.2	808.2	26.0%	21.1%	38.8%	15.3%
All Hardware Companies	46.9	38.7	.0	2,557.6	13.7%	23.4%	.0%	48.3%
All Turnkey & SW Companies	296.2	126.4	106.1	2,738.2	86.3%	76.6%	100.0%	51.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 25
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: France
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	79.7	51.6	14.6	836	35.6%	33.8%	47.5%	26.7%
Digital	48.6	36.4	.0	0	21.7%	23.9%	.0%	.0%
Computervision	13.8	6.4	3.3	288	6.2%	4.2%	10.8%	9.2%
Control Data	8.6	6.1	1.0	58	3.8%	4.0%	3.4%	1.8%
Ferranti	5.6	4.2	.4	48	2.5%	2.8%	1.4%	1.5%
Intergraph	5.1	2.6	.8	49	2.3%	1.7%	2.7%	1.6%
Dassault	3.5	.0	2.8	0	1.5%	.0%	9.1%	.0%
Cisigraph	2.3	.9	.8	7	1.0%	.6%	2.7%	.2%
McDonnell Douglas	1.7	.9	.6	54	.8%	.6%	2.0%	1.7%
Hewlett-Packard	1.1	1.0	.0	58	.5%	.6%	.0%	1.8%
Schlumberger (Applicon)	.7	.3	.2	13	.3%	.2%	.7%	.4%
Unisys	.6	.4	.2	17	.3%	.2%	.6%	.6%
SDRC	.5	.0	.5	0	.2%	.0%	1.7%	.0%
ESRI	.5	.0	.4	0	.2%	.0%	1.3%	.0%
Norsk Data	.5	.4	.0	13	.2%	.2%	.1%	.4%
Compiegne Science Industrie	.4	.0	.2	0	.2%	.0%	.7%	.0%
PAFEC	.4	.0	.4	0	.2%	.0%	1.4%	.0%
Siemens	.3	.2	.1	4	.1%	.1%	.3%	.1%
Silicon Graphics	.3	.3	.0	9	.1%	.2%	.0%	.3%
Fides Industrielle Automation	.2	.0	.2	1	.1%	.0%	.5%	.0%
Olivetti	.2	.1	.1	11	.1%	.0%	.2%	.4%
Racal-Redac	.2	.0	.1	1	.1%	.0%	.4%	.0%
DECAD	.1	.0	.0	0	.0%	.0%	.1%	.0%
Aucotec	.0	.0	.0	1	.0%	.0%	.0%	.0%
FEGS	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 25 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: France
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
Company	Revenue	Revenue	Revenue	Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	49.1	40.8	3.7	1,652.0	21.9%	26.8%	12.2%	52.8%
All Companies	223.9	152.5	30.6	3,128.7	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	210.3	146.7	25.4	3,033	93.9%	96.2%	82.9%	96.9%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	13.6	5.8	5.2	95.5	6.1%	3.8%	17.1%	3.1%
All Hardware Companies	93.6	77.5	.0	1,712.4	41.8%	50.9%	.0%	54.7%
All Turnkey & SW Companies	130.3	74.9	30.6	1,416.2	58.2%	49.1%	100.0%	45.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 26
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: France
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compaq	32.4	32.4	.0	5,398	30.8%	43.9%	.0%	38.8%
Apple Computer	15.3	13.4	.0	2,938	14.5%	18.2%	.0%	21.1%
IBM	12.5	11.8	.0	2,511	11.8%	16.1%	.0%	18.0%
Autodesk	6.1	.0	6.1	0	5.8%	.0%	24.0%	.0%
Hewlett-Packard	5.2	4.3	.0	865	4.9%	5.8%	.0%	6.2%
Datagraphic	3.2	1.5	1.2	54	3.1%	2.0%	4.6%	.4%
Serbi	3.0	.0	3.0	0	2.8%	.0%	11.8%	.0%
Vero International Software	2.7	.0	2.7	0	2.6%	.0%	10.7%	.0%
Olivetti	2.5	.6	1.1	395	2.4%	.9%	4.3%	2.8%
ALS Design	1.9	.2	1.6	34	1.8%	.3%	6.1%	.2%
CADAM	1.7	.0	1.6	0	1.7%	.0%	6.1%	.0%
Datagraph	1.2	1.0	.2	5	1.2%	1.3%	.9%	.0%
Computervision	1.0	.4	.2	25	.9%	.6%	.9%	.2%
Investronica SA	.9	.7	.1	36	.9%	1.0%	.4%	.3%
Superdraft	.8	.0	.7	0	.8%	.1%	2.9%	.0%
Intergraph	.8	.0	.7	0	.7%	.0%	2.8%	.0%
Wiechers Datentechnik	.6	.3	.3	14	.6%	.4%	1.2%	.1%
Vision 3D	.6	.3	.2	0	.6%	.4%	.7%	.0%
European Silicon Systems	.2	.1	.2	2	.2%	.1%	.6%	.0%
DAT Standard Information syste	.2	.0	.2	0	.2%	.0%	.8%	.0%
ISICAD	.2	.0	.2	0	.2%	.0%	.8%	.0%
BETRONEX	.2	.0	.2	0	.2%	.0%	.7%	.0%
Robocom	.2	.0	.2	0	.2%	.0%	.6%	.0%
Ziegler	.2	.0	.2	0	.1%	.0%	.6%	.0%
Secmai	.1	.1	.0	2	.1%	.1%	.1%	.0%
Academi Systems	.1	.0	.1	1	.1%	.0%	.2%	.0%
Aucotec	.1	.0	.1	10	.1%	.1%	.2%	.1%
Sycotronic AG	.1	.0	.1	0	.1%	.0%	.2%	.0%
ESRI	.1	.0	.1	0	.1%	.0%	.3%	.0%
Albert Nestler	.1	.0	.0	3	.1%	.0%	.0%	.0%
Pathtrace	.1	.0	.0	2	.1%	.0%	.2%	.0%
CAD Lab	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 26 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: France
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
BATISOFT	.0	.0	.0	1	.0%	.0%	.0%	.0%
Racal-Redac	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	11.1	6.5	4.3	1,622.7	10.6%	8.8%	16.9%	11.7%
All Companies	105.3	73.7	25.3	13,921.4	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	87.1	68.9	13.9	13,360	82.7%	93.5%	54.7%	96.0%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	18.2	4.8	11.5	561.3	17.3%	6.5%	45.3%	4.0%
All Hardware Companies	71.8	68.4	.0	13,328.2	68.2%	92.8%	.0%	95.7%
All Turnkey & SW Companies	33.5	5.3	25.3	593.2	31.8%	7.2%	100.0%	4.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 27
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: France
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Computervision	83.8	38.7	20.0	705	19.3%	14.9%	20.1%	5.5%
IBM	82.3	55.3	13.8	2,161	18.9%	21.3%	13.8%	16.9%
Digital	33.6	25.2	.0	230	7.7%	9.7%	.0%	1.8%
Hewlett-Packard	24.5	17.9	2.3	1,361	5.6%	6.9%	2.3%	10.7%
Cisigraph	23.2	9.3	8.3	259	5.3%	3.6%	8.4%	2.0%
Matra Datavision	22.6	13.6	6.8	10	5.2%	5.2%	6.8%	.1%
Compaq	17.2	17.2	.0	2,861	3.9%	6.6%	.0%	22.4%
Control Data	12.4	8.8	1.5	132	2.8%	3.4%	1.5%	1.0%
McDonnell Douglas	10.6	5.7	3.9	154	2.4%	2.2%	3.9%	1.2%
Intergraph	7.6	4.1	1.5	77	1.7%	1.6%	1.5%	.6%
Apple Computer	6.9	6.1	.0	1,322	1.6%	2.3%	.0%	10.4%
Sun	6.7	6.0	.0	448	1.5%	2.3%	.0%	3.5%
Ferranti	5.8	4.3	.5	52	1.3%	1.7%	.5%	.4%
Schlumberger (Applicon)	5.6	2.1	1.8	59	1.3%	.8%	1.8%	.5%
PAFEC	5.4	.0	5.4	0	1.2%	.0%	5.4%	.0%
Unisys	5.3	2.8	1.8	48	1.2%	1.1%	1.8%	.4%
Dassault	5.0	.0	4.1	0	1.1%	.0%	4.1%	.0%
Silicon Graphics	4.8	4.3	.0	143	1.1%	1.7%	.0%	1.1%
Framesoft	3.4	.0	3.8	15	.8%	.0%	3.8%	.1%
Vero International Software	2.7	.0	2.7	0	.6%	.0%	2.7%	.0%
Autodesk	2.6	.0	2.6	0	.6%	.0%	2.6%	.0%
SDRC	2.6	.0	2.6	0	.6%	.0%	2.6%	.0%
Siemens	1.7	1.0	.5	39	.4%	.4%	.5%	.3%
Catalpa	1.6	.5	.9	8	.4%	.2%	.9%	.1%
Olivetti	1.6	.4	.9	245	.4%	.1%	.9%	1.9%
Serbi	1.6	.0	1.6	0	.4%	.0%	1.6%	.0%
XAO Industrie	1.5	.5	.9	82	.4%	.2%	.9%	.6%
Compiegne Science Industrie	1.5	.0	.7	0	.3%	.0%	.7%	.0%
Datagraph	1.2	1.0	.2	5	.3%	.4%	.2%	.0%
Norsk Data	1.2	.9	.1	40	3%	.3%	.1%	.3%
ICL	1.1	.6	.3	33	.2%	.2%	.3%	.3%
Albert Nestler	1.0	.3	.5	32	.2%	.1%	.5%	.3%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 27 (Continued)
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: France
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Investronica SA	.9	.7	.1	36	.2%	.3%	.1%	.3%
Wiechers Datentechnik	.9	.4	.4	20	.2%	.2%	.4%	.2%
Superdraft	.8	.0	.7	0	.2%	.0%	.7%	.0%
ISICAD	.6	.3	.3	7	.1%	.1%	.3%	.1%
Vision 3D	.6	.3	.2	0	.1%	.1%	.2%	.0%
CAD Lab	.5	.0	.4	0	.1%	.0%	.4%	.0%
Mentor Graphics	.3	.1	.2	4	.1%	.0%	.2%	.0%
Fides Industrielle Automation	.3	.1	.2	3	.1%	.0%	.2%	.0%
DAT Standard Information syste	.2	.0	.2	0	.0%	.0%	.2%	.0%
Gerber Systems	.2	.1	.0	3	.0%	.0%	.0%	.0%
Robocom	.1	.0	.1	0	.0%	.0%	.1%	.0%
Pathtrace	.1	.0	.0	2	.0%	.0%	.0%	.0%
Ziegler	.0	.0	.0	0	.0%	.0%	.0%	.0%
FEGS	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	41.3	30.8	6.8	2,165.8	9.5%	11.9%	6.9%	17.0%
All Companies	435.1	259.3	99.5	12,760.0	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	349.6	225.4	59.6	11,881	80.3%	86.9%	60.0%	93.1%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	85.5	33.9	39.8	879.0	19.7%	13.1%	40.0%	6.9%
All Hardware Companies	119.1	104.1	.0	9,472.4	27.4%	40.1%	.0%	74.2%
All Turnkey & SW Companies	316.1	155.2	99.5	3,287.7	72.6%	59.9%	100.0%	25.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 28
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: France
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
IBM	11.4	8.7	1.3	952	16.0%	18.4%	10.0%	19.8%
Intergraph	7.6	4.1	1.5	77	10.7%	8.6%	11.8%	1.6%
Compaq	7.5	7.5	.0	1,241	10.5%	15.8%	.0%	25.8%
Digital	6.9	5.1	.0	47	9.7%	10.9%	.0%	1.0%
Apple Computer	6.6	5.8	.0	1,263	9.3%	12.2%	.0%	26.3%
Hewlett-Packard	5.1	3.9	.4	324	7.2%	8.2%	3.0%	6.7%
Computervision	3.8	1.8	.9	32	5.4%	3.7%	7.1%	.7%
Star Informatic	3.3	1.5	1.0	138	4.6%	3.1%	7.6%	2.9%
Datagraphic	3.2	1.5	1.2	54	4.6%	3.1%	9.2%	1.1%
Autodesk	2.6	.0	2.6	0	3.6%	.0%	20.2%	.0%
PAFEC	1.1	.0	1.1	0	1.5%	.0%	8.5%	.0%
Olivetti	1.0	.3	.3	142	1.4%	.7%	2.0%	3.0%
ISICAD	.9	.4	.4	10	1.3%	.8%	3.3%	.2%
Serbi	.8	.0	.8	0	1.1%	.0%	6.3%	.0%
Dassault	.8	.0	.6	0	1.1%	.0%	4.6%	.0%
Sun	.6	.6	.0	42	.9%	1.2%	.0%	.9%
Control Data	.3	.2	.0	3	.4%	.4%	.2%	.1%
Siemens	.3	.2	.1	5	.4%	.3%	.5%	.1%
t2 Solutions	.2	.1	.1	2	.3%	.3%	.5%	.0%
CAD Lab	.1	.0	.1	0	.2%	.0%	.8%	.0%
Robocom	.1	.0	.1	0	.1%	.0%	.5%	.0%
Schlumberger (Applicon)	.1	.0	.0	1	.1%	.0%	.2%	.0%
Sycotronic AG	.0	.0	.0	0	.0%	.0%	.2%	.0%
BATISOFT	.0	.0	.0	1	.0%	.0%	.1%	.0%
Ziegler	.0	.0	.0	0	.0%	.0%	.2%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 28 (Continued)
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: France
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	6.8	5.9	.4	477.4	9.6%	12.4%	3.1%	9.9%
All Companies	70.9	47.3	12.8	4,811.0	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	60.1	43.8	7.5	4,469	84.7%	92.5%	59.0%	92.9%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	10.9	3.5	5.2	342.0	15.3%	7.5%	41.0%	7.1%
All Hardware Companies	35.2	31.4	.0	4,222.5	49.6%	66.4%	.0%	87.8%
All Turnkey & SW Companies	35.7	15.9	12.8	588.5	50.4%	33.6%	100.0%	12.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 29
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: France
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Intergraph	10.1	5.4	2.0	103	30.8%	25.2%	37.8%	8.5%
Digital	6.2	4.7	.0	43	19.0%	21.9%	.0%	3.5%
IBM	3.4	2.4	.5	178	10.3%	11.3%	9.0%	14.7%
Compaq	1.6	1.6	.0	270	4.9%	7.6%	.0%	22.3%
Siemens	1.3	.8	.4	28	4.0%	3.6%	7.3%	2.3%
Computervision	1.0	.4	.2	8	2.9%	2.0%	4.3%	.7%
ICL	.9	.6	.3	27	2.8%	2.7%	4.7%	2.2%
ESRI	.9	.0	.8	0	2.7%	.0%	14.4%	.0%
Apple Computer	.8	.7	.0	147	2.3%	3.1%	.0%	12.1%
Autodesk	.6	.0	.6	0	1.7%	.0%	10.7%	.0%
Control Data	.4	.3	.0	4	1.2%	1.3%	.7%	.3%
Hewlett-Packard	.1	.1	.0	10	.3%	.4%	.0%	.8%
Robocom	.0	.0	.0	0	.0%	.0%	.2%	.0%
Other Companies	5.6	4.4	.6	394.1	17.0%	20.8%	10.9%	32.5%
All Companies	32.8	21.4	5.3	1,211.3	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	30.6	20.0	4.7	1,157	93.2%	93.7%	87.8%	95.5%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	2.2	1.4	.7	54.7	6.8%	6.3%	12.2%	4.5%
All Hardware Companies	14.2	12.2	.0	1,014.0	43.4%	57.1%	.0%	83.7%
All Turnkey & SW Companies	18.6	9.2	5.3	197.3	56.6%	42.9%	100.0%	16.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 30
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: France
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
					Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Digital	15.6	11.6	.0	133	11.7%	18.3%	.0%	3.7%
Mentor Graphics	15.6	4.5	7.6	206	11.7%	7.1%	17.2%	5.8%
Valid	11.4	2.8	6.1	0	8.5%	4.5%	13.8%	.0%
Hewlett-Packard	10.3	7.5	.5	740	7.7%	11.8%	1.1%	20.8%
Secmai	9.6	5.7	2.0	80	7.2%	9.1%	4.5%	2.2%
Dazix	7.9	3.0	3.2	79	5.9%	4.7%	7.1%	2.2%
Computervision	6.7	3.0	1.6	56	5.0%	4.7%	3.6%	1.6%
Compaq	6.2	6.2	.0	1,026	4.6%	9.7%	.0%	28.8%
Racal-Redac	6.0	.0	4.9	21	4.5%	.0%	11.0%	.6%
Sun	5.3	4.8	.0	355	4.0%	7.5%	.0%	10.0%
IBM	3.1	2.2	.5	128	2.3%	3.4%	1.1%	3.6%
Intergraph	3.0	1.4	.5	31	2.2%	2.2%	1.2%	.9%
ALS Design	1.9	.2	1.6	34	1.5%	.3%	3.5%	1.0%
CADAM	1.7	.0	1.6	0	1.3%	.0%	3.5%	.0%
DECAD	1.3	.1	.9	5	1.0%	.1%	2.1%	.1%
European Silicon Systems	1.1	.3	.8	6	.8%	.4%	1.8%	.2%
Apple Computer	1.1	.9	.0	206	.8%	1.5%	.0%	5.8%
Serbi	.8	.0	.8	0	.6%	.0%	1.8%	.0%
Academi Systems	.7	.1	.5	8	.5%	.2%	1.0%	.2%
Autodesk	.6	.0	.6	0	.4%	.0%	1.3%	.0%
Calay	.5	.2	.3	5	.4%	.2%	.6%	.1%
BETRONEX	.2	.0	.2	0	.1%	.0%	.4%	.0%
Schlumberger (Applicon)	.2	.0	.1	2	.1%	.1%	.1%	.1%
Aucotec	.1	.0	.1	11	.1%	.1%	.1%	.3%
Dassault	.1	.0	.1	0	.1%	.0%	.2%	.0%
Ziegler	.1	.0	.1	0	.1%	.0%	.2%	.0%
Olivetti	.1	.0	.0	18	.1%	.0%	.1%	.5%
Sycotronic AG	.1	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 30 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: France
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	22.5	8.8	10.1	413.0	16.8%	13.9%	22.7%	11.6%
All Companies	133.4	63.3	44.5	3,563.5	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	110.9	56.7	32.3	3,374	83.1%	89.5%	72.6%	94.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	22.5	6.6	12.2	189.4	16.9%	10.5%	27.4%	5.3%
All Hardware Companies	43.8	36.9	.0	2,889.4	32.8%	58.3%	.0%	81.1%
All Turnkey & SW Companies	89.7	26.4	44.5	674.1	67.2%	41.7%	100.0%	18.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 31
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: France
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Mentor Graphics	10.3	3.2	5.1	137	15.9%	10.3%	22.0%	7.3%
Valid	8.0	2.0	4.3	0	12.2%	6.5%	18.6%	.0%
Dazix	6.3	2.5	2.5	63	9.7%	8.2%	11.0%	3.4%
Digital	6.2	4.7	.0	53	9.6%	15.2%	.0%	2.8%
Sun	5.3	4.8	.0	355	8.1%	15.5%	.0%	19.0%
Hewlett-Packard	5.2	4.0	.3	374	7.9%	13.1%	1.1%	20.0%
Compaq	2.8	2.8	.0	459	4.2%	8.9%	.0%	24.6%
Computervision	1.9	.9	.4	16	2.9%	2.9%	1.9%	.9%
ALS Design	1.4	.1	1.1	25	2.2%	.5%	4.9%	1.3%
Racal-Redac	1.1	.0	.9	4	1.7%	.1%	3.9%	.2%
Intergraph	1.1	.6	.2	11	1.6%	1.9%	.8%	.6%
Secmai	.9	.6	.2	8	1.4%	1.9%	.8%	.4%
Serbi	.8	.0	.8	0	1.2%	.0%	3.5%	.0%
Autodesk	.5	.0	.5	0	.8%	.0%	2.2%	.0%
Apple Computer	.5	.4	.0	88	.7%	1.3%	.0%	4.7%
IBM	.3	.2	.0	50	.4%	.8%	.0%	2.7%
Aucotec	.1	.0	.1	11	.2%	.1%	.2%	.6%
Dassault	.1	.0	.1	0	.2%	.0%	.3%	.0%
Ziegler	.1	.0	.1	0	.1%	.0%	.3%	.0%
Academi Systems	.1	.0	.0	1	.1%	.0%	.2%	.0%
Other Companies	12.1	3.9	6.5	210.5	18.6%	12.7%	28.3%	11.3%
All Companies	65.0	30.7	23.1	1,866.4	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	60.3	29.9	19.8	1,817	92.9%	97.4%	85.8%	97.4%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	4.6	.8	3.3	49.5	7.1%	2.6%	14.2%	2.6%
All Hardware Companies	21.8	18.7	.0	1,547.7	33.5%	61.0%	.0%	82.9%
All Turnkey & SW Companies	43.2	12.0	23.1	318.7	66.5%	39.0%	100.0%	17.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 32
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: France
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	2.5	1.9	.0	21	23.9%	48.6%	.0%	15.9%
Valid	1.1	.3	.6	0	10.9%	7.3%	14.3%	.0%
European Silicon Systems	1.1	.3	.8	6	10.5%	7.0%	19.0%	4.5%
Hewlett-Packard	1.0	.8	.0	90	9.5%	21.9%	.0%	67.2%
Mentor Graphics	.8	.2	.4	11	7.6%	6.3%	9.1%	7.9%
Other Companies	3.9	.3	2.5	6.2	37.6%	8.9%	57.6%	4.6%
All Companies	10.4	3.8	4.3	133.7	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	9.3	3.6	3.5	128	89.5%	93.0%	81.0%	95.5%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	1.1	.3	.8	6.0	10.5%	7.0%	19.0%	4.5%
All Hardware Companies	3.7	2.9	.0	114.5	35.6%	76.2%	.0%	85.6%
All Turnkey & SW Companies	6.7	.9	4.3	19.2	64.4%	23.8%	100.0%	14.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 33
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: France
UNITS: Millions of Dollars/Actual Units

	Revenue				Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Secmai	8.7	5.2	1.8	72	15.0%	18.0%	10.5%	4.6%
Digital	6.9	5.0	.0	58	11.8%	17.5%	.0%	3.7%
Racal-Redac	4.9	.0	4.0	17	8.4%	.0%	23.4%	1.1%
Computervision	4.8	2.1	1.1	40	8.2%	7.3%	6.7%	2.6%
Mentor Graphics	4.4	1.1	2.2	59	7.7%	3.8%	12.7%	3.8%
Hewlett-Packard	4.1	2.6	.3	276	7.1%	8.9%	1.5%	17.7%
Compaq	3.4	3.4	.0	567	5.9%	11.8%	.0%	36.3%
IBM	2.9	1.9	.5	78	5.0%	6.8%	2.8%	5.0%
Valid	2.3	.6	1.2	0	3.9%	2.0%	7.2%	.0%
Intergraph	1.9	.8	.3	20	3.3%	2.9%	2.0%	1.3%
CADAM	1.7	.0	1.6	0	3.0%	.0%	9.1%	.0%
Dazix	1.6	.5	.6	16	2.7%	1.6%	3.7%	1.0%
DECAD	1.3	.1	.9	5	2.3%	.2%	5.5%	.3%
Apple Computer	.6	.5	.0	118	1.1%	1.9%	.0%	7.5%
Academi Systems	.6	.1	.4	7	1.0%	.4%	2.4%	.5%
ALS Design	.5	.1	.4	9	.9%	.2%	2.4%	.6%
Calay	.5	.2	.3	5	.8%	.5%	1.5%	.3%
BETRONEX	.2	.0	.2	0	.3%	.0%	1.1%	.0%
Schlumberger (Applicon)	.2	.0	.1	2	.3%	.1%	.3%	.1%
Olivetti	.1	.0	.0	18	.1%	.0%	.2%	1.2%
Autodesk	.1	.0	.1	0	.1%	.0%	.4%	.0%
Sycotronic AG	.1	.0	.0	0	.1%	.0%	.2%	.0%
Ziegler	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 33 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: France
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	6.4	4.6	1.1	196.3	11.1%	15.9%	6.5%	12.6%
All Companies	58.0	28.7	17.1	1,563.4	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	41.2	23.2	9.0	1,430	71.1%	80.6%	52.8%	91.4%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	16.8	5.6	8.1	133.9	28.9%	19.4%	47.2%	8.6%
All Hardware Companies	18.3	15.3	.0	1,227.2	31.5%	53.1%	.0%	78.5%
All Turnkey & SW Companies	39.8	13.5	17.1	336.3	68.5%	46.9%	100.0%	21.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 34
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					--- Market Share ---			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
DAT Standard Information syste	6.5	.0	6.5	0	.4%	.0%	1.7%	.0%
Silicon Graphics	5.8	5.1	.0	172	.4%	.6%	.0%	.4%
LPKF	5.6	3.4	1.7	563	.4%	.4%	.4%	1.2%
Ferranti	5.2	3.9	.4	46	.4%	.5%	.1%	.1%
Cisigraph	4.4	1.8	1.6	49	.3%	.2%	.4%	.1%
Aucotec	4.1	1.7	2.1	462	.3%	.2%	.5%	1.0%
Gerber Systems	4.0	2.4	1.0	56	.3%	.3%	.3%	.1%
Technische Computer Systeme	3.8	1.1	2.7	103	.3%	.1%	.7%	.2%
Cimatron	3.7	1.7	1.6	93	.2%	.2%	.4%	.2%
Albert Nestler	3.5	1.1	1.6	119	.2%	.1%	.4%	.3%
SDRC	3.5	.0	3.5	0	.2%	.0%	.9%	.0%
Marcus Computer Systems	3.5	1.9	1.1	119	.2%	.2%	.3%	.3%
ESRI	3.4	.0	3.0	0	.2%	.0%	.8%	.0%
Fides Industrielle Automation	3.1	.6	2.2	29	.2%	.1%	.6%	.1%
Philips International	2.9	1.0	1.4	5	.2%	.1%	.4%	.0%
Intercad	2.2	1.1	.6	109	.1%	.1%	.2%	.2%
European Silicon Systems	2.1	.5	1.5	11	.1%	.1%	.4%	.0%
Olivetti	1.9	.6	.9	437	.1%	.1%	.2%	.9%
Westward	1.7	1.7	.0	99	.1%	.2%	.0%	.2%
Star Informatic	1.4	.6	.4	61	.1%	.1%	.1%	.1%
CADAM	1.4	.0	1.3	0	.1%	.0%	.3%	.0%
ICL	1.4	.8	.4	43	.1%	.1%	.1%	.1%
Unisys	1.3	.6	.6	42	.1%	.1%	.1%	.1%
CAD-UL	1.0	.3	.7	20	.1%	.0%	.2%	.0%
Sycotronic AG	.8	.0	.7	2	.1%	.0%	.2%	.0%
Vero International Software	.7	.0	.7	0	.1%	.0%	.2%	.0%
Framesoft	.7	.0	.8	3	.0%	.0%	.2%	.0%
Investronica SA	.7	.6	.1	27	.0%	.1%	.0%	.1%
Secmai	.7	.4	.1	5	.0%	.0%	.0%	.0%
Academi Systems	.4	.1	.3	5	.0%	.0%	.1%	.0%
Superdraft	.4	.0	.3	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 34
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	188.5	129.1	30.2	6,436	12.8%	15.3%	8.0%	13.6%
Hewlett-Packard	132.2	94.6	12.2	7,409	9.0%	11.2%	3.2%	15.7%
Computervision	119.1	54.9	28.3	1,001	8.1%	6.5%	7.5%	2.1%
Digital	104.7	78.4	.0	760	7.1%	9.3%	.0%	1.6%
Siemens	92.2	54.4	27.7	2,045	6.3%	6.5%	7.3%	4.3%
Intergraph	87.7	46.1	17.3	895	6.0%	5.5%	4.6%	1.9%
Control Data	58.2	41.3	7.0	621	4.0%	4.9%	1.8%	1.3%
Schlumberger (Applicon)	47.6	17.9	15.3	499	3.2%	2.1%	4.0%	1.1%
Norsk Data	31.9	15.6	9.6	18	2.2%	1.9%	2.5%	.0%
Compaq	29.9	29.9	.0	4,981	2.0%	3.5%	.0%	10.5%
McDonnell Douglas	28.6	15.3	10.4	423	1.9%	1.8%	2.7%	.9%
Mentor Graphics	26.7	7.7	13.1	353	1.8%	.9%	3.5%	.7%
Racal-Redac	18.6	.1	15.3	66	1.3%	.0%	4.0%	.1%
Valid	17.6	4.4	9.5	0	1.2%	.5%	2.5%	.0%
Dazix	17.5	6.7	7.0	174	1.2%	.8%	1.8%	.4%
ISICAD	17.2	7.2	7.3	184	1.2%	.9%	1.9%	.4%
STI-Straessle	16.2	7.4	8.0	72	1.1%	.9%	2.1%	.2%
Sun	15.9	14.3	.0	1,068	1.1%	1.7%	.0%	2.3%
Mannesmann PROCAD	15.0	7.5	4.5	200	1.0%	.9%	1.2%	.4%
Matra Datavision	14.9	8.9	4.5	67	1.0%	1.1%	1.2%	.1%
Autodesk	13.6	.0	13.6	0	.9%	.0%	3.6%	.0%
Wiechers Datentechnik	13.3	6.6	6.6	312	.9%	.8%	1.8%	.7%
Dassault	13.0	.0	10.8	0	.9%	.0%	2.8%	.0%
ABB Cade International	13.0	7.1	3.1	5	.9%	.8%	.8%	.0%
Ziegler	12.5	.5	11.4	416	.8%	.1%	3.0%	.9%
ISYKON Software	11.4	6.3	4.0	111	.8%	.7%	1.1%	.2%
Exapt	10.3	6.8	2.3	173	.7%	.8%	.6%	.4%
Calay	10.0	3.1	5.1	100	.7%	.4%	1.3%	.2%
PAFEC	9.9	.0	9.9	0	.7%	.0%	2.6%	.0%
Datagraph	9.2	7.3	1.8	38	.6%	.9%	.5%	.1%
Apple Computer	8.3	7.3	.0	1,594	.6%	.9%	.0%	3.4%
Cadtronic	7.5	5.7	1.0	51	.5%	.7%	.3%	.1%
Rotring EURCAD	6.7	4.1	2.6	185	.5%	.5%	.7%	.4%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 34 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Vision 3D	.4	.2	.1	0	.0%	.0%	.0%	.0%
ALS Design	.3	.0	.2	5	.0%	.0%	.1%	.0%
Robocom	.3	.0	.3	0	.0%	.0%	.1%	.0%
BETRONEX	.2	.0	.2	0	.0%	.0%	.1%	.0%
Serbi	.2	.0	.2	0	.0%	.0%	.0%	.0%
Sysscan	.2	.1	.0	34	.0%	.0%	.0%	.1%
BATISOFT	.1	.0	.1	6	.0%	.0%	.0%	.0%
CAD Lab	.1	.0	.1	0	.0%	.0%	.0%	.0%
Datagraphic	.1	.0	.0	2	.0%	.0%	.0%	.0%
Pathtrace	.1	.0	.1	2	.0%	.0%	.0%	.0%
FEGS	.1	.0	.1	0	.0%	.0%	.0%	.0%
DECAD	.1	.0	.0	0	.0%	.0%	.0%	.0%
Compiegne Science Industrie	.0	.0	.0	0	.0%	.0%	.0%	.0%
Gable CAD Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	167.3	113.2	38.6	14,257.3	11.4%	13.4%	10.2%	30.2%
All Companies	1,469.3	843.2	378.8	47,242.9	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1,100.1	676.4	219.2	40,924	74.9%	80.2%	57.9%	86.6%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	369.3	166.8	159.6	6,318.6	25.1%	19.8%	42.1%	13.4%
All Hardware Companies	363.3	314.7	.0	32,890.9	24.7%	37.3%	.0%	69.6%
All Turnkey & SW Companies	1,106.0	528.6	378.8	14,352.0	75.3%	62.7%	100.0%	30.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 35
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: German Region
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
					Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Hewlett-Packard	110.1	76.4	12.2	3,994	14.1%	19.4%	5.2%	30.3%
Computervision	100.6	46.4	24.0	610	12.9%	11.8%	10.2%	4.6%
Siemens	83.6	49.3	25.1	1,944	10.7%	12.6%	10.7%	14.7%
Intergraph	69.5	38.2	12.5	744	8.9%	9.7%	5.3%	5.6%
Schlumberger (Applicon)	41.7	15.7	13.4	389	5.3%	4.0%	5.7%	3.0%
Mentor Graphics	26.7	7.7	13.1	353	3.4%	2.0%	5.6%	2.7%
McDonnell Douglas	23.7	12.7	8.6	267	3.0%	3.2%	3.7%	2.0%
Digital	23.0	17.1	.0	760	2.9%	4.4%	.0%	5.8%
Control Data	19.8	14.0	2.4	363	2.5%	3.6%	1.0%	2.8%
Racal-Redac	18.1	.1	14.9	63	2.3%	.0%	6.3%	.5%
Valid	17.6	4.4	9.5	0	2.3%	1.1%	4.0%	.0%
Dazix	17.5	6.7	7.0	174	2.2%	1.7%	3.0%	1.3%
Sun	15.9	14.3	.0	1,068	2.0%	3.6%	.0%	8.1%
IBM	15.1	9.7	2.8	136	1.9%	2.5%	1.2%	1.0%
Mannesmann PROCAD	15.0	7.5	4.5	200	1.9%	1.9%	1.9%	1.5%
ISICAD	14.9	7.2	5.1	184	1.9%	1.8%	2.1%	1.4%
Matra Datavision	14.9	8.9	4.5	0	1.9%	2.3%	1.9%	.0%
ABB Cade International	13.0	7.1	3.1	5	1.7%	1.8%	1.3%	.0%
STI-Straessle	12.7	5.8	6.3	57	1.6%	1.5%	2.7%	.4%
Norsk Data	11.8	5.8	3.4	7	1.5%	1.5%	1.5%	.1%
ISYKON Software	11.4	6.3	4.0	111	1.5%	1.6%	1.7%	.8%
Calay	10.0	3.1	5.1	100	1.3%	.8%	2.1%	.8%
PAFEC	9.2	.0	9.2	0	1.2%	.0%	3.9%	.0%
Silicon Graphics	5.4	4.8	.0	162	.7%	1.2%	.0%	1.2%
Dassault	4.3	.0	3.9	0	.6%	.0%	1.7%	.0%
Gerber Systems	4.0	2.4	1.0	56	.5%	.6%	.4%	.4%
Wiechers Datentechnik	4.0	2.0	2.0	94	.5%	.5%	.8%	.7%
Cisigraph	4.0	1.6	1.4	48	.5%	.4%	.6%	.4%
Technische Computer Systeme	3.8	1.1	2.7	103	.5%	.3%	1.1%	.8%
Cimatron	3.3	1.5	1.5	84	.4%	.4%	.6%	4%
Albert Nestler	3.2	1.0	1.5	95	.4%	.2%	.6%	.7%
SORC	2.8	.0	2.8	0	.4%	.0%	1.2%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 35 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: German Region
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Marcus Computer Systems	2.8	1.6	.8	95	.4%	.4%	.4%	.7%
Rotring EURCAD	2.7	1.9	.9	84	.4%	.5%	.4%	.6%
Exapt	2.3	1.0	1.0	51	.3%	.3%	.4%	.4%
European Silicon Systems	1.6	.4	1.2	7	.2%	.1%	.5%	.1%
Star Informatic	1.4	.6	.4	61	.2%	.2%	.2%	.5%
ICL	1.4	.8	.4	43	.2%	.2%	.2%	.3%
ESRI	1.3	.0	1.1	0	.2%	.0%	.5%	.0%
Unisys	1.0	.4	.5	34	.1%	.1%	.2%	.3%
Westward	1.0	1.0	.0	54	.1%	.3%	.0%	.4%
Framesoft	.7	.0	.8	3	.1%	.0%	.3%	.0%
Secmai	.7	.4	.1	5	.1%	.1%	.1%	.0%
Fides Industrielle Automation	.6	.1	.4	14	.1%	.0%	.2%	.1%
Autodesk	.4	.0	.4	0	.1%	.0%	.2%	.0%
Academi Systems	.4	.1	.3	4	.0%	.0%	.1%	.0%
Aucotec	.2	.1	.1	23	.0%	.0%	.0%	.2%
CAD Lab	.1	.0	.1	0	.0%	.0%	.0%	.0%
Ferranti	.1	.0	.0	2	.0%	.0%	.0%	.0%
DECAD	.1	.0	.0	0	.0%	.0%	.0%	.0%
Gable CAD Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
Sysscan	.0	.0	.0	0	.0%	.0%	.0%	.0%
Compiegne Science Industrie	.0	.0	.0	0	.0%	.0%	.0%	.0%
FEGS	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	31.7	5.6	19.3	541.7	4.1%	1.4%	8.2%	4.1%
All Companies	781.3	392.9	235.0	13,191.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	542.9	283.9	135.5	9,835	69.5%	72.2%	57.7%	74.6%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	238.4	109.1	99.5	3,356.3	30.5%	27.8%	42.3%	25.4%
All Hardware Companies	87.2	70.8	.0	4,486.4	11.2%	18.0%	.0%	34.0%
All Turnkey & SW Companies	694.1	322.2	235.0	8,704.9	88.8%	82.0%	100.0%	66.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 36
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: German Region
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
IBM	150.0	97.1	27.4	1,573	32.8%	32.6%	35.8%	28.0%
Digital	81.7	61.3	.0	0	17.9%	20.6%	.0%	.0%
Control Data	38.4	27.3	4.6	258	8.4%	9.1%	6.0%	4.6%
Norsk Data	19.8	9.9	6.1	10	4.3%	3.3%	7.9%	.2%
Computervision	17.3	8.0	4.1	360	3.8%	2.7%	5.4%	6.4%
Intergraph	15.8	7.9	2.5	151	3.5%	2.7%	3.3%	2.7%
Dassault	8.7	.0	6.9	0	1.9%	.0%	9.0%	.0%
Siemens	8.6	5.1	2.6	100	1.9%	1.7%	3.4%	1.8%
Exapt	8.0	5.8	1.3	123	1.7%	2.0%	1.8%	2.2%
Schlumberger (Applicon)	5.9	2.2	1.9	110	1.3%	.7%	2.5%	1.9%
Ferranti	5.1	3.9	.4	44	1.1%	1.3%	.5%	.8%
McDonnell Douglas	4.9	2.6	1.8	156	1.1%	.9%	2.3%	2.8%
STI-Straessle	3.6	1.6	1.8	16	.8%	.5%	2.3%	.3%
Fides Industrielle Automation	2.5	.5	1.7	14	.5%	.2%	2.3%	.3%
Hewlett-Packard	2.2	1.9	.0	111	.5%	.6%	.0%	2.0%
ESRI	1.8	.0	1.6	0	.4%	.0%	2.1%	.0%
PAFEC	.7	.0	.7	0	.2%	.0%	.9%	.0%
SDRC	.7	.0	.7	0	.2%	.0%	.9%	.0%
Racal-Redac	.5	.0	.4	3	.1%	.0%	.5%	.1%
Cisigraph	.4	.2	.2	1	.1%	.1%	.2%	.0%
Silicon Graphics	.4	.3	.0	10	.1%	.1%	.0%	.2%
Unisys	.3	.2	.1	8	.1%	.1%	.1%	.1%
Aucotec	.2	.1	.1	23	.0%	.0%	.1%	.4%
Olivetti	.1	.1	.1	9	.0%	.0%	.1%	.2%
Sysscan	.1	.1	.0	34	.0%	.0%	.0%	.6%
FEGS	.0	.0	.0	0	.0%	.0%	.0%	.0%
Compiegne Science Industrie	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 36 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: German Region
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Other Companies	79.4	62.3	9.5	2,438.1	17.4%	20.9%	12.5%	43.4%
All Companies	456.8	298.1	76.5	5,620.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	398.5	271.0	54.2	5,175	87.2%	90.9%	70.9%	92.1%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	58.3	27.1	22.3	445.1	12.8%	9.1%	29.1%	7.9%
All Hardware Companies	149.8	123.2	.0	2,540.2	32.8%	41.3%	.0%	45.2%
All Turnkey & SW Companies	307.0	174.9	76.5	3,080.0	67.2%	58.7%	100.0%	54.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 37
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compaq	29.9	29.9	.0	4,981	12.9%	19.6%	.0%	17.5%
IBM	23.4	22.3	.0	4,727	10.1%	14.6%	.0%	16.6%
Hewlett-Packard	19.9	16.3	.0	3,304	8.6%	10.7%	.0%	11.6%
Autodesk	13.1	.0	13.1	0	5.7%	.0%	19.5%	.0%
Ziegler	12.5	.5	11.4	416	5.4%	.3%	16.8%	1.5%
Wiechers Datentechnik	9.3	4.6	4.6	218	4.0%	3.0%	6.9%	.8%
Datagraph	9.2	7.3	1.8	38	4.0%	4.8%	2.7%	.1%
Apple Computer	8.3	7.3	.0	1,594	3.6%	4.8%	.0%	5.6%
Cadtronic	7.5	5.7	1.0	51	3.2%	3.8%	1.4%	.2%
DAT Standard Information syste	6.5	.0	6.5	0	2.8%	.0%	9.6%	.0%
LPKF	5.6	3.4	1.7	563	2.4%	2.2%	2.5%	2.0%
Rotring EURCAD	4.0	2.2	1.7	101	1.7%	1.5%	2.6%	.4%
Aucotec	3.7	1.5	1.9	416	1.6%	1.0%	2.8%	1.5%
Philips International	2.9	1.0	1.4	5	1.2%	.7%	2.1%	.0%
Intergraph	2.3	.0	2.2	0	1.0%	.0%	3.3%	.0%
ISICAD	2.3	.0	2.3	0	1.0%	.0%	3.4%	.0%
Intercad	2.2	1.1	.6	109	.9%	.7%	1.0%	.4%
Olivetti	1.8	.6	.9	428	.8%	.4%	1.3%	1.5%
CADAM	1.4	.0	1.3	0	.6%	.0%	1.9%	.0%
Computervision	1.2	.6	.3	32	.5%	.4%	.4%	.1%
CAD-UL	1.0	.3	.7	20	.4%	.2%	1.0%	.1%
Sycotronic AG	.8	.0	.7	2	.4%	.0%	1.0%	.0%
Vero International Software	.7	.0	.7	0	.3%	.0%	1.1%	.0%
Marcus Computer Systems	.7	.4	.2	24	.3%	.3%	.3%	.1%
Investronica SA	.7	.6	.1	27	.3%	.4%	.1%	.1%
Westward	.7	.7	.0	45	.3%	.4%	.0%	.2%
European Silicon Systems	.4	.1	.3	4	.2%	.1%	.5%	.0%
Cimatron	.4	.2	.2	9	.2%	.1%	.2%	.0%
Superdraft	.4	.0	.3	0	.2%	.0%	.5%	.0%
Vision 3D	.4	.2	.1	0	.2%	.1%	.2%	.0%
Albert Nestler	.3	.1	.1	25	.1%	.1%	.1%	.1%
ALS Design	.3	.0	.2	5	.1%	.0%	.3%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 37 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: German Region
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
					Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Norsk Data	.3	.0	.2	1	.1%	.0%	.2%	.0%
Robocom	.3	.0	.3	0	.1%	.0%	.4%	.0%
ESRI	.3	.0	.3	0	.1%	.0%	.4%	.0%
BETRONEX	.2	.0	.2	0	.1%	.0%	.4%	.0%
Serbi	.2	.0	.2	0	.1%	.0%	.2%	.0%
BATISOFT	.1	.0	.1	6	.0%	.0%	.1%	.0%
Datagraphic	.1	.0	.0	2	.0%	.0%	.1%	.0%
Pathtrace	.1	.0	.1	2	.0%	.0%	.1%	.0%
Academi Systems	.1	.0	.0	1	.0%	.0%	.1%	.0%
Racal-Redac	.0	.0	.0	0	.0%	.0%	.0%	.0%
Secmai	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	56.2	45.2	9.8	11,277.5	24.3%	29.7%	14.5%	39.7%
All Companies	231.3	152.2	67.4	28,431.5	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	158.7	121.6	29.5	25,914	68.6%	79.9%	43.8%	91.1%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	72.6	30.6	37.9	2,517.2	31.4%	20.1%	56.2%	8.9%
All Hardware Companies	126.4	120.7	.0	25,864.4	54.7%	79.3%	.0%	91.0%
All Turnkey & SW Companies	104.9	31.5	67.4	2,567.2	45.3%	20.7%	100.0%	9.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 38
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	154.8	104.1	25.9	4,068	16.5%	18.6%	11.5%	15.3%
Computervision	104.8	48.4	24.9	881	11.1%	8.7%	11.1%	3.3%
Hewlett-Packard	85.6	61.6	8.8	4,460	9.1%	11.0%	3.9%	16.8%
Digital	56.5	42.4	.0	386	6.0%	7.6%	.0%	1.5%
Control Data	55.3	39.2	6.6	590	5.9%	7.0%	3.0%	2.2%
Siemens	47.0	27.7	14.1	1,083	5.0%	5.0%	6.3%	4.1%
Schlumberger (Applicon)	45.7	17.3	14.6	479	4.9%	3.1%	6.5%	1.8%
Norsk Data	31.9	15.6	9.6	18	3.4%	2.8%	4.3%	.1%
McDonnell Douglas	26.5	14.2	9.6	386	2.8%	2.5%	4.3%	1.5%
Intergraph	23.5	12.5	4.7	239	2.5%	2.2%	2.1%	.9%
Compaq	15.8	15.8	.0	2,640	1.7%	2.8%	.0%	10.0%
Mannesmann PROCAD	15.0	7.5	4.5	200	1.6%	1.3%	2.0%	.8%
Matra Datavision	14.9	8.9	4.5	67	1.6%	1.6%	2.0%	.3%
Wiechers Datentechnik	13.3	6.6	6.6	312	1.4%	1.2%	3.0%	1.2%
STI-Straessle	13.0	5.9	6.4	58	1.4%	1.1%	2.9%	.2%
ISYKON Software	11.4	6.3	4.0	111	1.2%	1.1%	1.8%	.4%
Dassault	11.0	.0	9.1	0	1.2%	.0%	4.1%	.0%
Exapt	10.3	6.8	2.3	173	1.1%	1.2%	1.0%	.7%
Datagraph	9.2	7.3	1.8	38	1.0%	1.3%	.8%	.1%
ABB Cade International	9.0	5.1	2.1	3	1.0%	.9%	.9%	.0%
Sun	8.4	7.6	.0	566	.9%	1.4%	.0%	2.1%
PAFEC	8.3	.0	8.3	0	.9%	.0%	3.7%	.0%
ISICAD	6.9	3.0	2.7	77	.7%	.5%	1.2%	.3%
DAT Standard Information syste	6.1	.0	6.1	0	.7%	.0%	2.7%	.0%
Silicon Graphics	5.8	5.1	.0	172	.6%	.9%	.0%	.6%
Autodesk	5.6	.0	5.6	0	.6%	.0%	2.5%	.0%
Ferranti	5.2	3.9	.4	46	.5%	.7%	.2%	.2%
Ziegler	4.9	.2	4.4	162	.5%	.0%	2.0%	.6%
Rotring EURCAD	4.5	2.8	1.7	129	.5%	.5%	.7%	.5%
Cisigraph	4.4	1.8	1.6	49	.5%	.3%	.7%	.2%
Gerber Systems	4.0	2.4	1.0	56	.4%	.4%	.4%	.2%
Technische Computer Systeme	3.8	1.1	2.7	103	.4%	.2%	1.2%	.4%
Apple Computer	3.7	3.3	.0	717	.4%	.6%	.0%	2.7%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 38
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
					Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Cimatron	3.7	1.7	1.6	93	.4%	.3%	.7%	.4%
Albert Nestler	3.5	1.1	1.6	119	.4%	.2%	.7%	.5%
SDRC	3.5	.0	3.5	0	.4%	.0%	1.6%	.0%
Marcus Computer Systems	3.5	1.9	1.1	119	.4%	.3%	.5%	.4%
Fides Industrielle Automation	3.1	.6	2.2	29	.3%	.1%	1.0%	.1%
Philips International	2.9	1.0	1.4	5	.3%	.2%	.6%	.0%
Westward	1.5	1.5	.0	89	.2%	.3%	.0%	.3%
Intercad	1.5	.8	.5	77	.2%	.1%	.2%	.3%
Unisys	1.3	.6	.6	42	.1%	.1%	.2%	.2%
Olivetti	.8	.2	.4	166	.1%	.0%	.2%	.6%
Cadtronic	.8	.6	.1	3	.1%	.1%	.0%	.0%
Vero International Software	.7	.0	.7	0	.1%	.0%	.3%	.0%
Framesoft	.7	.0	.8	3	.1%	.0%	.3%	.0%
Investronica SA	.7	.6	.1	27	.1%	.1%	.0%	.1%
ICL	.7	.4	.2	20	.1%	.1%	.1%	.1%
Mentor Graphics	.5	.2	.3	7	.1%	.0%	.1%	.0%
Superdraft	.4	.0	.3	0	.0%	.0%	.1%	.0%
Vision 3D	.4	.2	.1	0	.0%	.0%	.0%	.0%
Robocom	.1	.0	.1	0	.0%	.0%	.1%	.0%
CAD Lab	.1	.0	.1	0	.0%	.0%	.0%	.0%
Pathtrace	.1	.0	.1	2	.0%	.0%	.0%	.0%
Serbi	.1	.0	.1	0	.0%	.0%	.0%	.0%
FEGS	.1	.0	.1	0	.0%	.0%	.0%	.0%
Compiegne Science Industrie	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 38 (Continued)
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	83.8	63.2	14.1	7,446.0	8.9%	11.3%	6.3%	28.1%
All Companies	940.1	559.3	224.7	26,514.8	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	692.4	441.1	123.3	23,211	73.6%	78.9%	54.9%	87.5%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	247.7	118.2	101.5	3,303.4	26.4%	21.1%	45.1%	12.5%
All Hardware Companies	202.6	176.0	.0	17,393.3	21.6%	31.5%	.0%	65.6%
All Turnkey & SW Companies	737.5	383.4	224.7	9,121.6	78.4%	68.5%	100.0%	34.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 39
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Intergraph	23.5	12.5	4.7	239	15.5%	12.6%	15.5%	2.4%
IBM	21.4	16.3	2.4	1,792	14.1%	16.4%	8.0%	18.2%
Hewlett-Packard	17.2	12.7	1.5	1,008	11.3%	12.7%	4.8%	10.2%
Digital	11.5	8.6	.0	79	7.6%	8.7%	.0%	.8%
ISICAD	10.3	4.2	4.6	107	6.8%	4.2%	15.2%	1.1%
Siemens	6.9	4.1	2.1	138	4.5%	4.1%	6.9%	1.4%
Compaq	6.9	6.9	.0	1,146	4.5%	6.9%	.0%	11.6%
Autodesk	5.6	.0	5.6	0	3.7%	.0%	18.4%	.0%
Computervision	4.8	2.2	1.1	40	3.1%	2.2%	3.8%	.4%
Cadtronic	4.5	3.5	.6	30	2.9%	3.5%	1.9%	.3%
Apple Computer	3.6	3.1	.0	685	2.3%	3.1%	.0%	6.9%
McDonnell Douglas	2.1	1.1	.8	37	1.4%	1.1%	2.5%	.4%
PAFEC	1.6	.0	1.6	0	1.0%	.0%	5.2%	.0%
Dassault	1.5	.0	1.2	0	1.0%	.0%	4.0%	.0%
Ziegler	1.5	.1	1.4	50	1.0%	.1%	4.5%	.5%
Star Informatic	1.4	.6	.4	61	.9%	.6%	1.4%	.6%
Control Data	1.2	.8	.1	12	.8%	.8%	.4%	.1%
Sun	.8	.7	.0	53	.5%	.7%	.0%	.5%
Olivetti	.7	.3	.3	174	.5%	.3%	1.0%	1.8%
Schlumberger (Applicon)	.5	.2	.2	5	.3%	.2%	.5%	.1%
DAT Standard Information syste	.4	.0	.4	0	.2%	.0%	1.2%	.0%
Sycotronic AG	.3	.0	.2	0	.2%	.0%	.7%	.0%
Robocom	.1	.0	.1	0	.1%	.0%	.4%	.0%
BATISOFT	.1	.0	.1	6	.1%	.0%	.3%	.1%
Datagraphic	.1	.0	.0	2	.1%	.0%	.1%	.0%
Westward	.1	.1	.0	5	.1%	.1%	.0%	.1%
Gable CAD Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.1%	.0%
CAD Lab	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 39 (Continued)
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Other Companies	23.3	21.7	.9	4,203.9	15.3%	21.7%	3.0%	42.6%
All Companies	151.7	99.8	30.2	9,874.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	132.5	91.1	21.8	9,408	87.3%	91.3%	72.1%	95.3%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	19.2	8.6	8.4	466.4	12.7%	8.7%	27.9%	4.7%
All Hardware Companies	62.1	56.2	.0	8,640.2	40.9%	56.3%	.0%	87.5%
All Turnkey & SW Companies	89.6	43.6	30.2	1,234.0	59.1%	43.7%	100.0%	12.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 40
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Siemens	36.4	21.5	10.9	779	32.7%	33.7%	37.9%	29.0%
Intergraph	31.4	16.7	6.3	319	28.2%	26.3%	21.7%	11.9%
Digital	10.5	7.9	.0	72	9.4%	12.3%	.0%	2.7%
IBM	6.4	4.5	.9	335	5.7%	7.1%	3.2%	12.5%
ESRI	3.4	.0	3.0	0	3.0%	.0%	10.3%	.0%
STI-Straessle	3.2	1.5	1.6	14	2.9%	2.3%	5.5%	.5%
Cadtronic	2.2	1.7	.3	19	2.0%	2.7%	1.0%	.7%
Control Data	1.7	1.2	.2	19	1.6%	1.9%	.8%	.7%
Compaq	1.5	1.5	.0	249	1.3%	2.3%	.0%	9.3%
Autodesk	1.2	.0	1.2	0	1.1%	.0%	4.2%	.0%
Computervision	1.2	.6	.3	10	1.1%	.9%	1.0%	.4%
Ziegler	1.1	.0	1.0	37	1.0%	.1%	3.5%	1.4%
ICL	.8	.5	.2	23	.7%	.7%	.7%	.9%
Apple Computer	.4	.4	.0	80	.4%	.6%	.0%	3.0%
Olivetti	.3	.1	.2	82	.3%	.2%	.7%	3.1%
Hewlett-Packard	.2	.2	.0	19	.2%	.3%	.0%	.7%
Sysscan	.2	.1	.0	34	.1%	.1%	.1%	1.3%
Robocom	.0	.0	.0	0	.0%	.0%	.1%	.0%
Other Companies	9.2	5.4	2.7	593.6	8.3%	8.4%	9.3%	22.1%
All Companies	111.3	63.6	28.8	2,685.1	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	67.1	38.3	14.6	1,696	60.3%	60.2%	50.5%	63.2%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	44.2	25.3	14.3	988.7	39.7%	39.8%	49.5%	36.8%
All Hardware Companies	19.5	16.4	.0	1,294.9	17.5%	25.7%	.0%	48.2%
All Turnkey & SW Companies	91.8	47.3	28.8	1,390.2	82.5%	74.3%	100.0%	51.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 41
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Hewlett-Packard	29.2	20.1	1.9	1,922	11.0%	16.7%	2.0%	23.5%
Digital	26.2	19.5	.0	224	9.8%	16.2%	.0%	2.7%
Mentor Graphics	26.1	7.6	12.9	346	9.8%	6.3%	13.5%	4.2%
Racal-Redac	18.6	.1	15.3	66	7.0%	.1%	16.1%	.8%
Valid	17.6	4.4	9.5	0	6.6%	3.7%	10.0%	.0%
Dazix	17.5	6.7	7.0	174	6.6%	5.5%	7.4%	2.1%
Calay	10.0	3.1	5.1	100	3.8%	2.6%	5.3%	1.2%
Intergraph	9.3	4.4	1.6	98	3.5%	3.6%	1.7%	1.2%
Computervision	8.3	3.7	2.0	70	3.1%	3.1%	2.1%	.9%
Sun	6.7	6.0	.0	449	2.5%	5.0%	.0%	5.5%
IBM	5.9	4.1	.9	241	2.2%	3.4%	1.0%	2.9%
Compaq	5.7	5.7	.0	946	2.1%	4.7%	.0%	11.6%
LPKF	5.6	3.4	1.7	563	2.1%	2.8%	1.8%	6.9%
Ziegler	5.0	.2	4.5	167	1.9%	.2%	4.8%	2.0%
Aucotec	4.1	1.7	2.1	462	1.6%	1.4%	2.2%	5.7%
ABB Cade International	4.0	2.1	1.0	1	1.5%	1.7%	1.0%	.0%
Rotring EURCAD	2.2	1.2	1.0	56	.8%	1.0%	1.0%	.7%
European Silicon Systems	2.1	.5	1.5	11	.8%	.4%	1.6%	.1%
Siemens	1.9	1.2	.6	44	.7%	1.0%	.6%	.5%
Schlumberger (Applicon)	1.4	.4	.5	15	.5%	.3%	.5%	.2%
CADAM	1.4	.0	1.3	0	.5%	.0%	1.3%	.0%
Autodesk	1.2	.0	1.2	0	.5%	.0%	1.3%	.0%
CAD-UL	1.0	.3	.7	20	.4%	.2%	.7%	.2%
Secmai	.7	.4	.1	5	.2%	.3%	.1%	.1%
Intercad	.7	.3	.2	33	.2%	.3%	.2%	.4%
Apple Computer	.6	.5	.0	112	.2%	.4%	.0%	1.4%
Sycotronic AG	.6	.0	.5	1	.2%	.0%	.5%	.0%
Dassault	.5	.0	.5	0	.2%	.0%	.5%	.0%
Academi Systems	.4	.1	.3	5	.2%	.1%	.3%	.1%
ALS Design	.3	.0	.2	5	.1%	.0%	.2%	.1%
ZTRONEX	.2	.0	.2	0	.1%	.%	.3%	.0%
Westward	.1	.1	.0	5	.0%	.1%	.0%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 41 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
DECAD	.1	.0	.0	0	.0%	.0%	.0%	.0%
Olivetti	.0	.0	.0	15	.0%	.0%	.0%	.2%
Serbi	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	51.0	22.9	20.9	2,013.8	19.1%	19.0%	21.9%	24.7%
All Companies	266.2	120.5	95.0	8,168.8	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	208.1	105.9	59.6	6,609	78.2%	87.9%	62.7%	80.9%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	58.1	14.6	35.4	1,560.2	21.8%	12.1%	37.3%	19.1%
All Hardware Companies	79.1	66.1	.0	5,562.5	29.7%	54.9%	.0%	68.1%
All Turnkey & SW Companies	187.1	54.4	95.0	2,606.3	70.3%	45.1%	100.0%	31.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 42
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	17.3	5.3	8.5	229	13.5%	8.9%	18.2%	5.7%
Dazix	14.0	5.6	5.6	139	10.9%	9.3%	12.0%	3.4%
Hewlett-Packard	13.5	10.2	1.0	861	10.5%	16.9%	2.1%	21.2%
Valid	12.3	3.1	6.7	0	9.6%	5.1%	14.2%	.0%
Digital	10.5	7.9	.0	89	8.2%	13.1%	.0%	2.2%
Sun	6.7	6.0	.0	449	5.2%	10.0%	.0%	11.1%
Aucotec	4.1	1.7	2.1	462	3.2%	2.7%	4.4%	11.4%
Racal-Redac	3.4	.1	2.9	13	2.7%	.1%	6.1%	.3%
Intergraph	3.3	1.8	.6	35	2.6%	3.0%	1.3%	.9%
Compaq	2.5	2.5	.0	423	2.0%	4.2%	.0%	10.4%
Ziegler	2.5	.1	2.3	83	1.9%	.2%	4.8%	2.1%
Computervision	2.4	1.1	.6	20	1.9%	1.8%	1.2%	.5%
Rotring EURCAD	2.2	1.2	1.0	56	1.7%	2.1%	2.0%	1.4%
Autodesk	1.1	.0	1.1	0	.8%	.0%	2.3%	.0%
Intercad	.7	.3	.2	33	.5%	.5%	.4%	.8%
Dassault	.5	.0	.5	0	.4%	.0%	1.0%	.0%
IBM	.5	.5	.0	95	.4%	.7%	.0%	2.3%
Apple Computer	.3	.2	.0	48	.2%	.4%	.0%	1.2%
Westward	.1	.1	.0	5	.1%	.1%	.0%	.1%
Secmai	.1	.0	.0	1	.1%	.1%	.0%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.1%	.0%
Sycotronic AG	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 42 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	30.3	12.5	14.0	1,013.3	23.6%	20.7%	29.9%	25.0%
All Companies	128.3	60.2	46.8	4,055.7	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	114.6	56.7	38.0	3,402	89.4%	94.2%	81.1%	83.9%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	13.7	3.5	8.9	653.9	10.6%	5.8%	18.9%	16.1%
All Hardware Companies	38.8	33.4	.0	2,826.7	30.3%	55.5%	.0%	69.7%
All Turnkey & SW Companies	89.4	26.8	46.8	1,229.1	69.7%	44.5%	100.0%	30.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 43
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	4.2	3.2	.0	36	22.8%	45.1%	.0%	12.9%
Hewlett-Packard	2.1	1.8	.0	193	11.6%	25.6%	.0%	69.7%
European Silicon Systems	2.1	.5	1.5	11	11.2%	7.3%	20.3%	4.0%
Valid	1.8	.4	1.0	0	9.6%	6.3%	12.6%	.0%
Mentor Graphics	1.3	.4	.7	18	7.2%	5.9%	8.6%	6.4%
Siemens	.1	.1	.0	3	.7%	1.0%	.5%	1.1%
Other Companies	6.8	.6	4.4	16.3	36.9%	8.9%	57.8%	5.9%
All Companies	18.4	7.0	7.5	277.0	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	16.2	6.4	6.0	263	88.1%	91.7%	79.1%	94.9%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	2.2	.6	1.6	14.2	11.9%	8.3%	20.9%	5.1%
All Hardware Companies	6.8	5.4	.0	240.0	36.8%	76.6%	.0%	86.6%
All Turnkey & SW Companies	11.6	1.6	7.5	37.0	63.2%	23.4%	100.0%	13.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 44
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Racal-Redac	15.2	.0	12.5	53	12.7%	.0%	30.6%	1.4%
Hewlett-Packard	13.6	8.1	1.0	867	11.4%	15.2%	2.4%	22.6%
Digital	11.5	8.5	.0	98	9.7%	15.9%	.0%	2.6%
Calay	10.0	3.1	5.1	100	8.4%	5.8%	12.4%	2.6%
Mentor Graphics	7.5	1.8	3.7	99	6.2%	3.4%	9.0%	2.6%
Intergraph	6.0	2.6	1.1	63	5.0%	4.8%	2.6%	1.6%
Computervision	6.0	2.6	1.4	50	5.0%	4.9%	3.5%	1.3%
LPKF	5.6	3.4	1.7	563	4.7%	6.3%	4.2%	14.7%
IBM	5.4	3.6	.9	146	4.5%	6.8%	2.2%	3.8%
ABB Cade International	4.0	2.1	1.0	1	3.3%	3.9%	2.3%	.0%
Valid	3.5	.9	1.9	0	2.9%	1.7%	4.7%	.0%
Dazix	3.5	1.1	1.4	35	2.9%	2.0%	3.4%	.9%
Compaq	3.1	3.1	.0	523	2.6%	5.9%	.0%	13.6%
Ziegler	2.5	.1	2.3	83	2.1%	.2%	5.6%	2.2%
Siemens	1.8	1.1	.5	41	1.5%	2.0%	1.3%	1.1%
Schlumberger (Applicon)	1.4	.4	.5	15	1.2%	.7%	1.1%	.4%
CADAM	1.4	.0	1.3	0	1.2%	.0%	3.1%	.0%
CAD-UL	1.0	.3	.7	20	.8%	.5%	1.6%	.5%
Secmai	.6	.4	.1	5	.5%	.7%	.3%	.1%
Sycotronic AG	.5	.0	.4	1	.5%	.0%	1.1%	.0%
Academi Systems	.4	.1	.3	5	.4%	.2%	.7%	.1%
Apple Computer	.3	.3	.0	64	.3%	.5%	.0%	1.7%
ALS Design	.3	.0	.2	5	.2%	.1%	.6%	.1%
BETRONEX	.2	.0	.2	0	.2%	.0%	.6%	.0%
Autodesk	.1	.0	.1	0	.1%	.0%	.3%	.0%
DECAD	.1	.0	.0	0	.0%	.0%	.1%	.0%
Olivetti	.0	.0	.0	15	.0%	.0%	.0%	.4%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 44 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: German Region
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	13.9	9.8	2.5	984.2	11.6%	18.5%	6.1%	25.7%
All Companies	119.6	53.3	40.7	3,836.0	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	77.3	42.8	15.7	2,944	64.7%	80.3%	38.5%	76.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	42.3	10.5	25.0	892.1	35.3%	19.7%	61.5%	23.3%
All Hardware Companies	33.5	27.3	.0	2,495.9	28.0%	51.3%	.0%	65.1%
All Turnkey & SW Companies	86.1	26.0	40.7	1,340.2	72.0%	48.7%	100.0%	34.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 45
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	76.6	52.5	12.3	2,615	17.5%	21.0%	11.0%	18.1%
Digital	45.7	34.2	.0	332	10.5%	13.7%	.0%	2.3%
Hewlett-Packard	42.0	30.4	3.6	2,442	9.6%	12.1%	3.3%	16.9%
Computervision	35.3	16.3	8.4	297	8.1%	6.5%	7.5%	2.1%
ItalCad	24.0	12.2	8.9	250	5.5%	4.9%	8.0%	1.7%
Siemens	14.5	8.6	4.4	322	3.3%	3.4%	3.9%	2.2%
Intergraph	12.7	6.7	2.5	130	2.9%	2.7%	2.2%	.9%
CAD Lab	10.4	.0	8.3	0	2.4%	.0%	7.5%	.0%
Mentor Graphics	9.5	2.8	4.7	126	2.2%	1.1%	4.2%	.9%
Compaq	9.2	9.2	.0	1,529	2.1%	3.7%	.0%	10.6%
Matra Datavision	8.7	5.2	2.6	139	2.0%	2.1%	2.4%	1.0%
Sysscan	8.1	3.6	2.1	71	1.9%	1.4%	1.9%	.5%
Dazix	7.1	2.7	2.9	71	1.6%	1.1%	2.6%	.5%
Dassault	5.8	.0	4.8	0	1.3%	.0%	4.3%	.0%
Olivetti	5.0	1.3	1.9	602	1.2%	.5%	1.7%	4.2%
Apple Computer	4.3	3.8	.0	826	1.0%	1.5%	.0%	5.7%
Vero International Software	4.3	.0	4.3	0	1.0%	.0%	3.9%	.0%
Control Data	4.2	3.0	.5	45	1.0%	1.2%	.4%	.3%
Unisys	4.2	1.2	2.5	116	1.0%	.5%	2.2%	.8%
Schlumberger (Applicon)	4.0	1.5	1.3	42	.9%	.6%	1.2%	.3%
PAFEC	3.9	.0	3.9	0	.9%	.0%	3.5%	.0%
Valid	3.7	.9	2.0	0	.8%	.4%	1.8%	.0%
Cimatron	3.3	1.5	1.5	85	.8%	.6%	1.3%	.6%
Sun	3.3	3.0	.0	222	.8%	1.2%	.0%	1.5%
Autodesk	3.0	.0	3.0	0	.7%	.0%	2.7%	.0%
SDRC	1.9	.0	1.9	0	.4%	.0%	1.7%	.0%
Ferranti	1.9	1.1	.5	17	.4%	.4%	.4%	.1%
Racal-Redac	1.8	.0	1.5	7	.4%	.0%	1.4%	.0%
Silicon Graphics	1.8	1.6	.0	53	.4%	.6%	.0%	.4%
Investronica SA	1.7	1.4	.2	68	.4%	.5%	.2%	.5%
McDonnell Douglas	1.6	.9	.6	24	.4%	.3%	.5%	.2%
ISICAD	1.6	.7	.7	17	.4%	.3%	.6%	.1%
ESRI	1.0	.0	.9	0	.2%	.0%	.8%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 45
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Secmai	.8	.5	.2	7	.2%	.2%	.1%	.0%
European Silicon Systems	.7	.2	.6	4	.2%	.1%	.5%	.0%
Fides Industrielle Automation	.7	.1	.5	7	.2%	.1%	.4%	.0%
Datagraph	.6	.5	.1	3	.1%	.2%	.1%	.0%
Ziegler	.6	.0	.5	20	.1%	.0%	.5%	.1%
CADAM	.6	.0	.5	0	.1%	.0%	.5%	.0%
Technische Computer Systeme	.5	.1	.3	13	.1%	.1%	.3%	.1%
Star Informatic	.5	.2	.1	20	.1%	.1%	.1%	.1%
Framesoft	.3	.0	.4	1	.1%	.0%	.3%	.0%
Robocom	.3	.0	.3	0	.1%	.0%	.3%	.0%
Cisigraph	.3	.1	.1	3	.1%	.0%	.1%	.0%
Calay	.3	.1	.1	2	.1%	.0%	.1%	.0%
Gerber Systems	.2	.2	.1	3	.1%	.1%	.1%	.0%
BETRONEX	.2	.0	.2	0	.0%	.0%	.2%	.0%
ALS Design	.1	.0	.1	3	.0%	.0%	.1%	.0%
ISYKON Software	.1	.1	.0	1	.0%	.0%	.0%	.0%
t2 Solutions	.1	.1	.0	1	.0%	.0%	.0%	.0%
Pathtrace	.1	.0	.1	2	.0%	.0%	.1%	.0%
Serbi	.1	.0	.1	0	.0%	.0%	.1%	.0%
DAT Standard Information syste	.1	.0	.1	0	.0%	.0%	.1%	.0%
Sycotronic AG	.0	.0	.0	0	.0%	.0%	.0%	.0%
BATISOFT	.0	.0	.0	1	.0%	.0%	.0%	.0%
FEGS	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 45 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	63.0	42.3	14.5	3,883.4	14.4%	16.9%	13.0%	26.9%
All Companies	436.5	250.3	111.3	14,434.0	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	328.6	209.2	59.8	12,572	75.3%	83.6%	53.7%	87.1%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	108.0	41.1	51.6	1,862.0	24.7%	16.4%	46.3%	12.9%
All Hardware Companies	134.4	114.8	.0	10,419.7	30.8%	45.9%	.0%	72.2%
All Turnkey & SW Companies	302.1	135.5	111.3	4,014.3	69.2%	54.1%	100.0%	27.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 46
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Italy
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Hewlett-Packard	35.2	24.7	3.6	1,405	16.6%	24.3%	5.2%	39.0%
Computervision	29.8	13.7	7.1	181	14.1%	13.5%	10.2%	5.0%
ItalCad	24.0	12.2	8.9	250	11.3%	12.0%	12.8%	6.9%
Siemens	13.1	7.8	3.9	306	6.2%	7.6%	5.7%	8.5%
Intergraph	10.1	5.5	1.8	108	4.8%	5.4%	2.6%	3.0%
Digital	10.1	7.5	.0	332	4.7%	7.3%	.0%	9.2%
CAD Lab	9.8	.0	7.9	0	4.6%	.0%	11.3%	.0%
Mentor Graphics	9.5	2.8	4.7	126	4.5%	2.7%	6.8%	3.5%
Matra Datavision	8.7	5.2	2.6	0	4.1%	5.1%	3.8%	.0%
Dazix	7.1	2.7	2.9	71	3.4%	2.7%	4.1%	2.0%
IBM	6.1	4.0	1.1	55	2.9%	3.9%	1.6%	1.5%
Unisys	3.7	1.0	2.2	103	1.7%	1.0%	3.1%	2.9%
Valid	3.7	.9	2.0	0	1.7%	.9%	2.8%	.0%
Schlumberger (Applicon)	3.5	1.3	1.2	33	1.7%	1.3%	1.7%	.9%
PAFEC	3.5	.0	3.5	0	1.7%	.0%	5.1%	.0%
Sun	3.3	3.0	.0	222	1.6%	2.9%	.0%	6.2%
Cimatron	3.0	1.4	1.3	76	1.4%	1.4%	1.9%	2.1%
Sysscan	2.0	.9	.5	0	1.0%	.9%	.8%	.0%
Racal-Redac	1.8	.0	1.5	6	.8%	.0%	2.1%	.2%
Silicon Graphics	1.7	1.5	.0	50	.8%	1.5%	.0%	1.4%
Dassault	1.7	.0	1.4	0	.8%	.0%	1.9%	.0%
SDRC	1.6	.0	1.6	0	.7%	.0%	2.2%	.0%
Control Data	1.4	1.0	.2	26	.7%	1.0%	.2%	.7%
ISICAD	1.4	.7	.5	17	.6%	.6%	.7%	.5%
McDonnell Douglas	1.3	.7	.5	15	.6%	.7%	.7%	.4%
Secmai	.8	.4	.2	6	.4%	.4%	.2%	.2%
European Silicon Systems	.6	.1	.4	3	.3%	.1%	.6%	.1%
Technische Computer Systeme	.5	.1	.3	13	.2%	.1%	.5%	.4%
Star Informatic	.5	.2	.1	20	.2%	.2%	.2%	.5%
ESRI	.4	.0	.3	0	.2%	.0%	.5%	.0%
Framesoft	.3	.0	.4	1	.2%	.0%	.5%	.0%
Cisigraph	.3	.1	.1	3	.1%	.1%	.1%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 46 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Italy
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
Company	Revenue	Revenue	Revenue	Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Calay	.3	.1	.1	2	.1%	.1%	.2%	.1%
Gerber Systems	.2	.2	.1	3	.1%	.1%	.1%	.1%
Fides Industrielle Automation	.1	.0	.1	3	.1%	.0%	.1%	.1%
ISYKON Software	.1	.1	.0	1	.1%	.1%	.1%	.0%
t2 Solutions	.1	.1	.0	1	.1%	.0%	.0%	.0%
Autodesk	.1	.0	.1	0	.0%	.0%	.1%	.0%
Ferranti	.1	.0	.0	2	.0%	.0%	.0%	.0%
Other Companies	10.3	2.0	6.5	154.0	4.9%	1.9%	9.3%	4.3%
All Companies	211.8	101.9	69.5	3,602.1	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	139.7	72.5	36.0	2,873	66.0%	71.2%	51.9%	79.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	72.1	29.4	33.4	729.4	34.0%	28.8%	48.1%	20.3%
All Hardware Companies	30.1	24.1	.0	1,561.9	14.2%	23.7%	.0%	43.4%
All Turnkey & SW Companies	181.7	77.8	69.5	2,040.2	85.8%	76.3%	100.0%	56.6%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 47
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Italy
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	60.9	39.5	11.1	639	38.5%	37.7%	45.1%	28.9%
Digital	35.7	26.7	.0	0	22.6%	25.6%	.0%	.0%
Sysscan	6.1	2.7	1.6	71	3.8%	2.6%	6.4%	3.2%
Computervision	5.1	2.4	1.2	107	3.2%	2.3%	4.9%	4.8%
Dassault	4.1	.0	3.5	0	2.6%	.0%	14.0%	.0%
Control Data	2.8	2.0	.3	19	1.8%	1.9%	1.4%	.8%
Intergraph	2.3	1.1	.4	22	1.4%	1.1%	1.5%	1.0%
Ferranti	1.8	1.0	.5	15	1.2%	1.0%	1.9%	.7%
Siemens	1.4	.8	.4	16	.9%	.8%	1.7%	.7%
Hewlett-Packard	.9	.8	.0	46	.6%	.7%	.0%	2.1%
Fides Industrielle Automation	.6	.1	.4	3	.4%	.1%	1.6%	.1%
ESRI	.5	.0	.5	0	.3%	.0%	1.9%	.0%
Unisys	.5	.1	.3	13	.3%	.1%	1.3%	.6%
Schlumberger (Applicon)	.5	.2	.2	9	.3%	.2%	.6%	.4%
Olivetti	.4	.2	.2	29	.3%	.2%	.7%	1.3%
PAFEC	.4	.0	.4	0	.3%	.0%	1.7%	.0%
SDRC	.4	.0	.4	0	.2%	.0%	1.6%	.0%
McDonnell Douglas	.3	.2	.1	9	.2%	.1%	.4%	.4%
Silicon Graphics	.1	.1	.0	3	.1%	.1%	.0%	.1%
Racal-Redac	.1	.0	.0	0	.0%	.0%	.2%	.0%
Cisigraph	.0	.0	.0	0	.0%	.0%	.0%	.0%
FEGS	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 47 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Italy
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
Company	Revenue	Revenue	Revenue	Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	33.2	26.7	3.2	1,070.9	21.0%	25.5%	13.1%	48.4%
All Companies	158.0	104.6	24.7	2,211.7	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	143.1	99.7	17.7	1,938	90.6%	95.4%	71.7%	87.6%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	14.9	4.9	7.0	274.1	9.4%	4.6%	28.3%	12.4%
All Hardware Companies	65.6	54.0	.0	1,117.5	41.5%	51.6%	.0%	50.5%
All Turnkey & SW Companies	92.5	50.6	24.7	1,094.3	58.5%	48.4%	100.0%	49.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 48
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Italy
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	9.5	9.0	.0	1,920	14.3%	20.6%	.0%	22.3%
Compaq	9.2	9.2	.0	1,529	13.8%	20.9%	.0%	17.7%
Hewlett-Packard	6.0	4.9	.0	990	8.9%	11.1%	.0%	11.5%
Olivetti	4.6	1.1	1.7	573	6.9%	2.4%	9.8%	6.6%
Apple Computer	4.3	3.8	.0	826	6.4%	8.6%	.0%	9.6%
Vero International Software	4.3	.0	4.3	0	6.4%	.0%	25.0%	.0%
Autodesk	2.9	.0	2.9	0	4.3%	.0%	16.9%	.0%
Investronica SA	1.7	1.4	.2	68	2.5%	3.1%	1.0%	.8%
Datagraph	.6	.5	.1	3	.9%	1.1%	.7%	.0%
Ziegler	.6	.0	.5	20	.9%	.0%	3.1%	.2%
CADAM	.6	.0	.5	0	.9%	.0%	3.0%	.0%
CAD Lab	.5	.0	.5	0	.8%	.0%	2.7%	.0%
Computervision	.4	.2	.1	9	.5%	.4%	.4%	.1%
Intergraph	.3	.0	.3	0	.5%	.0%	1.9%	.0%
Cimatron	.3	.2	.2	8	.5%	.4%	.9%	.1%
Robocom	.3	.0	.3	0	.5%	.0%	1.8%	.0%
ISICAD	.2	.0	.2	0	.3%	.0%	1.2%	.0%
BETRONEX	.2	.0	.2	0	.3%	.0%	1.0%	.0%
European Silicon Systems	.2	.0	.1	1	.2%	.1%	.6%	.0%
ALS Design	.1	.0	.1	3	.2%	.0%	.6%	.0%
Pathtrace	.1	.0	.1	2	.1%	.0%	.3%	.0%
ESRI	.1	.0	.1	0	.1%	.0%	.5%	.0%
Serbi	.1	.0	.1	0	.1%	.0%	.5%	.0%
DAT Standard Information syste	.1	.0	.1	0	.1%	.0%	.4%	.0%
Sycotronic AG	.0	.0	.0	0	.1%	.0%	.2%	.0%
BATISOFT	.0	.0	.0	1	.0%	.0%	.1%	.0%
Secmai	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 48 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Italy
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
Company	Revenue	Revenue	Revenue	Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	19.6	13.6	4.7	2,658.5	29.3%	31.1%	27.5%	30.8%
All Companies	66.7	43.8	17.2	8,620.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	45.7	36.9	6.0	7,762	68.6%	84.3%	35.1%	90.0%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	21.0	6.9	11.2	858.5	31.4%	15.7%	64.9%	10.0%
All Hardware Companies	38.8	36.7	.0	7,740.3	58.2%	83.8%	.0%	89.8%
All Turnkey & SW Companies	27.9	7.1	17.2	879.9	41.8%	16.2%	100.0%	10.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 49
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	62.9	42.3	10.5	1,653	23.1%	27.0%	15.1%	21.3%
Computervision	31.0	14.3	7.4	261	11.4%	9.1%	10.6%	3.4%
Hewlett-Packard	26.6	19.2	2.6	1,423	9.8%	12.3%	3.8%	18.3%
Digital	24.7	18.5	.0	169	9.1%	11.8%	.0%	2.2%
ItalCad	12.0	6.1	4.4	125	4.4%	3.9%	6.4%	1.6%
Matra Datavision	8.7	5.2	2.6	139	3.2%	3.3%	3.8%	1.8%
CAD Lab	8.3	.0	6.7	0	3.0%	.0%	9.5%	.0%
Siemens	7.6	4.5	2.3	174	2.8%	2.8%	3.3%	2.2%
Compaq	4.9	4.9	.0	810	1.8%	3.1%	.0%	10.4%
Dassault	4.7	.0	3.9	0	1.7%	.0%	5.6%	.0%
Vero International Software	4.3	.0	4.3	0	1.6%	.0%	6.1%	.0%
Unisys	4.2	1.2	2.5	116	1.5%	.7%	3.6%	1.5%
Control Data	4.0	2.8	.5	43	1.5%	1.8%	.7%	.6%
Schlumberger (Applicon)	3.9	1.5	1.2	40	1.4%	.9%	1.8%	.5%
Olivetti	3.5	.8	1.6	421	1.3%	.5%	2.2%	5.4%
Intergraph	3.4	1.8	.7	35	1.3%	1.2%	1.0%	.4%
Cimatron	3.3	1.5	1.5	85	1.2%	1.0%	2.1%	1.1%
PAFEC	3.3	.0	3.3	0	1.2%	.0%	4.7%	.0%
SDRC	1.9	.0	1.9	0	.7%	.0%	2.8%	.0%
Apple Computer	1.9	1.7	.0	372	.7%	1.1%	.0%	4.8%
Ferranti	1.9	1.1	.5	17	.7%	.7%	.7%	.2%
Silicon Graphics	1.8	1.6	.0	53	.7%	1.0%	.0%	.7%
Sun	1.8	1.6	.0	118	.6%	1.0%	.0%	1.5%
Investronica SA	1.7	1.4	.2	68	.6%	.9%	.2%	.9%
McDonnell Douglas	1.4	.8	.5	21	.5%	.5%	.7%	.3%
Autodesk	1.2	.0	1.2	0	.5%	.0%	1.8%	.0%
Fides Industrielle Automation	.7	.1	.5	7	.3%	.1%	.7%	.1%
ISICAD	.6	.3	.3	7	.2%	.2%	.4%	.1%
Datagraph	.6	.5	.1	3	.2%	.3%	.2%	.0%
Technische Computer Systeme	.5	.1	.3	13	.2%	.1%	.5%	.2%
Framesoft	.3	.0	.4	1	.1%	.0%	.5%	.0%
Cisigraph	.3	.1	.1	3	.1%	.1%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 49 (Continued)
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Gerber Systems	.2	.2	.1	3	.1%	.1%	.1%	.0%
Ziegler	.2	.0	.2	8	.1%	.0%	.3%	.1%
Mentor Graphics	.2	.1	.1	3	.1%	.0%	.1%	.0%
Robocom	.2	.0	.2	0	.1%	.0%	.2%	.0%
ISYKON Software	.1	.1	.0	1	.0%	.0%	.1%	.0%
Pathtrace	.1	.0	.1	2	.0%	.0%	.1%	.0%
DAT Standard Information syste	.1	.0	.1	0	.0%	.0%	.1%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.1%	.0%
FEGS	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	32.7	22.7	7.2	1,567.1	12.0%	14.5%	10.3%	20.2%
All Companies	271.7	156.9	69.8	7,769.6	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	205.0	133.0	35.1	6,583	75.4%	84.7%	50.3%	84.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	66.8	24.0	34.7	1,186.9	24.6%	15.3%	49.7%	15.3%
All Hardware Companies	73.2	62.5	.0	5,012.5	26.9%	39.8%	.0%	64.5%
All Turnkey & SW Companies	198.5	94.4	69.8	2,757.2	73.1%	60.2%	100.0%	35.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 50
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
ItalCad	9.8	5.0	3.6	103	18.1%	14.7%	29.1%	3.4%
IBM	8.7	6.6	1.0	728	16.0%	19.5%	7.8%	24.1%
Hewlett-Packard	5.4	4.1	.4	329	10.0%	11.9%	3.5%	10.9%
Digital	5.0	3.8	.0	34	9.2%	11.1%	.0%	1.1%
Intergraph	3.4	1.8	.7	35	6.3%	5.3%	5.4%	1.1%
Compaq	2.1	2.1	.0	352	3.9%	6.2%	.0%	11.7%
CAD Lab	2.1	.0	1.7	0	3.8%	.0%	13.3%	.0%
Apple Computer	1.9	1.6	.0	355	3.4%	4.7%	.0%	11.8%
Computervision	1.4	.7	.3	12	2.6%	1.9%	2.7%	.4%
Autodesk	1.2	.0	1.2	0	2.3%	.0%	9.8%	.0%
Siemens	1.1	.7	.3	22	2.0%	1.9%	2.6%	.7%
ISICAD	.9	.4	.4	10	1.7%	1.1%	3.4%	.3%
Dassault	.9	.0	.8	0	1.7%	.0%	6.2%	.0%
Olivetti	.8	.4	.2	111	1.4%	1.0%	1.4%	3.7%
PAFEC	.7	.0	.7	0	1.2%	.0%	5.2%	.0%
Star Informatic	.5	.2	.1	20	.9%	.6%	1.1%	.7%
McDonnell Douglas	.2	.1	.1	3	.3%	.3%	.5%	.1%
Sun	.2	.2	.0	11	.3%	.4%	.0%	.4%
Robocom	.1	.0	.1	0	.3%	.0%	1.1%	.0%
t2 Solutions	.1	.1	.0	1	.2%	.1%	.2%	.0%
Control Data	.1	.1	.0	1	.2%	.2%	.1%	.0%
Ziegler	.1	.0	.1	2	.1%	.0%	.5%	.1%
Schlumberger (Applicon)	.0	.0	.0	0	.1%	.0%	.2%	.0%
BATISOFT	.0	.0	.0	1	.0%	.0%	.1%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.2%	.0%
Sycotronic AG	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 50 (Continued)
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	7.6	6.5	.7	889.1	13.9%	19.0%	5.3%	29.5%
All Companies	54.3	34.1	12.5	3,018.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	37.3	27.4	4.6	2,739	68.7%	80.3%	36.4%	90.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	17.0	6.7	7.9	279.5	31.3%	19.7%	63.6%	9.3%
All Hardware Companies	21.8	19.3	.0	2,564.9	40.1%	56.6%	.0%	85.0%
All Turnkey & SW Companies	32.5	14.8	12.5	453.3	59.9%	43.4%	100.0%	15.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 51
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Sysscan	8.1	3.6	2.1	71	22.9%	18.4%	24.7%	8.9%
Siemens	5.9	3.5	1.8	125	16.5%	17.8%	20.6%	15.7%
Digital	4.6	3.4	.0	31	12.9%	17.7%	.0%	3.9%
Intergraph	4.6	2.4	.9	46	12.8%	12.5%	10.6%	5.8%
IBM	2.6	1.9	.4	136	7.3%	9.6%	4.3%	17.1%
ItalCad	2.2	1.1	.8	23	6.1%	5.7%	9.4%	2.8%
ESRI	1.0	.0	.9	0	2.8%	.0%	10.4%	.0%
Olivetti	.8	.1	.1	68	2.3%	.6%	1.4%	8.5%
Compaq	.5	.5	.0	76	1.3%	2.4%	.0%	9.6%
Computervision	.4	.2	.1	3	1.0%	.9%	.9%	.4%
Autodesk	.3	.0	.3	0	.8%	.0%	3.2%	.0%
Apple Computer	.2	.2	.0	41	.6%	1.0%	.0%	5.2%
Control Data	.1	.1	.0	1	.3%	.5%	.1%	.2%
Hewlett-Packard	.1	.1	.0	8	.3%	.4%	.0%	1.0%
Ziegler	.1	.0	.1	2	.1%	.0%	.6%	.2%
Robocom	.0	.0	.0	0	.1%	.0%	.2%	.0%
Other Companies	4.2	2.4	1.1	164.2	12.0%	12.5%	13.5%	20.6%
All Companies	35.5	19.4	8.5	795.9	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	17.8	10.8	3.4	492	50.2%	55.7%	40.3%	61.8%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	17.7	8.6	5.1	304.1	49.8%	44.3%	59.7%	38.2%
All Hardware Companies	8.1	6.7	.0	419.4	22.9%	34.8%	.0%	52.7%
All Turnkey & SW Companies	27.3	12.6	8.5	376.6	77.1%	65.2%	100.0%	47.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 52
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	11.4	8.5	.0	98	15.2%	21.3%	.0%	3.4%
Hewlett-Packard	9.9	7.0	.6	682	13.2%	17.6%	2.8%	23.9%
Mentor Graphics	9.3	2.7	4.6	123	12.4%	6.8%	22.4%	4.3%
Dazix	7.1	2.7	2.9	71	9.5%	6.8%	13.9%	2.5%
Valid	3.7	.9	2.0	0	4.9%	2.3%	9.6%	.0%
Computervision	2.5	1.1	.6	21	3.3%	2.8%	2.8%	.7%
IBM	2.4	1.7	.4	98	3.2%	4.2%	1.8%	3.4%
Racal-Redac	1.8	.0	1.5	7	2.5%	.0%	7.4%	.2%
Compaq	1.7	1.7	.0	291	2.3%	4.4%	.0%	10.2%
Sun	1.4	1.3	.0	93	1.9%	3.1%	.0%	3.3%
Intergraph	1.4	.6	.2	14	1.8%	1.6%	1.1%	.5%
Secmai	.8	.5	.2	7	1.0%	1.1%	.8%	.2%
European Silicon Systems	.7	.2	.6	4	1.0%	.4%	2.7%	.1%
CADAM	.6	.0	.5	0	.8%	.0%	2.5%	.0%
Apple Computer	.3	.3	.0	58	.4%	.7%	.0%	2.0%
Autodesk	.3	.0	.3	0	.4%	.0%	1.3%	.0%
Calay	.3	.1	.1	2	.3%	.2%	.6%	.1%
Ziegler	.2	.0	.2	8	.3%	.0%	1.1%	.3%
BETRONEX	.2	.0	.2	0	.2%	.0%	.9%	.0%
Dassault	.2	.0	.2	0	.2%	.0%	.7%	.0%
ALS Design	.1	.0	.1	3	.2%	.0%	.5%	.1%
Schlumberger (Applicon)	.1	.0	.0	1	.2%	.1%	.2%	.0%
Sycotronic AG	.0	.0	.0	0	.0%	.0%	.1%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 52 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	18.6	10.7	5.5	1,263.1	24.7%	26.7%	26.7%	44.3%
All Companies	75.0	39.9	20.5	2,850.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	68.5	38.0	16.7	2,759	91.3%	95.3%	81.4%	96.8%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	6.5	1.9	3.8	91.5	8.7%	4.7%	18.6%	3.2%
All Hardware Companies	31.3	26.3	.0	2,423.0	41.7%	65.8%	.0%	85.0%
All Turnkey & SW Companies	43.7	13.6	20.5	427.2	58.3%	34.2%	100.0%	15.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 53
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Mentor Graphics	6.2	1.9	3.1	82	15.6%	8.9%	26.7%	4.5%
Dazix	5.7	2.3	2.3	57	14.4%	10.6%	20.0%	3.1%
Hewlett-Packard	4.8	3.7	.3	325	12.0%	17.2%	2.5%	17.7%
Digital	4.6	3.4	.0	39	11.6%	16.0%	.0%	2.1%
Valid	2.6	.6	1.4	0	6.5%	3.0%	12.1%	.0%
Sun	1.4	1.3	.0	93	3.5%	5.8%	.0%	5.1%
Compaq	.8	.8	.0	130	2.0%	3.6%	.0%	7.1%
Computervision	.7	.3	.2	6	1.8%	1.5%	1.4%	.3%
Intergraph	.5	.3	.1	5	1.2%	1.2%	.7%	.3%
Racal-Redac	.3	.0	.3	1	.9%	.0%	2.4%	.1%
Autodesk	.2	.0	.2	0	.6%	.0%	2.1%	.0%
IBM	.2	.2	.0	38	.5%	.8%	.0%	2.1%
Dassault	.2	.0	.2	0	.5%	.0%	1.3%	.0%
Apple Computer	.1	.1	.0	25	.3%	.5%	.0%	1.4%
Ziegler	.1	.0	.1	4	.3%	.0%	1.0%	.2%
Secmai	.1	.0	.0	1	.2%	.1%	.2%	.0%
Serbi	.0	.0	.0	0	.1%	.0%	.2%	.0%
Other Companies	11.2	6.5	3.4	1,023.2	28.2%	30.5%	29.5%	55.8%
All Companies	39.6	21.4	11.4	1,833.5	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	37.5	20.6	10.3	1,787	94.6%	96.2%	90.4%	97.5%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	2.2	.8	1.1	46.4	5.4%	3.8%	9.6%	2.5%
All Hardware Companies	15.7	13.7	.0	1,594.6	39.6%	64.0%	.0%	87.0%
All Turnkey & SW Companies	23.9	7.7	11.4	238.8	60.4%	36.0%	100.0%	13.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 54
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
					Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Digital	1.8	1.4	.0	16	28.5%	50.9%	.0%	14.6%
Hewlett-Packard	.8	.7	.0	75	12.9%	25.8%	.0%	70.8%
European Silicon Systems	.7	.2	.6	4	11.4%	6.3%	22.8%	3.7%
Mentor Graphics	.5	.2	.2	6	7.5%	5.5%	10.0%	5.9%
Valid	.4	.1	.2	0	5.8%	3.3%	8.3%	.0%
Other Companies	2.2	.2	1.4	5.2	34.0%	8.1%	58.9%	4.9%
All Companies	6.4	2.7	2.4	106.6	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	5.7	2.5	1.9	103	88.6%	93.7%	77.2%	96.3%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	.7	.2	.6	4.0	11.4%	6.3%	22.8%	3.7%
All Hardware Companies	2.9	2.2	.0	94.6	44.4%	82.7%	.0%	88.8%
All Turnkey & SW Companies	3.6	.5	2.4	12.0	55.6%	17.3%	100.0%	11.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 55
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Italy
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Digital	5.0	3.7	.0	43	17.4%	23.5%	.0%	4.7%
Hewlett-Packard	4.3	2.6	.3	282	14.9%	16.6%	4.3%	31.0%
Mentor Graphics	2.7	.7	1.3	35	9.2%	4.1%	19.7%	3.9%
IBM	2.2	1.5	.4	59	7.6%	9.4%	5.5%	6.5%
Computervision	1.8	.8	.4	15	6.1%	5.0%	6.3%	1.6%
Racal-Redac	1.5	.0	1.2	5	5.2%	.0%	18.4%	.6%
Dazix	1.4	.4	.6	14	4.9%	2.7%	8.5%	1.6%
Compaq	1.0	1.0	.0	161	3.3%	6.1%	.0%	17.6%
Intergraph	.9	.4	.2	9	3.0%	2.3%	2.2%	1.0%
Valid	.7	.2	.4	0	2.5%	1.1%	5.8%	.0%
Secmai	.7	.4	.1	6	2.4%	2.7%	2.1%	.7%
CADAM	.6	.0	.5	0	2.0%	.0%	7.6%	.0%
Calay	.3	.1	.1	2	.9%	.5%	1.8%	.3%
BETRONEX	.2	.0	.2	0	.6%	.0%	2.7%	.0%
Apple Computer	.2	.2	.0	33	.6%	1.0%	.0%	3.6%
ALS Design	.1	.0	.1	3	.5%	.1%	1.6%	.3%
Schlumberger (Applicon)	.1	.0	.0	1	.4%	.2%	.6%	.1%
Ziegler	.1	.0	.1	4	.4%	.0%	1.6%	.4%
Autodesk	.0	.0	.0	0	.1%	.0%	.4%	.0%
Sycotronic AG	.0	.0	.0	0	.1%	.0%	.3%	.0%
Other Companies	5.2	3.9	.7	234.6	17.9%	24.7%	10.3%	25.8%
All Companies	29.0	15.8	6.7	910.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	25.3	14.9	4.5	869	87.4%	94.4%	67.6%	95.5%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	3.6	.9	2.2	41.2	12.6%	5.6%	32.4%	4.5%
All Hardware Companies	12.8	10.3	.0	733.7	44.0%	65.4%	.0%	80.6%
All Turnkey & SW Companies	16.2	5.5	6.7	176.4	56.0%	34.6%	100.0%	19.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 56
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	69.9	47.7	11.3	2,266	16.9%	19.5%	12.0%	15.8%
Computervision	45.8	21.1	10.9	385	11.1%	8.6%	11.5%	2.7%
Digital	42.5	31.8	.0	308	10.3%	13.0%	.0%	2.1%
Hewlett-Packard	41.5	30.2	3.4	2,479	10.1%	12.3%	3.6%	17.3%
Intergraph	41.5	21.8	8.2	424	10.1%	8.9%	8.6%	3.0%
Autodesk	16.2	.0	16.2	0	3.9%	.0%	17.1%	.0%
Norsk Data	11.2	5.5	3.4	16	2.7%	2.2%	3.6%	.1%
Mentor Graphics	9.7	2.8	4.8	129	2.4%	1.2%	5.1%	.9%
Sun	9.3	8.4	.0	623	2.2%	3.4%	.0%	4.3%
Compaq	8.8	8.8	.0	1,460	2.1%	3.6%	.0%	10.2%
Apple Computer	7.7	6.8	.0	1,489	1.9%	2.8%	.0%	10.4%
McDonnell Douglas	7.1	3.8	2.6	107	1.7%	1.6%	2.7%	.7%
PAFEC	5.7	.0	5.7	0	1.4%	.0%	6.0%	.0%
Control Data	5.1	3.6	.6	54	1.2%	1.5%	.6%	.4%
Sysscan	3.9	1.7	1.0	6	.9%	.7%	1.1%	.0%
BATISOFT	3.4	.5	2.6	197	.8%	.2%	2.7%	1.4%
Siemens	3.3	1.9	1.0	72	.8%	.8%	1.0%	.5%
Dassault	3.0	.0	2.5	0	.7%	.0%	2.7%	.0%
Dazix	2.2	.8	.9	22	.5%	.3%	.9%	.2%
Schlumberger (Applicon)	1.8	.7	.6	18	.4%	.3%	.6%	.1%
Westward	1.6	1.6	.0	91	.4%	.6%	.0%	.6%
Matra Datavision	1.5	.9	.5	6	.4%	.4%	.5%	.0%
Investronica SA	1.5	1.2	.2	59	.4%	.5%	.2%	.4%
Racal-Redac	1.4	.0	1.1	5	.3%	.0%	1.2%	.0%
SDRC	1.3	.0	1.3	0	.3%	.0%	1.3%	.0%
ESRI	1.0	.0	.9	0	.2%	.0%	.9%	.0%
Exapt	.9	.6	.2	16	.2%	.2%	.3%	.1%
CADAM	.9	.0	.8	0	.2%	.0%	.9%	.0%
Olivetti	.9	.3	.4	181	.2%	.1%	.4%	1.3%
Silicon Graphics	.9	.8	.0	26	.2%	.3%	.0%	.2%
Aucotec	.8	.3	.4	85	.2%	.1%	.4%	.6%
Unisys	.7	.4	.3	12	.2%	.1%	.3%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 56 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
ABB Cade International	.7	.4	.2	0	.2%	.2%	.2%	.0%
Valid	.6	.2	.3	0	.1%	.1%	.3%	.0%
Vero International Software	.6	.0	.6	0	.1%	.0%	.6%	.0%
BETRONEX	.6	.0	.6	0	.1%	.0%	.6%	.0%
Dategraph	.5	.4	.1	2	.1%	.2%	.1%	.0%
European Silicon Systems	.4	.1	.3	2	.1%	.0%	.3%	.0%
Ziegler	.4	.0	.4	15	.1%	.0%	.4%	.1%
Secmai	.4	.2	.1	3	.1%	.1%	.1%	.0%
Gerber Systems	.3	.2	.1	4	.1%	.1%	.1%	.0%
Cisigraph	.3	.1	.1	3	.1%	.0%	.1%	.0%
Calay	.3	.1	.1	2	.1%	.0%	.1%	.0%
Sycotronic AG	.2	.0	.2	0	.1%	.0%	.2%	.0%
Ferranti	.2	.2	.0	2	.1%	.1%	.0%	.0%
Pathtrace	.2	.0	.1	4	.0%	.0%	.1%	.0%
Superdraft	.2	.0	.1	0	.0%	.0%	.1%	.0%
Robocom	.2	.0	.2	0	.0%	.0%	.2%	.0%
ALS Design	.1	.0	.1	3	.0%	.0%	.1%	.0%
Academi Systems	.1	.0	.1	2	.0%	.0%	.1%	.0%
Intercad	.1	.0	.0	5	.0%	.0%	.0%	.0%
DAT Standard Information syste	.1	.0	.1	0	.0%	.0%	.1%	.0%
Gable CAD Systems	.1	.0	.0	1	.0%	.0%	.0%	.0%
Star Informatic	.1	.0	.0	2	.0%	.0%	.0%	.0%
FEGS	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	53.6	39.2	9.3	3,543.1	13.0%	16.0%	9.8%	24.7%
All Companies	412.8	245.2	94.6	14,351.7	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	368.4	229.1	72.4	13,349	89.2%	93.4%	76.5%	93.0%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	44.4	16.1	22.2	1,002.6	10.8%	6.6%	23.5%	7.0%
All Hardware Companies	139.5	119.7	.0	11,005.9	33.8%	48.8%	.0%	76.7%
All Turnkey & SW Companies	273.4	125.4	94.6	3,345.8	66.2%	51.2%	100.0%	23.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 57
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Computervision	38.7	17.8	9.2	235	20.9%	18.0%	20.2%	6.1%
Hewlett-Packard	34.9	24.7	3.4	1,493	18.8%	25.0%	7.5%	38.9%
Intergraph	32.9	18.1	5.9	353	17.8%	18.3%	13.0%	9.2%
Mentor Graphics	9.7	2.8	4.8	129	5.3%	2.9%	10.5%	3.4%
Digital	9.4	6.9	.0	308	5.1%	7.0%	.0%	8.0%
Sun	9.3	8.4	.0	623	5.0%	8.4%	.0%	16.2%
Norsk Data	6.4	3.1	1.9	10	3.4%	3.1%	4.3%	.3%
McDonnell Douglas	5.8	3.1	2.1	65	3.1%	3.1%	4.7%	1.7%
IBM	5.7	3.7	1.0	51	3.1%	3.7%	2.3%	1.3%
PAFEC	5.1	.0	5.1	0	2.8%	.0%	11.3%	.0%
Siemens	2.9	1.7	.9	69	1.6%	1.8%	1.9%	1.8%
Dazix	2.2	.8	.9	22	1.2%	.8%	2.0%	.6%
Control Data	1.7	1.2	.2	32	.9%	1.2%	.5%	.8%
Schlumberger (Applicon)	1.6	.6	.5	14	.8%	.6%	1.1%	.4%
Matra Datavision	1.5	.9	.5	0	.8%	.9%	1.0%	.0%
Racal-Redac	1.4	.0	1.1	5	.7%	.0%	2.4%	.1%
SDRC	1.0	.0	1.0	0	.5%	.0%	2.2%	.0%
Sysscan	1.0	.4	.3	0	.5%	.4%	.5%	.0%
Dassault	1.0	.0	.8	0	.5%	.0%	1.7%	.0%
Westward	.9	.9	.0	50	.5%	.9%	.0%	1.3%
Silicon Graphics	.8	.7	.0	25	.4%	.7%	.0%	.6%
ABB Cade International	.7	.4	.2	0	.4%	.4%	.4%	.0%
Valid	.6	.2	.3	0	.3%	.2%	.7%	.0%
Unisys	.6	.3	.2	10	.3%	.3%	.5%	.3%
Autodesk	.5	.0	.5	0	.3%	.0%	1.1%	.0%
Exapt	.4	.2	.2	8	.2%	.2%	.3%	.2%
ESRI	.4	.0	.3	0	.2%	.0%	.7%	.0%
European Silicon Systems	.4	.1	.3	2	.2%	.1%	.6%	.0%
Secmi	.4	.2	.1	3	.2%	.2%	.1%	.1%
Gerber Systems	.3	.2	.1	4	.2%	.2%	.2%	.1%
Cisigraph	.3	.1	.1	3	.1%	.1%	.2%	.1%
Calay	.3	.1	.1	2	.1%	.1%	.3%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 57 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Academi Systems	.1	.0	.1	1	.1%	.0%	.2%	.0%
Gable CAD Systems	.1	.0	.0	1	.0%	.0%	.1%	.0%
Star Informatic	.1	.0	.0	2	.0%	.0%	.0%	.1%
Aucotec	.0	.0	.0	4	.0%	.0%	.0%	.1%
FEGS	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	6.2	1.2	3.5	116.5	3.4%	1.2%	7.7%	3.0%
All Companies	184.9	99.1	45.6	3,836.8	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	162.2	90.8	34.0	3,480	87.7%	91.6%	74.6%	90.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	22.7	8.3	11.6	357.2	12.3%	8.4%	25.4%	9.3%
All Hardware Companies	35.4	29.0	.0	2,029.5	19.1%	29.2%	.0%	52.9%
All Turnkey & SW Companies	149.6	70.1	45.6	1,807.3	80.9%	70.8%	100.0%	47.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 58
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	56.2	36.4	10.3	590	36.0%	34.4%	47.4%	27.6%
Digital	33.1	24.9	.0	0	21.2%	23.5%	.0%	.0%
Intergraph	7.5	3.7	1.2	71	4.8%	3.5%	5.5%	3.3%
Computervision	6.6	3.1	1.6	138	4.2%	2.9%	7.3%	6.5%
Norsk Data	4.8	2.4	1.5	5	3.1%	2.2%	6.7%	.2%
Control Data	3.3	2.4	.4	22	2.1%	2.2%	1.8%	1.0%
Sysscan	2.9	1.3	.8	6	1.9%	1.2%	3.5%	.3%
Dassault	2.0	.0	1.7	0	1.3%	.0%	8.0%	.0%
McDonnell Douglas	1.3	.7	.5	42	.8%	.7%	2.2%	2.0%
Hewlett-Packard	1.1	.9	.0	54	.7%	.8%	.0%	2.5%
Exapt	.5	.4	.1	8	.3%	.3%	.4%	.4%
PAFEC	.5	.0	.5	0	.3%	.0%	2.4%	.0%
ESRI	.5	.0	.5	0	.3%	.0%	2.1%	.0%
Siemens	.3	.2	.1	4	.2%	.2%	.4%	.2%
SDRC	.3	.0	.3	0	.2%	.0%	1.2%	.0%
Schlumberger (Applicon)	.2	.1	.1	4	.1%	.1%	.3%	.2%
Ferranti	.2	.2	.0	2	.1%	.1%	.0%	.1%
Unisys	.1	.1	.0	2	.1%	.0%	.2%	.1%
Olivetti	.1	.0	.0	3	.0%	.0%	.1%	.2%
Silicon Graphics	.1	.1	.0	2	.0%	.0%	.0%	.1%
Aucotec	.0	.0	.0	4	.0%	.0%	.1%	.2%
Racal-Redac	.0	.0	.0	0	.0%	.0%	.1%	.0%
Cisigraph	.0	.0	.0	0	.0%	.0%	.0%	.0%
FEGS	.0	.0	.0	0	.0%	.0%	.0%	.0%
Gable CAD Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 58 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Other Companies	34.6	29.1	2.2	1,177.9	22.1%	27.5%	10.1%	55.0%
All Companies	156.4	105.7	21.7	2,141.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	144.9	101.3	16.9	2,103	92.6%	95.8%	78.2%	98.2%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	11.5	4.4	4.7	38.1	7.4%	4.2%	21.8%	1.8%
All Hardware Companies	65.0	54.0	.0	1,227.8	41.6%	51.1%	.0%	57.3%
All Turnkey & SW Companies	91.3	51.7	21.7	913.4	58.4%	48.9%	100.0%	42.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 59
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Autodesk	15.7	.0	15.7	0	22.0%	.0%	57.4%	.0%
Compaq	8.8	8.8	.0	1,460	12.2%	21.7%	.0%	17.4%
IBM	8.1	7.7	.0	1,625	11.3%	19.0%	.0%	19.4%
Apple Computer	7.7	6.8	.0	1,489	10.8%	16.9%	.0%	17.8%
Hewlett-Packard	5.6	4.6	.0	932	7.8%	11.4%	.0%	11.1%
BATISOFT	3.4	.5	2.6	197	4.8%	1.3%	9.4%	2.4%
Investronica SA	1.5	1.2	.2	59	2.1%	2.9%	.5%	.7%
Intergraph	1.1	.0	1.0	0	1.6%	.0%	3.8%	.0%
CADAM	.9	.0	.8	0	1.3%	.0%	3.0%	.0%
Olivetti	.8	.3	.4	177	1.2%	.7%	1.4%	2.1%
Aucotec	.7	.3	.3	76	1.0%	.7%	1.2%	.9%
Westward	.6	.6	.0	41	.9%	1.5%	.0%	.5%
Vero International Software	.6	.0	.6	0	.9%	.0%	2.2%	.0%
BETRONEX	.6	.0	.6	0	.8%	.0%	2.1%	.0%
Datagraph	.5	.4	.1	2	.7%	1.0%	.4%	.0%
Computervision	.5	.2	.1	12	.6%	.5%	.4%	.1%
Ziegler	.4	.0	.4	15	.6%	.0%	1.5%	.2%
Sycotronic AG	.2	.0	.2	0	.3%	.0%	.7%	.0%
Pathtrace	.2	.0	.1	4	.2%	.1%	.4%	.0%
Superdraft	.2	.0	.1	0	.2%	.0%	.5%	.0%
Robocom	.2	.0	.2	0	.2%	.0%	.6%	.0%
ALS Design	.1	.0	.1	3	.2%	.0%	.4%	.0%
Intercad	.1	.0	.0	5	.1%	.1%	.1%	.1%
European Silicon Systems	.1	.0	.1	1	.1%	.0%	.2%	.0%
ESRI	.1	.0	.1	0	.1%	.0%	.3%	.0%
DAT Standard Information syste	.1	.0	.1	0	.1%	.0%	.3%	.0%
Norsk Data	.0	.0	.0	1	.1%	.0%	.0%	.0%
Academi Systems	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 59 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Other Companies	12.8	9.0	3.6	2,248.7	17.8%	22.2%	13.1%	26.9%
All Companies	71.5	40.4	27.4	8,373.7	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	61.3	37.0	21.5	7,766	85.7%	91.6%	78.4%	92.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	10.2	3.4	5.9	607.4	14.3%	8.4%	21.6%	7.3%
All Hardware Companies	39.1	36.7	.0	7,748.6	54.6%	91.1%	.0%	92.5%
All Turnkey & SW Companies	32.5	3.6	27.4	625.2	45.4%	8.9%	100.0%	7.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 60
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	57.7	38.7	9.7	1,444	23.6%	25.4%	19.4%	17.4%
Computervision	40.3	18.6	9.6	339	16.5%	12.2%	19.2%	4.1%
Hewlett-Packard	25.8	18.8	2.5	1,410	10.6%	12.3%	4.9%	17.0%
Digital	22.9	17.2	.0	157	9.4%	11.3%	.0%	1.9%
Intergraph	11.1	5.9	2.2	113	4.6%	3.9%	4.4%	1.4%
Autodesk	6.6	.0	6.6	0	2.7%	.0%	13.3%	.0%
McDonnell Douglas	5.9	3.2	2.1	86	2.4%	2.1%	4.3%	1.0%
Sun	4.9	4.4	.0	330	2.0%	2.9%	.0%	4.0%
Control Data	4.8	3.4	.6	51	2.0%	2.2%	1.2%	.6%
Compaq	4.6	4.6	.0	774	1.9%	3.0%	.0%	9.3%
PAFEC	4.6	.0	4.6	0	1.9%	.0%	9.2%	.0%
Apple Computer	3.5	3.1	.0	670	1.4%	2.0%	.0%	8.1%
Norsk Data	3.2	1.6	1.0	16	1.3%	1.0%	1.9%	.2%
Dassault	2.5	.0	2.1	0	1.0%	.0%	4.2%	.0%
Schlumberger (Applicon)	1.7	.6	.5	18	.7%	.4%	1.1%	.2%
Siemens	1.7	1.0	.5	39	.7%	.7%	1.0%	.5%
Matra Datavision	1.5	.9	.5	6	.6%	.6%	.9%	.1%
Investronica SA	1.5	1.2	.2	59	.6%	.8%	.3%	.7%
Westward	1.4	1.4	.0	82	.6%	.9%	.0%	1.0%
SDRC	1.3	.0	1.3	0	.5%	.0%	2.5%	.0%
Exapt	.9	.6	.2	16	.4%	.4%	.5%	.2%
Silicon Graphics	.9	.8	.0	26	.4%	.5%	.0%	.3%
Unisys	.7	.4	.3	12	.3%	.2%	.5%	.1%
Olivetti	.6	.2	.3	122	.3%	.1%	.6%	1.5%
Vero International Software	.6	.0	.6	0	.2%	.0%	1.2%	.0%
ABB Cade International	.6	.3	.1	0	.2%	.2%	.3%	.0%
Datagraph	.5	.4	.1	2	.2%	.3%	.2%	.0%
Gerber Systems	.3	.2	.1	4	.1%	.1%	.1%	.1%
Cisigraph	.3	.1	.1	3	.1%	.1%	.2%	.0%
Ferranti	.2	.2	.0	2	.1%	.1%	.0%	.0%
Mentor Graphics	.2	.1	.1	3	.1%	.0%	.2%	.0%
Pathtrace	.2	.0	.1	4	.1%	.0%	.2%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 60 (Continued)
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Superdraft	.2	.0	.1	0	.1%	.0%	.3%	.0%
Ziegler	.2	.0	.2	6	.1%	.0%	.3%	.1%
Robocom	.1	.0	.1	0	.0%	.0%	.2%	.0%
DAT Standard Information syste	.1	.0	.1	0	.0%	.0%	.1%	.0%
Intercad	.1	.0	.0	3	.0%	.0%	.0%	.0%
FEGS	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	30.3	24.5	3.5	2,293.8	12.4%	16.1%	7.1%	27.7%
All Companies	244.4	152.3	50.0	8,290.5	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	223.7	144.4	39.2	7,730	91.5%	94.8%	78.5%	93.2%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	20.7	7.9	10.8	560.6	8.5%	5.2%	21.5%	6.8%
All Hardware Companies	78.6	68.0	.0	6,143.2	32.2%	44.7%	.0%	74.1%
All Turnkey & SW Companies	165.8	84.3	50.0	2,147.4	67.8%	55.3%	100.0%	25.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 61
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Intergraph	11.1	5.9	2.2	113	17.8%	16.7%	12.4%	3.6%
IBM	7.8	5.9	.9	620	12.4%	16.6%	5.1%	19.7%
Autodesk	6.6	.0	6.6	0	10.6%	.0%	37.2%	.0%
Norsk Data	5.8	2.9	1.8	0	9.3%	8.1%	9.8%	.0%
Hewlett-Packard	5.4	4.0	.4	331	8.6%	11.3%	2.3%	10.5%
Digital	4.7	3.5	.0	32	7.5%	9.9%	.0%	1.0%
BATISOFT	3.4	.5	2.6	197	5.5%	1.4%	14.5%	6.3%
Apple Computer	3.3	2.9	.0	640	5.3%	8.3%	.0%	20.3%
Compaq	2.0	2.0	.0	336	3.2%	5.7%	.0%	10.7%
Computervision	1.8	.9	.4	15	2.9%	2.4%	2.4%	.5%
McDonnell Douglas	1.2	.7	.5	22	2.0%	1.9%	2.6%	.7%
PAFEC	1.1	.0	1.1	0	1.7%	.0%	5.9%	.0%
Sun	.5	.4	.0	31	.7%	1.2%	.0%	1.0%
Dassault	.4	.0	.3	0	.6%	.0%	1.8%	.0%
Siemens	.3	.2	.1	5	.4%	.4%	.4%	.2%
Olivetti	.2	.1	.1	48	.4%	.3%	.4%	1.5%
Control Data	.1	.1	.0	1	.2%	.2%	.1%	.0%
Sycotronic AG	.1	.0	.1	0	.1%	.0%	.3%	.0%
Westward	.1	.1	.0	5	.1%	.2%	.0%	.1%
Gable CAD Systems	.1	.0	.0	1	.1%	.1%	.2%	.0%
Robocom	.1	.0	.1	0	.1%	.0%	.4%	.0%
Star Informatic	.1	.0	.0	2	.1%	.1%	.1%	.1%
Ziegler	.1	.0	.1	2	.1%	.0%	.3%	.1%
Schlumberger (Applicon)	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 61 (Continued)
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Other Companies	6.5	5.5	.7	745.5	10.4%	15.4%	3.9%	23.7%
All Companies	62.6	35.5	17.8	3,146.3	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	51.0	31.7	11.8	2,888	81.6%	89.4%	66.0%	91.8%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	11.5	3.8	6.1	258.7	18.4%	10.6%	34.0%	8.2%
All Hardware Companies	22.0	19.5	.0	2,630.3	35.2%	55.0%	.0%	83.6%
All Turnkey & SW Companies	40.5	16.0	17.8	516.0	64.8%	45.0%	100.0%	16.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 62
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Intergraph	14.9	7.9	3.0	151	40.4%	39.5%	34.1%	22.2%
Digital	4.2	3.2	.0	29	11.5%	15.9%	.0%	4.3%
Sysscan	3.9	1.7	1.0	6	10.6%	8.6%	11.6%	.8%
IBM	2.3	1.7	.3	117	6.3%	8.3%	3.9%	17.1%
Norsk Data	2.2	1.1	.7	0	6.1%	5.4%	7.8%	.0%
Autodesk	1.5	.0	1.5	0	3.9%	.0%	16.7%	.0%
Siemens	1.3	.8	.4	28	3.6%	3.8%	4.5%	4.1%
ESRI	1.0	.0	.9	0	2.6%	.0%	9.8%	.0%
Computervision	.5	.2	.1	4	1.3%	1.0%	1.3%	.6%
Compaq	.4	.4	.0	73	1.2%	2.2%	.0%	10.7%
Apple Computer	.4	.3	.0	74	1.1%	1.7%	.0%	10.9%
Control Data	.2	.1	.0	2	.4%	.5%	.2%	.2%
Hewlett-Packard	.1	.1	.0	9	.3%	.4%	.0%	1.4%
Ziegler	.0	.0	.0	1	.1%	.0%	.5%	.2%
Robocom	.0	.0	.0	0	.0%	.0%	.1%	.0%
Other Companies	3.9	2.5	.8	180.0	10.6%	12.5%	9.4%	26.4%
All Companies	36.8	20.0	8.7	682.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	29.3	16.4	6.6	639	79.6%	82.2%	75.5%	93.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	7.5	3.6	2.1	42.8	20.4%	17.8%	24.5%	6.3%
All Hardware Companies	8.3	7.0	.0	463.3	22.6%	34.9%	.0%	67.9%
All Turnkey & SW Companies	28.5	13.0	8.7	218.9	77.4%	65.1%	100.0%	32.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 63
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	10.6	7.9	.0	91	15.4%	21.1%	.0%	4.1%
Hewlett-Packard	10.3	7.4	.5	728	14.9%	19.8%	3.0%	32.6%
Mentor Graphics	9.6	2.8	4.7	126	13.8%	7.4%	26.0%	5.7%
Intergraph	4.4	2.1	.8	46	6.4%	5.6%	4.3%	2.1%
Sun	3.9	3.5	.0	262	5.6%	9.4%	.0%	11.7%
Computervision	3.2	1.4	.8	27	4.6%	3.8%	4.2%	1.2%
Dazix	2.2	.8	.9	22	3.2%	2.2%	4.9%	1.0%
IBM	2.2	1.5	.3	84	3.1%	4.0%	1.9%	3.8%
Compaq	1.7	1.7	.0	277	2.4%	4.4%	.0%	12.4%
Autodesk	1.5	.0	1.5	0	2.1%	.0%	8.1%	.0%
Racal-Redac	1.4	.0	1.1	5	2.0%	.0%	6.3%	.2%
CADAM	.9	.0	.8	0	1.3%	.0%	4.5%	.0%
Aucotec	.8	.3	.4	85	1.1%	.8%	2.1%	3.8%
Valid	.6	.2	.3	0	.9%	.4%	1.8%	.0%
BETRONEX	.6	.0	.6	0	.8%	.0%	3.2%	.0%
Apple Computer	.5	.5	.0	104	.8%	1.3%	.0%	4.7%
European Silicon Systems	.4	.1	.3	2	.6%	.3%	1.8%	.1%
Secmai	.4	.2	.1	3	.5%	.6%	.3%	.1%
Calay	.3	.1	.1	2	.4%	.2%	.7%	.1%
Ziegler	.2	.0	.2	6	.3%	.0%	.9%	.3%
Sycotronic AG	.2	.0	.1	0	.2%	.0%	.7%	.0%
ALS Design	.1	.0	.1	3	.2%	.0%	.6%	.1%
Academi Systems	.1	.0	.1	2	.2%	.1%	.5%	.1%
Dassault	.1	.0	.1	0	.1%	.0%	.4%	.0%
ABB Cade International	.1	.0	.0	0	.1%	.1%	.1%	.0%
Westward	.1	.1	.0	5	.1%	.2%	.0%	.2%
Schlumberger (Applicon)	.1	.0	.0	1	.1%	.0%	.1%	.0%
Olivetti	.1	.0	.0	11	.1%	.1%	.1%	.5%
Intercad	.0	.0	.0	1	.0%	.0%	.1%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 63 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

					--- Market Share ---			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	12.9	6.8	4.2	323.7	18.6%	18.1%	23.4%	14.5%
All Companies	69.1	37.4	18.1	2,232.7	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	64.4	36.5	14.9	2,092	93.2%	97.5%	82.2%	93.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	4.7	.9	3.2	140.6	6.8%	2.5%	17.8%	6.3%
All Hardware Companies	30.5	25.3	.0	1,769.2	44.1%	67.5%	.0%	79.2%
All Turnkey & SW Companies	38.6	12.1	18.1	463.5	55.9%	32.5%	100.0%	20.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 64
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	6.3	2.0	3.1	84	17.8%	9.8%	31.8%	6.6%
Hewlett-Packard	5.1	4.0	.3	360	14.3%	19.9%	2.8%	28.5%
Digital	4.3	3.2	.0	36	11.9%	16.1%	.0%	2.9%
Sun	3.9	3.5	.0	262	11.0%	17.6%	.0%	20.7%
Dazix	1.8	.7	.7	18	5.0%	3.6%	7.3%	1.4%
Intergraph	1.6	.9	.3	17	4.4%	4.4%	2.9%	1.3%
Autodesk	1.3	.0	1.3	0	3.7%	.0%	13.3%	.0%
Computervision	.9	.4	.2	8	2.6%	2.1%	2.2%	.6%
Aucotec	.8	.3	.4	85	2.1%	1.5%	3.9%	6.7%
Compaq	.7	.7	.0	124	2.1%	3.7%	.0%	9.8%
Valid	.4	.1	.2	0	1.2%	.6%	2.4%	.0%
Racal-Redac	.3	.0	.2	1	.7%	.1%	2.0%	.1%
Apple Computer	.2	.2	.0	45	.6%	1.0%	.0%	3.5%
IBM	.2	.2	.0	33	.4%	.8%	.0%	2.6%
Dassault	.1	.0	.1	0	.3%	.0%	.8%	.0%
Ziegler	.1	.0	.1	3	.3%	.0%	.8%	.2%
Westward	.1	.1	.0	5	.2%	.4%	.0%	.4%
Intercad	.0	.0	.0	1	.1%	.1%	.1%	.1%
Secmai	.0	.0	.0	0	.1%	.2%	.0%	.0%
Other Companies	7.6	3.7	2.9	182.6	21.3%	18.4%	29.8%	14.5%
All Companies	35.6	19.9	9.8	1,261.9	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	34.3	19.5	9.0	1,167	96.2%	97.8%	92.3%	92.5%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	1.3	.4	.8	94.8	3.8%	2.2%	7.7%	7.5%
All Hardware Companies	15.8	13.5	.0	999.1	44.5%	67.9%	.0%	79.2%
All Turnkey & SW Companies	19.8	6.4	9.8	262.8	55.5%	32.1%	100.0%	20.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 65
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	1.7	1.3	.0	15	34.3%	50.4%	.0%	12.8%
Hewlett-Packard	1.0	.8	.0	85	19.2%	31.1%	.0%	75.1%
Mentor Graphics	.5	.2	.2	6	9.9%	5.9%	17.0%	5.7%
European Silicon Systems	.4	.1	.3	2	8.9%	4.3%	23.4%	2.1%
Valid	.1	.0	.0	0	1.2%	.8%	2.1%	.0%
Other Companies	1.3	.2	.8	5.0	26.6%	7.5%	57.4%	4.4%
All Companies	5.0	2.5	1.4	113.7	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	4.5	2.4	1.1	111	91.1%	95.7%	76.6%	97.9%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	.4	.1	.3	2.4	8.9%	4.3%	23.4%	2.1%
All Hardware Companies	2.8	2.2	.0	103.3	57.1%	87.4%	.0%	90.9%
All Turnkey & SW Companies	2.1	.3	1.4	10.3	42.9%	12.6%	100.0%	9.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 66
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Digital	4.7	3.4	.0	40	16.4%	22.9%	.0%	4.7%
Hewlett-Packard	4.3	2.6	.3	283	14.9%	17.7%	3.9%	33.0%
Intergraph	2.8	1.2	.5	30	9.9%	8.1%	7.3%	3.5%
Mentor Graphics	2.7	.7	1.3	36	9.5%	4.5%	19.5%	4.2%
Computervision	2.3	1.0	.5	19	8.0%	6.8%	7.8%	2.2%
IBM	2.0	1.3	.3	52	7.0%	9.0%	4.9%	6.0%
Racal-Redac	1.1	.0	.9	4	4.0%	.0%	13.5%	.5%
Compaq	.9	.9	.0	153	3.2%	6.2%	.0%	17.9%
CADAM	.9	.0	.8	0	3.2%	.0%	11.8%	.0%
BETRONEX	.6	.0	.6	0	2.0%	.0%	8.4%	.0%
Dazix	.4	.1	.2	4	1.5%	.9%	2.6%	.5%
Secmei	.3	.2	.1	3	1.1%	1.4%	.9%	.3%
Apple Computer	.3	.3	.0	60	1.1%	1.8%	.0%	6.9%
Calay	.3	.1	.1	2	.9%	.5%	1.7%	.3%
Autodesk	.2	.0	.2	0	.6%	.0%	2.3%	.0%
Sycotronic AG	.2	.0	.1	0	.6%	.0%	1.9%	.0%
ALS Design	.1	.0	.1	3	.5%	.1%	1.6%	.3%
Academi Systems	.1	.0	.1	2	.5%	.1%	1.3%	.2%
Valid	.1	.0	.1	0	.4%	.2%	1.0%	.0%
Ziegler	.1	.0	.1	3	.3%	.0%	1.2%	.3%
ABB Cade International	.1	.0	.0	0	.3%	.3%	.3%	.0%
Schlumberger (Applicon)	.1	.0	.0	1	.2%	.1%	.3%	.1%
Olivetti	.1	.0	.0	11	.2%	.1%	.3%	1.3%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 66 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Scandinavia
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	4.0	2.9	.5	136.1	13.8%	19.5%	7.4%	15.9%
All Companies	28.6	15.0	6.9	857.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	25.7	14.6	4.7	814	89.8%	97.5%	68.9%	94.9%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	2.9	.4	2.1	43.4	10.2%	2.5%	31.1%	5.1%
All Hardware Companies	11.9	9.5	.0	666.8	41.4%	63.7%	.0%	77.8%
All Turnkey & SW Companies	16.7	5.4	6.9	190.3	58.6%	36.3%	100.0%	22.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 67
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Computervision	97.1	44.8	23.1	816	12.3%	10.0%	11.3%	3.3%
IBM	95.0	65.3	15.1	3,366	12.0%	14.6%	7.4%	13.7%
Intergraph	77.9	41.0	15.3	795	9.9%	9.2%	7.5%	3.2%
Digital	72.0	53.8	.0	522	9.1%	12.0%	.0%	2.1%
Compaq	44.1	44.1	.0	7,344	5.6%	9.8%	.0%	30.0%
Hewlett-Packard	42.3	31.4	3.0	2,700	5.4%	7.0%	1.5%	11.0%
McDonnell Douglas	34.2	18.3	12.4	719	4.3%	4.1%	6.1%	2.9%
Mentor Graphics	23.9	7.0	11.8	316	3.0%	1.6%	5.7%	1.3%
PAFEC	19.9	.0	19.9	0	2.5%	.0%	9.7%	.0%
Sun	19.9	17.9	.0	1,335	2.5%	4.0%	.0%	5.5%
Dazix	13.8	5.3	5.5	138	1.8%	1.2%	2.7%	.6%
Engineering Computer Services	13.5	5.4	4.6	247	1.7%	1.2%	2.2%	1.0%
Racal-Redac	13.1	.1	10.8	46	1.7%	.0%	5.2%	.2%
Ferranti	12.6	7.1	3.3	113	1.6%	1.6%	1.6%	.5%
ICL	12.0	7.5	3.2	329	1.5%	1.7%	1.6%	1.3%
Autodesk	11.3	.0	11.3	0	1.4%	.0%	5.5%	.0%
t2 Solutions	10.3	5.4	3.4	96	1.3%	1.2%	1.7%	.4%
Westward	9.4	9.4	.0	547	1.2%	2.1%	.0%	2.2%
Schlumberger (Applicon)	8.9	3.4	2.9	94	1.1%	.8%	1.4%	.4%
ISICAD	7.8	3.3	3.3	83	1.0%	.7%	1.6%	.3%
Valid	7.8	1.9	4.2	0	1.0%	.4%	2.0%	.0%
Apple Computer	7.7	6.8	.0	1,478	1.0%	1.5%	.0%	6.0%
SDRC	5.6	.0	5.6	0	.7%	.0%	2.7%	.0%
Radan Computational	5.4	3.2	1.6	220	.7%	.7%	.8%	.9%
Silicon Graphics	4.2	3.7	.0	125	.5%	.8%	.0%	.5%
Siemens	2.6	1.6	.8	58	.3%	.3%	.4%	.2%
Vero International Software	2.6	.0	2.6	0	.3%	.0%	1.3%	.0%
Norsk Data	2.5	1.2	.7	0	.3%	.3%	.4%	.0%
Robocom	2.5	.0	2.5	0	.3%	.0%	1.2%	.0%
Pathtrace	2.4	.7	1.6	57	.3%	.1%	.8%	.2%
Gable CAD Systems	2.4	1.5	1.0	20	.3%	.3%	.5%	.1%
Superdraft	2.3	.0	2.2	0	.3%	.0%	1.1%	.0%
European Silicon Systems	2.2	.6	1.7	12	.3%	.1%	.8%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 67
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Sysscan	2.1	.9	.6	0	.3%	.2%	.3%	.0%
Dassault	2.0	.0	1.7	0	.3%	.0%	.8%	.0%
Olivetti	2.0	.7	1.0	415	.2%	.2%	.5%	1.7%
Matra Datavision	1.9	1.1	.6	13	.2%	.2%	.3%	.1%
Unisys	1.7	.4	1.0	24	.2%	.1%	.5%	.1%
Wiechers Datentechnik	1.5	.8	.8	36	.2%	.2%	.4%	.1%
Calay	1.5	.5	.7	15	.2%	.1%	.4%	.1%
CADAM	.9	.0	.8	0	.1%	.0%	.4%	.0%
ESRI	.8	.0	.7	0	.1%	.0%	.4%	.0%
FEGS	.8	.0	.7	0	.1%	.0%	.3%	.0%
Exapt	.8	.5	.2	13	.1%	.1%	.1%	.1%
Control Data	.8	.5	.1	8	.1%	.1%	.0%	.0%
Gerber Systems	.5	.3	.1	7	.1%	.1%	.1%	.0%
Investronica SA	.5	.4	.1	19	.1%	.1%	.0%	.1%
LPKF	.5	.3	.1	45	.1%	.1%	.1%	.2%
BETRONEX	.4	.0	.4	0	.0%	.0%	.2%	.0%
Serbi	.2	.0	.2	0	.0%	.0%	.1%	.0%
DAT Standard Information syste	.2	.0	.2	0	.0%	.0%	.1%	.0%
Computational Mechanics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Intercad	.2	.1	.1	10	.0%	.0%	.0%	.0%
Marcus Computer Systems	.2	.1	.1	6	.0%	.0%	.0%	.0%
Secmai	.1	.1	.0	1	.0%	.0%	.0%	.0%
Academi Systems	.1	.0	.1	1	.0%	.0%	.0%	.0%
ALS Design	.1	.0	.1	1	.0%	.0%	.0%	.0%
Sycotronic AG	.1	.0	.0	0	.0%	.0%	.0%	.0%
Aucotec	.1	.0	.0	5	.0%	.0%	.0%	.0%
Framesoft	.1	.0	.0	0	.0%	.0%	.0%	.0%
Star Informatic	.1	.0	.0	2	.0%	.0%	.0%	.0%
Ziegler	.1	.0	.1	0	.0%	.0%	.0%	.0%
CAD-UL	.0	.0	.0	1	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 67 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	80.1	49.4	21.3	2,289.8	10.1%	11.1%	10.4%	9.4%
All Companies	789.1	447.3	205.0	24,488.7	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	673.9	403.9	144.3	22,407	85.4%	90.3%	70.4%	91.5%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	115.1	43.5	60.7	2,081.3	14.6%	9.7%	29.6%	8.5%
All Hardware Companies	235.0	204.2	.0	17,699.7	29.8%	45.6%	.0%	72.3%
All Turnkey & SW Companies	554.1	243.2	205.0	6,789.0	70.2%	54.4%	100.0%	27.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 68
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Computervision	82.0	37.8	19.5	497	19.7%	18.9%	14.8%	6.9%
Intergraph	61.8	34.0	11.1	661	14.8%	17.0%	8.4%	9.1%
Hewlett-Packard	35.8	26.1	3.0	1,799	8.6%	13.0%	2.3%	24.8%
Mentor Graphics	23.9	7.0	11.8	316	5.7%	3.5%	8.9%	4.4%
Sun	19.9	17.9	.0	1,335	4.8%	8.9%	.0%	18.4%
McDonnell Douglas	18.1	9.7	6.6	203	4.3%	4.8%	5.0%	2.8%
PAFEC	17.6	.0	17.6	0	4.2%	.0%	13.4%	.0%
Digital	15.8	11.7	.0	522	3.8%	5.9%	.0%	7.2%
Dazix	13.8	5.3	5.5	138	3.3%	2.6%	4.2%	1.9%
Racal-Redac	12.8	.1	10.5	44	3.1%	.0%	7.9%	.6%
ICL	12.0	7.5	3.2	329	2.9%	3.7%	2.4%	4.5%
t2 Solutions	10.3	5.4	3.4	96	2.5%	2.7%	2.6%	1.3%
Schlumberger (Applicon)	7.8	2.9	2.5	73	1.9%	1.5%	1.9%	1.0%
Valid	7.8	1.9	4.2	0	1.9%	1.0%	3.2%	.0%
IBM	7.5	4.9	1.4	68	1.8%	2.4%	1.0%	.9%
Engineering Computer Services	7.3	2.9	2.5	78	1.7%	1.5%	1.9%	1.1%
ISICAD	6.8	3.3	2.3	83	1.6%	1.6%	1.7%	1.2%
Westward	5.6	5.6	.0	301	1.3%	2.8%	.0%	4.1%
Radan Computational	5.4	3.2	1.6	220	1.3%	1.6%	1.2%	3.0%
SDRC	4.5	.0	4.5	0	1.1%	.0%	3.4%	.0%
Silicon Graphics	3.9	3.5	.0	117	.9%	1.7%	.0%	1.6%
Siemens	2.4	1.4	.7	55	.6%	.7%	.5%	.8%
Gable CAD Systems	2.2	1.3	.9	19	.5%	.7%	.7%	.3%
Matra Datavision	1.9	1.1	.6	0	.4%	.5%	.4%	.0%
European Silicon Systems	1.8	.4	1.3	8	.4%	.2%	1.0%	.1%
Calay	1.5	.5	.7	15	.4%	.2%	.6%	.2%
Unisys	1.3	.3	.8	15	.3%	.2%	.6%	.2%
Norsk Data	1.1	.5	.3	0	.3%	.3%	.2%	.0%
Sysscan	.5	.2	.1	0	.1%	.1%	.1%	.0%
Dassault	.5	.0	.4	0	.1%	.0%	.3%	.0%
Gerber Systems	.5	.3	.1	7	.1%	.1%	.1%	.1%
Wiechers Datentechnik	.5	.2	.2	11	.1%	.1%	.2%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 68 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Autodesk	.3	.0	.3	0	.1%	.0%	.3%	.0%
ESRI	.3	.0	.3	0	.1%	.0%	.2%	.0%
FEGS	.3	.0	.3	0	.1%	.0%	.2%	.0%
Ferranti	.3	.1	.1	6	.1%	.1%	.1%	.1%
Control Data	.3	.2	.0	5	.1%	.1%	.0%	.1%
Exapt	.2	.1	.1	5	.1%	.0%	.1%	.1%
Marcus Computer Systems	.2	.1	.0	5	.0%	.0%	.0%	.1%
Secmai	.1	.1	.0	1	.0%	.0%	.0%	.0%
Academi Systems	.1	.0	.1	1	.0%	.0%	.0%	.0%
Star Informatic	.1	.0	.0	2	.0%	.0%	.0%	.0%
Computational Mechanics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Framesoft	.0	.0	.0	0	.0%	.0%	.0%	.0%
Serbi	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	19.8	2.7	13.2	218.3	4.8%	1.3%	10.0%	3.0%
All Companies	416.6	200.2	131.9	7,252.6	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	339.3	172.2	89.6	6,136	81.5%	86.0%	67.9%	84.6%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	77.3	27.9	42.3	1,116.7	18.5%	14.0%	32.1%	15.4%
All Hardware Companies	58.8	48.9	.0	3,409.9	14.1%	24.4%	.0%	47.0%
All Turnkey & SW Companies	357.8	151.3	131.9	3,842.7	85.9%	75.6%	100.0%	53.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 69
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
IBM	75.0	48.5	13.7	787	29.1%	28.6%	33.5%	20.7%
Digital	56.1	42.1	.0	0	21.8%	24.8%	.0%	.0%
McDonnell Douglas	16.1	8.7	5.9	516	6.3%	5.1%	14.3%	13.6%
Computervision	14.1	6.5	3.4	293	5.5%	3.8%	8.2%	7.7%
Intergraph	14.0	7.0	2.2	134	5.4%	4.1%	5.5%	3.5%
Ferranti	12.2	7.0	3.2	108	4.8%	4.1%	7.9%	2.8%
PAFEC	2.2	.0	2.2	0	.9%	.0%	5.5%	.0%
Sysscan	1.6	.7	.4	0	.6%	.4%	1.0%	.0%
Hewlett-Packard	1.5	1.3	.0	77	.6%	.7%	.0%	2.0%
Dassault	1.5	.0	1.2	0	.6%	.0%	3.0%	.0%
Norsk Data	1.3	.7	.4	0	.5%	.4%	1.0%	.0%
SDRC	1.1	.0	1.1	0	.4%	.0%	2.7%	.0%
Schlumberger (Applicon)	1.1	.4	.4	21	.4%	.2%	.9%	.5%
Exapt	.5	.4	.1	8	.2%	.2%	.2%	.2%
FEGS	.5	.0	.4	0	.2%	.0%	1.0%	.0%
Control Data	.5	.4	.1	3	.2%	.2%	.1%	.1%
ESRI	.4	.0	.4	0	.2%	.0%	1.0%	.0%
Unisys	.4	.1	.2	9	.1%	.1%	.5%	.2%
Racal-Redac	.3	.0	.3	2	.1%	.0%	.7%	.1%
Siemens	.3	.2	.1	3	.1%	.1%	.2%	.1%
Silicon Graphics	.3	.2	.0	7	.1%	.1%	.0%	.2%
Gable CAD Systems	.2	.1	.1	2	.1%	.1%	.2%	.0%
Olivetti	.2	.1	.1	12	.1%	.0%	.2%	.3%
Computational Mechanics	.2	.0	.2	0	.1%	.0%	.4%	.0%
Framesoft	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 69 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	55.9	45.8	5.0	1,810.2	21.7%	26.9%	12.1%	47.6%
All Companies	257.5	170.0	40.9	3,804.7	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	236.5	160.9	32.2	3,658	91.8%	94.7%	78.9%	96.1%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	21.0	9.1	8.6	147.0	8.2%	5.3%	21.1%	3.9%
All Hardware Companies	106.1	87.7	.0	1,886.1	41.2%	51.6%	.0%	49.6%
All Turnkey & SW Companies	151.5	82.3	40.9	1,918.6	58.8%	48.4%	100.0%	50.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 70
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Compaq	44.1	44.1	.0	7,344	38.3%	57.1%	.0%	54.7%
IBM	12.5	11.8	.0	2,511	10.8%	15.3%	.0%	18.7%
Autodesk	11.0	.0	11.0	0	9.6%	.0%	34.1%	.0%
Apple Computer	7.7	6.8	.0	1,478	6.7%	8.8%	.0%	11.0%
Engineering Computer Services	6.2	2.5	2.1	169	5.4%	3.2%	6.6%	1.3%
Hewlett-Packard	5.0	4.1	.0	824	4.3%	5.3%	.0%	6.1%
Westward	3.8	3.8	.0	247	3.3%	4.9%	.0%	1.8%
Vero International Software	2.6	.0	2.6	0	2.2%	.0%	8.0%	.0%
Robocom	2.5	.0	2.5	0	2.2%	.0%	7.7%	.0%
Pathtrace	2.4	.7	1.6	57	2.1%	.9%	5.0%	.4%
Superdraft	2.3	.0	2.2	0	2.0%	.1%	6.7%	.0%
Intergraph	2.1	.0	2.0	0	1.8%	.0%	6.1%	.0%
Olivetti	1.8	.6	.9	403	1.6%	.8%	2.8%	3.0%
Wiechers Datentechnik	1.1	.5	.5	25	.9%	.7%	1.6%	.2%
ISICAD	1.0	.0	1.0	0	.9%	.0%	3.2%	.0%
Computervision	1.0	.4	.2	26	.8%	.6%	.7%	.2%
CADAM	.9	.0	.8	0	.8%	.0%	2.5%	.0%
Investronica SA	.5	.4	.1	19	.4%	.5%	.2%	.1%
LPKF	.5	.3	.1	45	.4%	.3%	.4%	.3%
European Silicon Systems	.4	.1	.3	4	.4%	.1%	1.0%	.0%
BETRONEX	.4	.0	.4	0	.3%	.0%	1.1%	.0%
Serbi	.2	.0	.2	0	.2%	.0%	.7%	.0%
DAT Standard Information syste	.2	.0	.2	0	.2%	.0%	.7%	.0%
Intercad	.2	.1	.1	10	.2%	.1%	.2%	.1%
ESRI	.1	.0	.1	0	.1%	.0%	.2%	.0%
Norsk Data	.1	.0	.0	0	.1%	.1%	.1%	.0%
ALS Design	.1	.0	.1	1	.1%	.0%	.2%	.0%
Sycotronic AG	.1	.0	.0	0	.1%	.0%	.1%	.0%
Aucotec	.1	.0	.0	5	.0%	.0%	.1%	.0%
Ziegler	.1	.0	.1	0	.0%	.0%	.2%	.0%
Marcus Computer Systems	.0	.0	.0	1	.0%	.0%	.1%	.0%
CAD-UL	.0	.0	.0	1	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 70 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Racal-Redac	.0	.0	.0	0	.0%	.0%	.1%	.0%
Academi Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	4.4	1.1	3.1	261.3	3.8%	1.4%	9.8%	1.9%
All Companies	115.0	77.2	32.2	13,431.4	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	98.1	70.7	22.5	12,614	85.3%	91.6%	69.8%	93.9%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	16.9	6.5	9.7	817.7	14.7%	8.4%	30.2%	6.1%
All Hardware Companies	70.1	67.7	.0	12,403.7	61.0%	87.6%	.0%	92.3%
All Turnkey & SW Companies	44.8	9.5	32.2	1,027.7	39.0%	12.4%	100.0%	7.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 71
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Computervision	85.4	39.5	20.3	718	19.0%	14.9%	18.8%	5.3%
IBM	77.8	52.5	13.0	2,115	17.3%	19.7%	12.0%	15.5%
Digital	38.8	29.1	.0	265	8.6%	11.0%	.0%	2.0%
Hewlett-Packard	25.0	18.4	2.2	1,445	5.5%	6.9%	2.0%	10.6%
Compaq	23.4	23.4	.0	3,892	5.2%	8.8%	.0%	28.6%
Intergraph	20.9	11.1	4.2	212	4.6%	4.2%	3.8%	1.6%
PAFEC	16.5	.0	16.5	0	3.7%	.0%	15.2%	.0%
Engineering Computer Services	13.5	5.4	4.6	247	3.0%	2.0%	4.3%	1.8%
Ferranti	12.6	7.1	3.3	113	2.8%	2.7%	3.1%	.8%
Sun	10.5	9.5	.0	708	2.3%	3.6%	.0%	5.2%
McDonnell Douglas	10.0	5.4	3.6	146	2.2%	2.0%	3.4%	1.1%
Schlumberger (Applicon)	8.6	3.3	2.8	90	1.9%	1.2%	2.5%	.7%
Westward	8.4	8.4	.0	492	1.9%	3.2%	.0%	3.6%
SDRC	5.6	.0	5.6	0	1.2%	.0%	5.2%	.0%
ICL	5.6	3.3	1.6	165	1.2%	1.2%	1.5%	1.2%
Autodesk	4.6	.0	4.6	0	1.0%	.0%	4.3%	.0%
Radan Computational	4.6	2.8	1.4	187	1.0%	1.0%	1.3%	1.4%
Silicon Graphics	4.2	3.7	.0	125	.9%	1.4%	.0%	.9%
Apple Computer	3.5	3.0	.0	665	.8%	1.1%	.0%	4.9%
ISICAD	3.1	1.4	1.2	35	.7%	.5%	1.1%	.3%
Vero International Software	2.6	.0	2.6	0	.6%	.0%	2.4%	.0%
Norsk Data	2.5	1.2	.7	0	.6%	.5%	.7%	.0%
Pathtrace	2.4	.7	1.6	57	.5%	.2%	1.5%	.4%
Superdraft	2.3	.0	2.2	0	.5%	.0%	2.0%	.0%
Matra Datavision	1.9	1.1	.6	13	.4%	.4%	.5%	.1%
Unisys	1.7	.4	1.0	24	.4%	.2%	1.0%	.2%
Dassault	1.6	.0	1.4	0	.4%	.0%	1.3%	.0%
Wiechers Datentechnik	1.5	.8	.8	36	.3%	.3%	.7%	.3%
Siemens	1.4	.8	.4	32	.3%	.3%	.4%	.2%
Olivetti	1.3	.4	.7	262	.3%	.1%	.6%	1.9%
Robocom	1.2	.0	1.2	0	.3%	.0%	1.1%	.0%
FEGS	.8	.0	.7	0	.2%	.0%	.6%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 71 (Continued)
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Exapt	.8	.5	.2	13	.2%	.2%	.2%	.1%
Control Data	.7	.5	.1	8	.2%	.2%	.1%	.1%
Gerber Systems	.5	.3	.1	7	.1%	.1%	.1%	.0%
Mentor Graphics	.5	.2	.2	6	.1%	.1%	.2%	.0%
Investronica SA	.5	.4	.1	19	.1%	.1%	.0%	.1%
DAT Standard Information syste	.2	.0	.2	0	.0%	.0%	.2%	.0%
Computational Mechanics	.2	.0	.2	0	.0%	.0%	.2%	.0%
Marcus Computer Systems	.2	.1	.1	6	.0%	.0%	.1%	.0%
Intercad	.1	.1	.0	7	.0%	.0%	.0%	.0%
Serbi	.1	.0	.1	0	.0%	.0%	.1%	.0%
Framesoft	.1	.0	.0	0	.0%	.0%	.0%	.0%
Ziegler	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	43.1	31.1	8.0	1,502.9	9.6%	11.7%	7.4%	11.0%
All Companies	450.6	265.7	107.9	13,613.4	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	383.7	238.1	73.7	12,212	85.1%	89.6%	68.3%	89.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	66.9	27.5	34.2	1,401.8	14.9%	10.4%	31.7%	10.3%
All Hardware Companies	132.2	115.4	.0	9,519.5	29.3%	43.4%	.0%	69.9%
All Turnkey & SW Companies	318.5	150.3	107.9	4,093.9	70.7%	56.6%	100.0%	30.1%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 72
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Intergraph	20.9	11.1	4.2	212	18.6%	16.4%	14.4%	4.4%
McDonnell Douglas	13.8	7.4	5.0	241	12.3%	10.9%	17.4%	5.0%
IBM	11.0	8.4	1.2	948	9.8%	12.5%	4.2%	19.7%
t2 Solutions	10.3	5.4	3.4	96	9.2%	8.0%	11.8%	2.0%
Compaq	10.1	10.1	.0	1,689	9.0%	15.0%	.0%	35.2%
Digital	7.9	5.9	.0	54	7.0%	8.8%	.0%	1.1%
Hewlett-Packard	5.4	4.1	.4	354	4.8%	6.0%	1.2%	7.4%
ISICAD	4.7	1.9	2.1	48	4.2%	2.8%	7.2%	1.0%
Autodesk	4.6	.0	4.6	0	4.1%	.0%	16.1%	.0%
Computervision	3.9	1.8	.9	33	3.5%	2.7%	3.2%	.7%
PAFEC	3.4	.0	3.4	0	3.1%	.0%	11.9%	.0%
Apple Computer	3.3	2.9	.0	636	2.9%	4.3%	.0%	13.2%
Gable CAD Systems	2.4	1.5	1.0	20	2.2%	2.2%	3.4%	.4%
Robocom	1.1	.0	1.1	0	1.0%	.0%	3.9%	.0%
Sun	1.0	.9	.0	67	.9%	1.3%	.0%	1.4%
Radan Computational	.8	.5	.2	33	.7%	.7%	.8%	.7%
Westward	.5	.5	.0	27	.4%	.7%	.0%	.6%
Olivetti	.3	.1	.1	69	.2%	.2%	.5%	1.4%
Dassault	.3	.0	.2	0	.2%	.0%	.7%	.0%
Siemens	.2	.1	.1	4	.2%	.2%	.2%	.1%
Schlumberger (Applicon)	.1	.0	.0	1	.1%	.0%	.1%	.0%
Serbi	.1	.0	.1	0	.1%	.0%	.2%	.0%
Star Informatic	.1	.0	.0	2	.0%	.0%	.0%	.0%
Control Data	.0	.0	.0	0	.0%	.0%	.0%	.0%
Sycotronic AG	.0	.0	.0	0	.0%	.0%	.0%	.0%
Ziegler	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 72 (Continued)
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	6.2	4.9	.8	266.9	5.5%	7.2%	2.7%	5.6%
All Companies	112.2	67.6	28.8	4,801.6	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	92.8	59.5	19.2	4,550	82.7%	88.0%	66.5%	94.8%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	19.4	8.1	9.6	251.9	17.3%	12.0%	33.5%	5.2%
All Hardware Companies	35.3	31.6	.0	3,894.3	31.4%	46.7%	.0%	81.1%
All Turnkey & SW Companies	77.0	36.1	28.8	907.4	68.6%	53.3%	100.0%	18.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 73
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Intergraph	27.9	14.8	5.6	284	40.2%	36.8%	35.8%	16.8%
McDonnell Douglas	10.4	5.6	3.8	333	15.0%	13.8%	24.4%	19.7%
Digital	7.2	5.4	.0	49	10.4%	13.4%	.0%	2.9%
ICL	5.6	3.7	1.4	143	8.1%	9.1%	9.0%	8.4%
IBM	3.2	2.3	.5	176	4.6%	5.7%	2.9%	10.4%
Compaq	2.2	2.2	.0	367	3.2%	5.5%	.0%	21.7%
Sysscan	2.1	.9	.6	0	3.0%	2.3%	3.5%	.0%
Siemens	1.1	.6	.3	23	1.5%	1.6%	2.1%	1.3%
Autodesk	1.0	.0	1.0	0	1.5%	.0%	6.6%	.0%
Computervision	1.0	.4	.2	8	1.4%	1.1%	1.3%	.5%
ESRI	.8	.0	.7	0	1.2%	.0%	4.8%	.0%
Apple Computer	.4	.3	.0	74	.5%	.8%	.0%	4.4%
Olivetti	.3	.1	.1	58	.4%	.3%	.6%	3.4%
Robocom	.2	.0	.2	0	.2%	.0%	1.1%	.0%
Hewlett-Packard	.1	.1	.0	13	.2%	.3%	.0%	.8%
Control Data	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	5.9	3.7	1.2	164.4	8.6%	9.2%	7.7%	9.7%
All Companies	69.4	40.3	15.5	1,692.1	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	60.2	35.0	13.0	1,469	86.7%	86.7%	83.6%	86.8%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	9.2	5.4	2.5	223.0	13.3%	13.3%	16.4%	13.2%
All Hardware Companies	14.7	12.5	.0	817.8	21.2%	30.9%	.0%	48.3%
All Turnkey & SW Companies	54.7	27.9	15.5	874.3	78.8%	69.1%	100.0%	51.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 74
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	23.4	6.8	11.5	310	14.9%	9.2%	21.8%	7.1%
Digital	18.0	13.4	.0	154	11.5%	18.1%	.0%	3.5%
Dazix	13.8	5.3	5.5	138	8.8%	7.1%	10.5%	3.1%
Racal-Redac	13.1	.1	10.8	46	8.4%	.1%	20.4%	1.1%
Hewlett-Packard	11.8	8.7	.5	888	7.5%	11.8%	.9%	20.3%
Compaq	8.4	8.4	.0	1,395	5.3%	11.4%	.0%	31.8%
Sun	8.4	7.5	.0	561	5.3%	10.2%	.0%	12.8%
Intergraph	8.3	3.9	1.5	87	5.3%	5.3%	2.8%	2.0%
Valid	7.8	1.9	4.2	0	5.0%	2.6%	8.0%	.0%
Computervision	6.8	3.0	1.6	57	4.3%	4.1%	3.1%	1.3%
IBM	3.0	2.1	.5	126	1.9%	2.8%	.9%	2.9%
European Silicon Systems	2.2	.6	1.7	12	1.4%	.7%	3.1%	.3%
Calay	1.5	.5	.7	15	.9%	.6%	1.4%	.3%
Autodesk	1.0	.0	1.0	0	.7%	.0%	1.9%	.0%
CADAM	.9	.0	.8	0	.6%	.0%	1.5%	.0%
ICL	.8	.5	.2	21	.5%	.7%	.4%	.5%
Apple Computer	.5	.5	.0	103	.3%	.6%	.0%	2.4%
Westward	.5	.5	.0	27	.3%	.6%	.0%	.6%
LPKF	.5	.3	.1	45	.3%	.4%	.2%	1.0%
BETRONEX	.4	.0	.4	0	.2%	.0%	.7%	.0%
Schlumberger (Applicon)	.3	.1	.1	3	.2%	.1%	.2%	.1%
Dassault	.1	.0	.1	0	.1%	.0%	.2%	.0%
Secmai	.1	.1	.0	1	.1%	.1%	.1%	.0%
Academi Systems	.1	.0	.1	1	.1%	.0%	.1%	.0%
Olivetti	.1	.0	.0	26	.1%	.1%	.1%	.6%
ALS Design	.1	.0	.1	1	.0%	.0%	.1%	.0%
Intercad	.1	.0	.0	3	.0%	.0%	.0%	.1%
Serbi	.1	.0	.1	0	.0%	.0%	.1%	.0%
Aucotec	.1	.0	.0	5	.0%	.0%	.0%	.1%
Sycotronic AG	.0	.0	.0	0	.0%	.0%	.1%	.0%
CAD-UL	.0	.0	.0	1	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 74 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Ziegler	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	24.9	9.7	11.3	355.6	15.9%	13.2%	21.4%	8.1%
All Companies	156.8	73.7	52.8	4,381.6	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	137.3	71.3	38.5	4,177	87.5%	96.6%	72.9%	95.3%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	19.6	2.5	14.3	204.7	12.5%	3.4%	27.1%	4.7%
All Hardware Companies	52.9	44.8	.0	3,468.2	33.7%	60.7%	.0%	79.2%
All Turnkey & SW Companies	104.0	28.9	52.8	913.4	66.3%	39.3%	100.0%	20.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 75
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Mentor Graphics	15.5	4.8	7.6	206	19.5%	11.9%	29.9%	8.8%
Dazix	11.1	4.4	4.4	110	13.9%	11.0%	17.3%	4.7%
Sun	8.4	7.5	.0	561	10.5%	18.7%	.0%	23.9%
Digital	7.2	5.4	.0	61	9.1%	13.4%	.0%	2.6%
Hewlett-Packard	6.2	4.9	.2	471	7.8%	12.2%	.9%	20.0%
Valid	5.5	1.4	2.9	0	6.9%	3.4%	11.5%	.0%
Compaq	3.8	3.8	.0	624	4.7%	9.3%	.0%	26.6%
Intergraph	3.0	1.6	.5	31	3.7%	4.1%	2.1%	1.3%
Racal-Redac	2.4	.1	2.0	9	3.0%	.1%	7.8%	.4%
Computervision	1.9	.9	.5	16	2.4%	2.2%	1.8%	.7%
Autodesk	.9	.0	.9	0	1.1%	.0%	3.6%	.0%
Westward	.5	.5	.0	27	.6%	1.2%	.0%	1.2%
IBM	.3	.2	.0	50	.3%	.6%	.0%	2.1%
Apple Computer	.2	.2	.0	44	.3%	.5%	.0%	1.9%
Dassault	.1	.0	.1	0	.1%	.0%	.4%	.0%
Intercad	.1	.0	.0	3	.1%	.1%	.1%	.1%
Serbi	.1	.0	.1	0	.1%	.0%	.2%	.0%
Aucotec	.1	.0	.0	5	.1%	.0%	.1%	.2%
Academi Systems	.0	.0	.0	0	.0%	.0%	.1%	.0%
Ziegler	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	12.5	4.5	6.2	129.8	15.7%	11.2%	24.2%	5.5%
All Companies	79.5	40.2	25.6	2,350.3	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	76.3	39.6	23.3	2,305	96.0%	98.6%	91.3%	98.1%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	3.2	.6	2.2	45.5	4.0%	1.4%	8.7%	1.9%
All Hardware Companies	27.4	23.7	.0	1,895.4	34.4%	58.9%	.0%	80.6%
All Turnkey & SW Companies	52.2	16.5	25.6	454.9	65.6%	41.1%	100.0%	19.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 76
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Digital	2.9	2.2	.0	25	20.7%	45.5%	.0%	13.9%
European Silicon Systems	2.2	.6	1.7	12	15.8%	11.6%	24.7%	6.8%
Hewlett-Packard	1.3	1.1	.0	116	9.2%	22.4%	.0%	65.7%
Mentor Graphics	1.2	.4	.6	16	8.6%	7.8%	8.8%	9.0%
Valid	.8	.2	.4	0	5.6%	4.0%	6.3%	.0%
Other Companies	5.6	.4	4.0	8.2	40.0%	8.7%	60.1%	4.6%
All Companies	13.9	4.7	6.7	176.4	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	11.7	4.2	5.0	164	84.2%	88.4%	75.3%	93.2%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	2.2	.6	1.7	12.0	15.8%	11.6%	24.7%	6.8%
All Hardware Companies	4.4	3.5	.0	144.1	32.0%	73.2%	.0%	81.7%
All Turnkey & SW Companies	9.4	1.3	6.7	32.3	68.0%	26.8%	100.0%	18.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 77
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Racal-Redac	10.7	.0	8.8	37	16.9%	.0%	42.7%	2.0%
Digital	7.9	5.8	.0	68	12.5%	20.2%	.0%	3.6%
Mentor Graphics	6.7	1.6	3.3	89	10.6%	5.7%	16.0%	4.8%
Intergraph	5.3	2.3	.9	56	8.3%	7.9%	4.5%	3.0%
Computervision	4.9	2.1	1.2	41	7.6%	7.4%	5.6%	2.2%
Compaq	4.6	4.6	.0	771	7.3%	16.1%	.0%	41.6%
Hewlett-Packard	4.3	2.8	.2	301	6.8%	9.6%	1.2%	16.2%
Dazix	2.8	.8	1.1	28	4.4%	2.9%	5.4%	1.5%
IBM	2.7	1.8	.5	76	4.3%	6.4%	2.2%	4.1%
Valid	1.6	.4	.8	0	2.5%	1.4%	4.1%	.0%
Calay	1.5	.5	.7	15	2.3%	1.6%	3.6%	.8%
CADAM	.9	.0	.8	0	1.4%	.0%	3.8%	.0%
ICL	.8	.5	.2	21	1.2%	1.7%	1.0%	1.2%
LPKF	.5	.3	.1	45	.7%	.9%	.6%	2.4%
BETRONEX	.4	.0	.4	0	.6%	.0%	1.8%	.0%
Apple Computer	.3	.3	.0	59	.5%	.9%	.0%	3.2%
Schlumberger (Applicon)	.3	.1	.1	3	.4%	.2%	.4%	.2%
Autodesk	.1	.0	.1	0	.2%	.0%	.5%	.0%
Secmai	.1	.1	.0	1	.2%	.2%	.1%	.0%
Olivetti	.1	.0	.0	26	.1%	.1%	.2%	1.4%
Academi Systems	.1	.0	.0	1	.1%	.0%	.1%	.0%
ALS Design	.1	.0	.1	1	.1%	.0%	.2%	.1%
Sycotronic AG	.0	.0	.0	0	.1%	.0%	.1%	.0%
CAD-UL	.0	.0	.0	1	.0%	.0%	.1%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.1%	.0%
Ziegler	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 77 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: United Kingdom
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	6.9	4.8	1.1	217.7	10.9%	16.6%	5.4%	11.7%
All Companies	63.4	28.8	20.5	1,854.9	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	49.3	27.5	10.1	1,708	77.7%	95.3%	49.2%	92.1%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	14.2	1.4	10.4	147.2	22.3%	4.7%	50.8%	7.9%
All Hardware Companies	21.0	17.7	.0	1,428.7	33.2%	61.3%	.0%	77.0%
All Turnkey & SW Companies	42.4	11.1	20.5	426.2	66.8%	38.7%	100.0%	23.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 78
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Hewlett-Packard	24.3	16.8	2.7	1,199	12.7%	16.6%	4.5%	20.5%
Investronica SA	17.4	13.9	1.7	696	9.1%	13.8%	3.0%	11.9%
Computervision	16.9	7.8	4.0	142	8.9%	7.7%	6.9%	2.4%
Intergraph	13.3	7.0	2.6	135	6.9%	6.9%	4.4%	2.3%
IBM	11.8	8.1	1.9	402	6.2%	8.0%	3.2%	6.9%
Mentor Graphics	9.1	2.6	4.5	120	4.8%	2.6%	7.6%	2.1%
Control Data	8.0	5.7	1.0	85	4.2%	5.6%	1.6%	1.5%
Siemens	6.7	3.9	2.0	147	3.5%	3.9%	3.4%	2.5%
Digital	6.5	4.9	.0	47	3.4%	4.8%	.0%	.8%
Compaq	5.4	5.4	.0	904	2.8%	5.4%	.0%	15.5%
STI-Straessle	4.1	1.8	2.0	18	2.1%	1.8%	3.4%	.3%
Autodesk	3.7	.0	3.7	0	1.9%	.0%	6.3%	.0%
Dazix	3.5	1.3	1.4	35	1.9%	1.3%	2.4%	.6%
Cimatron	3.4	1.6	1.5	88	1.8%	1.6%	2.6%	1.5%
Assigraph	2.9	.0	2.3	35	1.5%	.0%	3.9%	.6%
Star Informatic	2.8	1.2	.8	116	1.4%	1.2%	1.4%	2.0%
Fides Industrielle Automation	2.5	.5	1.8	24	1.3%	.5%	3.0%	.4%
Apple Computer	2.3	2.0	.0	441	1.2%	2.0%	.0%	7.5%
BETRONEX	1.5	.0	1.5	0	.8%	.0%	2.5%	.0%
LPKF	1.4	.9	.4	143	.7%	.8%	.7%	2.4%
Racal-Redac	1.4	.0	1.1	5	.7%	.0%	1.9%	.1%
Vero International Software	1.4	.0	1.4	0	.7%	.0%	2.3%	.0%
Schlumberger (Applicon)	1.3	.5	.4	14	.7%	.5%	.7%	.2%
Ziegler	1.2	.1	1.1	40	.6%	.0%	1.8%	.7%
Dassault	1.2	.0	1.0	0	.6%	.0%	1.7%	.0%
Matra Datavision	.8	.5	.2	5	.4%	.5%	.4%	.1%
ACERI SA	.8	.3	.3	14	.4%	.3%	.6%	.2%
Unisys	.8	.2	.5	13	.4%	.2%	.8%	.2%
Pathtrace	.8	.2	.5	18	.4%	.2%	.9%	.3%
Sysscan	.8	.3	.2	0	.4%	.3%	.3%	.0%
ESRI	.7	.0	.7	0	.4%	.0%	1.1%	.0%
Olivetti	.7	.3	.3	115	.4%	.2%	.5%	2.0%
PAFEC	.7	.0	.7	0	.4%	.0%	1.2%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 78
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Wiechers Datentechnik	.7	.3	.3	16	.4%	.3%	.6%	.3%
Sun	.7	.6	.0	45	.3%	.6%	.0%	.8%
Secmai	.6	.4	.2	4	.3%	.4%	.3%	.1%
Academi Systems	.6	.1	.4	7	.3%	.1%	.8%	.1%
Cisigraph	.6	.2	.2	7	.3%	.2%	.4%	.1%
CAD Lab	.5	.0	.4	0	.2%	.0%	.6%	.0%
Ferranti	.5	.3	.1	4	.2%	.3%	.2%	.1%
McDonnell Douglas	.4	.2	.1	6	.2%	.2%	.2%	.1%
European Silicon Systems	.4	.1	.3	2	.2%	.1%	.4%	.0%
BATISOFT	.4	.1	.3	20	.2%	.0%	.4%	.3%
CADAM	.4	.0	.3	0	.2%	.0%	.5%	.0%
Silicon Graphics	.3	.3	.0	10	.2%	.3%	.0%	.2%
Computational Mechanics	.3	.0	.3	0	.2%	.0%	.5%	.0%
Gerber Systems	.3	.2	.1	4	.2%	.2%	.1%	.1%
ALS Design	.3	.0	.2	5	.2%	.0%	.4%	.1%
Datagraphic	.3	.1	.1	4	.1%	.1%	.2%	.1%
Datagraph	.2	.2	.1	1	.1%	.2%	.1%	.0%
Robocom	.2	.0	.2	0	.1%	.0%	.4%	.0%
Technische Computer Systeme	.2	.1	.2	6	.1%	.1%	.3%	.1%
FEGS	.2	.0	.2	0	.1%	.0%	.3%	.0%
Vision 3D	.2	.1	.1	0	.1%	.1%	.1%	.0%
Gable CAD Systems	.2	.1	.1	2	.1%	.1%	.1%	.0%
Sycotronic AG	.2	.0	.1	0	.1%	.0%	.2%	.0%
SDRC	.1	.0	.1	0	.1%	.0%	.2%	.0%
DAT Standard Information syste	.1	.0	.1	0	.1%	.0%	.2%	.0%
ISYKON Software	.1	.1	.0	1	.1%	.1%	.1%	.0%
Serbi	.1	.0	.1	0	.1%	.0%	.2%	.0%
t2 Solutions	.1	.1	.0	1	.1%	.0%	.1%	.0%
Intercad	.1	.0	.0	5	.1%	.0%	.1%	.1%
CAD-UL	.0	.0	.0	1	.0%	.0%	.0%	.0%
DECAD	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 78 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: All Platforms
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Framesoft	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	21.9	9.8	9.7	680.0	11.4%	9.7%	16.5%	11.6%
All Companies	191.2	101.1	58.6	5,839.0	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	125.4	68.9	32.2	4,149	65.6%	68.1%	54.9%	71.1%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	65.8	32.2	26.5	1,689.8	34.4%	31.9%	45.1%	28.9%
All Hardware Companies	30.8	26.6	.0	3,059.3	16.1%	26.3%	.0%	52.4%
All Turnkey & SW Companies	160.4	74.6	58.6	2,779.7	83.9%	73.7%	100.0%	47.6%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 79
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
Hewlett-Packard	20.0	13.2	2.7	475	20.8%	29.3%	8.6%	31.8%
Computervision	14.3	6.6	3.4	87	15.0%	14.6%	11.1%	5.8%
Intergraph	10.5	5.8	1.9	113	11.0%	12.8%	6.1%	7.5%
Mentor Graphics	9.1	2.6	4.5	120	9.5%	5.8%	14.6%	8.1%
Siemens	6.0	3.5	1.8	140	6.3%	7.8%	5.9%	9.4%
Dazix	3.5	1.3	1.4	35	3.7%	3.0%	4.6%	2.4%
STI-Streessle	3.2	1.4	1.6	14	3.3%	3.2%	5.1%	.9%
Cimatron	3.1	1.4	1.4	79	3.2%	3.2%	4.4%	5.3%
Star Informatic	2.8	1.2	.8	116	2.9%	2.7%	2.7%	7.8%
Control Data	2.7	1.9	.3	50	2.8%	4.3%	1.1%	3.3%
Assigraph	1.9	.0	1.5	0	2.0%	.0%	4.8%	.0%
Digital	1.4	1.1	.0	47	1.5%	2.3%	.0%	3.1%
Racal-Redac	1.4	.0	1.1	5	1.4%	.0%	3.6%	.3%
Schlumberger (Applicon)	1.2	.4	.4	11	1.2%	1.0%	1.2%	.7%
IBM	1.0	.6	.2	8	1.0%	1.3%	.5%	.6%
Matra Datavision	.8	.5	.2	0	.9%	1.1%	.8%	.0%
Unisys	.7	.2	.4	11	.7%	.4%	1.3%	.7%
Sun	.7	.6	.0	45	.7%	1.3%	.0%	3.0%
PAFEC	.7	.0	.7	0	.7%	.0%	2.1%	.0%
Secmai	.6	.4	.2	4	.7%	.8%	.5%	.3%
Cisigraph	.5	.2	.2	6	.6%	.5%	.6%	.4%
Academi Systems	.5	.1	.4	6	.5%	.2%	1.2%	.4%
Fides Industrielle Automation	.5	.1	.4	12	.5%	.2%	1.2%	.8%
CAD Lab	.4	.0	.4	0	.5%	.0%	1.1%	.0%
Dassault	.4	.0	.3	0	.4%	.0%	1.1%	.0%
Silicon Graphics	.3	.3	.0	10	.3%	.6%	.0%	.6%
McDonnell Douglas	.3	.2	.1	4	.3%	.4%	.4%	.2%
Gerber Systems	.3	.2	.1	4	.3%	.4%	.2%	.3%
ESRI	.3	.0	.3	0	.3%	.0%	.8%	.0%
European Silicon Systems	.3	.1	.2	1	.3%	.2%	.7%	.1%
Technische Computer Systeme	.2	.1	.2	6	.3%	.2%	.6%	.4%
Gable CAD Systems	.2	.1	.1	2	.2%	.3%	.3%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 79 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Technical Workstation
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Wiechers Datentechnik	.2	.1	.1	5	.2%	.2%	.3%	.3%
Sysscan	.2	.1	.1	0	.2%	.2%	.2%	.0%
Autodesk	.1	.0	.1	0	.1%	.0%	.4%	.0%
ISYKON Software	.1	.1	.0	1	.1%	.1%	.1%	.1%
SDRC	.1	.0	.1	0	.1%	.0%	.4%	.0%
t2 Solutions	.1	.1	.0	1	.1%	.1%	.1%	.1%
FEGS	.1	.0	.1	0	.1%	.0%	.3%	.0%
Computational Mechanics	.1	.0	.1	0	.1%	.0%	.2%	.0%
DECAD	.0	.0	.0	0	.0%	.0%	.1%	.0%
Framesoft	.0	.0	.0	0	.0%	.0%	.1%	.0%
Other Companies	5.0	.7	3.3	69.0	5.2%	1.6%	10.8%	4.6%
All Companies	95.8	45.2	30.8	1,493.0	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	71.4	35.7	19.1	1,088	74.6%	79.0%	62.0%	72.8%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	24.4	9.5	11.7	405.4	25.4%	21.0%	38.0%	27.2%
All Hardware Companies	7.6	6.0	.0	245.4	7.9%	13.2%	.0%	16.4%
All Turnkey & SW Companies	88.2	39.3	30.8	1,247.6	92.1%	86.8%	100.0%	83.6%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 80
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
IBM	9.4	6.1	1.7	98	23.6%	28.8%	15.0%	23.5%
Control Data	5.3	3.7	.6	35	13.2%	17.7%	5.5%	8.4%
Digital	5.0	3.8	.0	0	12.7%	18.1%	.0%	.0%
Computervision	2.5	1.1	.6	51	6.2%	5.4%	5.0%	12.2%
Intergraph	2.4	1.2	.4	23	6.0%	5.5%	3.3%	5.4%
Fides Industrielle Automation	2.0	.4	1.4	12	5.1%	1.9%	12.5%	2.8%
Assigraph	1.0	.0	.8	35	2.6%	.0%	7.2%	8.4%
STI-Straessle	.9	.4	.5	4	2.2%	1.9%	4.0%	1.0%
Dassault	.8	.0	.7	0	1.9%	.0%	5.7%	.0%
Siemens	.6	.4	.2	7	1.6%	1.8%	1.7%	1.8%
Sysscan	.6	.3	.2	0	1.4%	1.2%	1.3%	.0%
Ferranti	.5	.3	.1	4	1.2%	1.3%	1.1%	1.0%
ESRI	.4	.0	.4	0	1.0%	.0%	3.1%	.0%
Computational Mechanics	.3	.0	.3	0	.6%	.0%	2.2%	.0%
Schlumberger (Applicon)	.2	.1	.1	3	.4%	.3%	.4%	.7%
FEGS	.1	.0	.1	0	.4%	.0%	1.0%	.0%
Unisys	.1	.0	.1	3	.3%	.1%	.6%	.6%
Olivetti	.1	.1	.0	7	.3%	.2%	.4%	1.7%
McDonnell Douglas	.1	.0	.0	3	.2%	.2%	.3%	.7%
Cisigraph	.1	.0	.0	0	.2%	.1%	.2%	.0%
PAFEC	.1	.0	.1	0	.2%	.0%	.5%	.0%
Racal-Redac	.0	.0	.0	0	.1%	.0%	.3%	.1%
SDRC	.0	.0	.0	0	.1%	.0%	.3%	.0%
Gable CAD Systems	.0	.0	.0	0	.1%	.0%	.0%	.0%
Silicon Graphics	.0	.0	.0	1	.1%	.1%	.0%	.1%
Framesoft	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 80 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Host/Server
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	7.4	3.3	3.3	127.5	18.5%	15.5%	28.6%	30.5%
All Companies	39.7	21.1	11.4	418.8	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	32.7	19.3	7.1	344	82.3%	91.6%	62.2%	82.2%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	7.0	1.8	4.3	74.7	17.7%	8.4%	37.8%	17.8%
All Hardware Companies	8.4	6.9	.0	117.2	21.1%	32.5%	.0%	28.0%
All Turnkey & SW Companies	31.3	14.2	11.4	301.6	78.9%	67.5%	100.0%	72.0%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 81
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Investronica SA	17.4	13.9	1.7	696	31.2%	40.0%	10.6%	17.7%
Compaq	5.4	5.4	.0	904	9.7%	15.6%	.0%	23.0%
Hewlett-Packard	4.3	3.6	.0	724	7.8%	10.2%	.0%	18.4%
Autodesk	3.6	.0	3.6	0	6.4%	.0%	21.7%	.0%
Apple Computer	2.3	2.0	.0	441	4.1%	5.8%	.0%	11.2%
BETRONEX	1.5	.0	1.5	0	2.6%	.0%	8.9%	.0%
IBM	1.5	1.4	.0	295	2.6%	4.0%	.0%	7.5%
LPKF	1.4	.9	.4	143	2.6%	2.4%	2.6%	3.6%
Vero International Software	1.4	.0	1.4	0	2.4%	.0%	8.2%	.0%
Ziegler	1.2	.1	1.1	40	2.1%	.1%	6.5%	1.0%
ACERI SA	.8	.3	.3	14	1.4%	.8%	2.0%	.4%
Pathtrace	.8	.2	.5	18	1.4%	.6%	3.2%	.5%
Olivetti	.6	.2	.3	108	1.1%	.6%	1.6%	2.7%
Wiechers Datentechnik	.5	.2	.2	11	.9%	.7%	1.4%	.3%
Intergraph	.4	.0	.3	0	.6%	.0%	2.0%	.0%
BATISOFT	.4	.1	.3	20	.6%	.1%	1.6%	.5%
CADAM	.4	.0	.3	0	.6%	.0%	1.9%	.0%
Cimatron	.3	.2	.2	9	.6%	.5%	.9%	.2%
ALS Design	.3	.0	.2	5	.5%	.1%	1.4%	.1%
Datagraphic	.3	.1	.1	4	.4%	.3%	.5%	.1%
Datagraph	.2	.2	.1	1	.4%	.5%	.3%	.0%
Robocom	.2	.0	.2	0	.4%	.0%	1.5%	.0%
Vision 3D	.2	.1	.1	0	.4%	.3%	.4%	.0%
Computervision	.2	.1	.0	5	.3%	.2%	.2%	.1%
Sycotronic AG	.2	.0	.1	0	.3%	.0%	.8%	.0%
DAT Standard Information syste	.1	.0	.1	0	.2%	.0%	.8%	.0%
Serbi	.1	.0	.1	0	.2%	.0%	.7%	.0%
Intercad	.1	.0	.0	5	.2%	.1%	.2%	.1%
Academi Systems	.1	.0	.1	1	.2%	.1%	.4%	.0%
European Silicon Systems	.1	.0	.1	1	.1%	.1%	.3%	.0%
ESRI	.1	.0	.1	0	.1%	.0%	.4%	.0%
CAD-UL	.0	.0	.0	1	.1%	.0%	.1%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 81 (Continued)
TITLE: 1989 Market Share
APPLICATION: All Applications
PLATFORM: Personal Computer
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

	Total	Hardware	Software	Wkstns	Market Share			
	Total	Hardware	Software	Wkstns	Total	Hardware	Software	Wkstns
Company	Revenue	Revenue	Revenue	Shipped	Revenue	Revenue	Revenue	Shipped
CAD Lab	.0	.0	.0	0	.0%	.0%	.1%	.0%
Other Companies	9.5	5.9	3.1	483.4	17.1%	16.8%	18.7%	12.3%
All Companies	55.7	34.8	16.5	3,927.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	21.3	13.9	6.0	2,717	38.3%	39.8%	36.4%	69.2%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	34.4	21.0	10.5	1,209.7	61.7%	60.2%	63.6%	30.8%
All Hardware Companies	14.8	13.7	.0	2,696.7	26.6%	39.4%	.0%	68.7%
All Turnkey & SW Companies	40.9	21.1	16.5	1,230.5	73.4%	60.6%	100.0%	31.3%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 82
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Investronica SA	17.4	13.9	1.7	696	15.5%	20.9%	6.2%	19.9%
Hewlett-Packard	16.9	12.0	1.9	812	15.1%	17.9%	6.9%	23.2%
Computervision	14.9	6.9	3.6	125	13.3%	10.3%	12.7%	3.6%
IBM	9.7	6.5	1.6	254	8.6%	9.8%	5.8%	7.3%
Control Data	7.6	5.4	.9	81	6.7%	8.1%	3.3%	2.3%
Intergraph	3.6	1.9	.7	36	3.2%	2.8%	2.5%	1.0%
Digital	3.5	2.6	.0	24	3.1%	3.9%	.0%	.7%
Siemens	3.5	2.0	1.0	80	3.1%	3.1%	3.7%	2.3%
Cimatron	3.4	1.6	1.5	88	3.1%	2.4%	5.4%	2.5%
STI-Straessle	3.2	1.5	1.6	14	2.9%	2.2%	5.8%	.4%
Compaq	2.9	2.9	.0	479	2.6%	4.3%	.0%	13.7%
Fides Industrielle Automation	2.5	.5	1.8	24	2.3%	.7%	6.4%	.7%
Autodesk	1.5	.0	1.5	0	1.3%	.0%	5.4%	.0%
Vero International Software	1.4	.0	1.4	0	1.2%	.0%	4.8%	.0%
Schlumberger (Applicon)	1.3	.5	.4	13	1.1%	.7%	1.5%	.4%
Apple Computer	1.0	.9	.0	198	.9%	1.4%	.0%	5.7%
Dassault	.9	.0	.8	0	.8%	.0%	2.8%	.0%
Matra Datavision	.8	.5	.2	5	.7%	.7%	.9%	.1%
ACERI SA	.8	.3	.3	14	.7%	.4%	1.2%	.4%
Unisys	.8	.2	.5	13	.7%	.3%	1.7%	.4%
Pathtrace	.8	.2	.5	18	.7%	.3%	1.9%	.5%
Wiechers Datentechnik	.7	.3	.3	16	.6%	.5%	1.2%	.5%
Cisigraph	.6	.2	.2	7	.5%	.4%	.8%	.2%
PAFEC	.6	.0	.6	0	.5%	.0%	2.0%	.0%
Olivetti	.5	.2	.2	75	.5%	.2%	.8%	2.1%
Ferranti	.5	.3	.1	4	.4%	.4%	.4%	.1%
Ziegler	.5	.0	.4	15	.4%	.0%	1.5%	.4%
CAD Lab	.4	.0	.3	0	.3%	.0%	1.1%	.0%
Sun	.4	.3	.0	24	.3%	.5%	.0%	.7%
Silicon Graphics	.3	.3	.0	10	.3%	.5%	.0%	.3%
Computational Mechanics	.3	.0	.3	0	.3%	.0%	1.1%	.0%
Gerber Systems	.3	.2	.1	4	.3%	.3%	.3%	.1%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 82 (Continued)
TITLE: 1989 Market Share
APPLICATION: Mechanical
PLATFORM: All Platforms
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Datagraph	.2	.2	.1	1	.2%	.3%	.2%	.0%
Technische Computer Systeme	.2	.1	.2	6	.2%	.1%	.6%	.2%
FEGS	.2	.0	.2	0	.2%	.0%	.7%	.0%
McDonnell Douglas	.2	.1	.1	3	.2%	.2%	.3%	.1%
Vision 3D	.2	.1	.1	0	.2%	.2%	.3%	.0%
Mentor Graphics	.2	.1	.1	2	.2%	.1%	.3%	.1%
SDRC	.1	.0	.1	0	.1%	.0%	.5%	.0%
DAT Standard Information syste	.1	.0	.1	0	.1%	.0%	.4%	.0%
ISYKON Software	.1	.1	.0	1	.1%	.1%	.1%	.0%
Robocom	.1	.0	.1	0	.1%	.0%	.4%	.0%
Intercad	.1	.0	.0	3	.1%	.0%	.1%	.1%
Serbi	.1	.0	.1	0	.1%	.0%	.2%	.0%
Framesoft	.0	.0	.0	0	.0%	.0%	.1%	.0%
Other Companies	6.9	4.0	2.2	343.5	6.2%	6.1%	7.9%	9.8%
All Companies	112.3	66.7	27.9	3,496.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	71.1	44.0	13.5	2,401	63.4%	65.9%	48.4%	68.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	41.1	22.7	14.4	1,095.1	36.6%	34.1%	51.6%	31.3%
All Hardware Companies	18.2	15.8	.0	1,717.1	16.2%	23.7%	.0%	49.1%
All Turnkey & SW Companies	94.1	50.9	27.9	1,779.1	83.8%	76.3%	100.0%	50.9%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 83
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Intergraph	3.6	1.9	.7	36	14.4%	12.8%	10.9%	3.3%
Hewlett-Packard	3.2	2.3	.3	170	13.0%	15.6%	5.0%	15.4%
Star Informatic	2.8	1.2	.8	116	11.1%	8.4%	13.0%	10.5%
Autodesk	1.5	.0	1.5	0	6.1%	.0%	23.6%	.0%
IBM	1.3	1.0	.2	112	5.4%	6.9%	2.3%	10.1%
Compaq	1.3	1.3	.0	208	5.1%	8.5%	.0%	18.8%
Apple Computer	1.0	.9	.0	189	4.0%	5.9%	.0%	17.1%
Digital	.7	.5	.0	5	2.9%	3.6%	.0%	.4%
Computervision	.7	.3	.2	6	2.8%	2.1%	2.3%	.5%
Siemens	.5	.3	.2	10	2.1%	2.0%	2.3%	.9%
BATISOFT	.4	.1	.3	20	1.4%	.3%	4.1%	1.8%
Datagraphic	.3	.1	.1	4	1.0%	.8%	1.4%	.4%
Gable CAD Systems	.2	.1	.1	2	.9%	.9%	1.3%	.2%
Dassault	.2	.0	.2	0	.7%	.0%	2.7%	.0%
McDonnell Douglas	.2	.1	.1	3	.7%	.7%	.9%	.3%
Control Data	.2	.1	.0	2	.6%	.7%	.3%	.2%
Olivetti	.2	.1	.1	26	.6%	.5%	1.1%	2.4%
PAFEC	.2	.0	.2	0	.6%	.0%	2.5%	.0%
Ziegler	.1	.0	.1	5	.6%	.1%	2.0%	.4%
Robocom	.1	.0	.1	0	.4%	.0%	1.7%	.0%
t2 Solutions	.1	.1	.0	1	.4%	.3%	.5%	.1%
CAD Lab	.1	.0	.1	0	.4%	.0%	1.1%	.0%
Sycotronic AG	.1	.0	.0	0	.2%	.0%	.6%	.0%
Serbi	.0	.0	.0	0	.1%	.0%	.5%	.0%
Sun	.0	.0	.0	2	.1%	.2%	.0%	.2%
Schlumberger (Applicon)	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 83 (Continued)
TITLE: 1989 Market Share
APPLICATION: AEC
PLATFORM: All Platforms
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	6.0	4.3	1.3	188.3	24.2%	29.5%	19.8%	17.0%
All Companies	24.7	14.7	6.4	1,106.0	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	14.6	9.0	3.2	809	58.9%	61.3%	49.2%	73.1%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	10.1	5.7	3.3	297.4	41.1%	38.7%	50.8%	26.9%
All Hardware Companies	5.5	4.9	.0	711.0	22.4%	33.5%	.0%	64.3%
All Turnkey & SW Companies	19.2	9.8	6.4	395.0	77.6%	66.5%	100.0%	35.7%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 84
TITLE: 1989 Market Share
APPLICATION: GIS/Mapping
PLATFORM: All Platforms
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Intergraph	4.7	2.5	.9	48	36.2%	39.1%	22.4%	19.7%
Siemens	2.7	1.6	.8	57	20.5%	24.2%	19.1%	23.3%
STI-Straessle	.8	.4	.4	4	6.2%	5.5%	9.8%	1.5%
Sysscan	.8	.3	.2	0	5.7%	5.1%	4.8%	.0%
ESRI	.7	.0	.7	0	5.7%	.0%	15.8%	.0%
Digital	.6	.5	.0	4	4.9%	7.4%	.0%	1.8%
IBM	.4	.3	.1	21	3.1%	4.3%	1.2%	8.5%
Autodesk	.3	.0	.3	0	2.5%	.0%	7.9%	.0%
Compaq	.3	.3	.0	45	2.1%	4.2%	.0%	18.4%
Control Data	.2	.2	.0	3	1.8%	2.8%	.7%	1.0%
Computervision	.2	.1	.0	1	1.2%	1.1%	1.0%	.6%
Apple Computer	.1	.1	.0	22	.8%	1.5%	.0%	9.0%
Ziegler	.1	.0	.1	4	.8%	.0%	2.4%	1.5%
Olivetti	.1	.0	.0	14	.5%	.5%	.2%	5.8%
Robocom	.0	.0	.0	0	.2%	.0%	.5%	.0%
Other Companies	1.0	.3	.6	21.7	7.9%	4.3%	14.3%	8.9%
All Companies	13.1	6.5	4.2	245.3	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	8.7	4.2	2.7	167	66.2%	64.7%	63.2%	67.9%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	4.4	2.3	1.5	78.6	33.8%	35.3%	36.8%	32.1%
All Hardware Companies	1.4	1.2	.0	110.9	10.7%	18.5%	.0%	45.2%
All Turnkey & SW Companies	11.7	5.3	4.2	134.4	89.3%	81.5%	100.0%	54.8%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 85
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Market Share Total Revenue	Market Share Hardware Revenue	Market Share Software Revenue	Market Share Wkstns Shipped
Company								
Mentor Graphics	8.9	2.6	4.4	118	21.6%	19.5%	21.9%	11.9%
Hewlett-Packard	4.2	2.5	.4	218	10.1%	19.1%	2.1%	22.0%
Dazix	3.5	1.3	1.4	35	8.6%	10.1%	7.1%	3.6%
Assigraph	2.9	.0	2.3	35	7.1%	.0%	11.5%	3.5%
Digital	1.6	1.2	.0	14	3.9%	9.3%	.0%	1.4%
BETRONEX	1.5	.0	1.5	0	3.6%	.0%	7.3%	.0%
LPKF	1.4	.9	.4	143	3.5%	6.4%	2.1%	14.4%
Intergraph	1.4	.7	.2	15	3.4%	4.9%	1.2%	1.5%
Racal-Redac	1.4	.0	1.1	5	3.4%	.1%	5.6%	.5%
Computervision	1.2	.5	.3	10	2.9%	3.9%	1.3%	1.0%
Compaq	1.0	1.0	.0	172	2.5%	7.8%	.0%	17.3%
Secmai	.6	.4	.2	4	1.6%	2.8%	.8%	.4%
Academi Systems	.6	.1	.4	7	1.5%	.9%	2.2%	.7%
Ziegler	.5	.0	.4	16	1.2%	.2%	2.1%	1.6%
IBM	.4	.3	.1	15	.9%	2.0%	.2%	1.5%
European Silicon Systems	.4	.1	.3	2	.9%	.8%	1.3%	.2%
CADAM	.4	.0	.3	0	.8%	.0%	1.5%	.0%
Autodesk	.3	.0	.3	0	.8%	.0%	1.7%	.0%
ALS Design	.3	.0	.2	5	.7%	.2%	1.1%	.5%
Sun	.3	.3	.0	19	.7%	1.9%	.0%	1.9%
Apple Computer	.2	.1	.0	31	.4%	1.1%	.0%	3.1%
Sycotronic AG	.1	.0	.1	0	.3%	.0%	.4%	.0%
Schlumberger (Applicon)	.0	.0	.0	0	.1%	.1%	.1%	.0%
CAD-UL	.0	.0	.0	1	.1%	.1%	.1%	.1%
Dassault	.0	.0	.0	0	.1%	.0%	.1%	.0%
DECAD	.0	.0	.0	0	.1%	.0%	.1%	.0%
Intercad	.0	.0	.0	1	.1%	.1%	.0%	.1%
Serbi	.0	.0	.0	0	.1%	.0%	.1%	.0%
DAT Standard Information syste	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 85 (Continued)
TITLE: 1989 Market Share
APPLICATION: Electronic Design Automation
PLATFORM: All Platforms
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	7.9	1.2	5.6	126.5	19.2%	8.8%	27.7%	12.8%
All Companies	41.2	13.2	20.1	991.5	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	31.1	11.7	12.8	773	75.5%	88.5%	63.9%	78.0%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	10.1	1.5	7.2	218.6	24.5%	11.5%	36.1%	22.0%
All Hardware Companies	5.7	4.7	.0	520.3	13.8%	35.2%	.0%	52.5%
All Turnkey & SW Companies	35.5	8.6	20.1	471.2	86.2%	64.8%	100.0%	47.5%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 86
TITLE: 1989 Market Share
APPLICATION: Electronic CAE
PLATFORM: All Platforms
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	5.9	1.8	2.9	78	28.9%	27.7%	28.9%	17.8%
Dazix	2.8	1.1	1.1	28	13.9%	17.2%	11.2%	6.4%
Assigraph	1.9	.0	1.5	24	9.5%	.0%	15.1%	5.6%
Hewlett-Packard	1.6	1.1	.2	61	7.6%	16.3%	2.1%	13.9%
Digital	.7	.5	.0	6	3.2%	7.6%	.0%	1.3%
Intergraph	.5	.3	.1	5	2.4%	4.1%	.8%	1.2%
Compaq	.5	.5	.0	77	2.3%	7.0%	.0%	17.5%
Computervision	.3	.2	.1	3	1.7%	2.3%	.8%	.6%
Autodesk	.3	.0	.3	0	1.5%	.0%	3.0%	.0%
Sun	.3	.3	.0	19	1.4%	3.8%	.0%	4.2%
Racal-Redac	.3	.0	.2	1	1.3%	.2%	2.0%	.2%
Ziegler	.2	.0	.2	8	1.2%	.2%	2.1%	1.8%
Apple Computer	.1	.1	.0	13	.3%	.9%	.0%	3.0%
Dassault	.0	.0	.0	0	.1%	.0%	.3%	.0%
IBM	.0	.0	.0	6	.1%	.5%	.0%	1.3%
Intercad	.0	.0	.0	1	.1%	.2%	.1%	.3%
Serbi	.0	.0	.0	0	.1%	.0%	.3%	.0%
DAT Standard Information syste	.0	.0	.0	0	.0%	.0%	.1%	.0%
Secmai	.0	.0	.0	0	.0%	.2%	.0%	.0%
Other Companies	4.9	.8	3.3	109.2	24.2%	12.2%	33.2%	24.8%
All Companies	20.4	6.6	10.1	440.1	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	17.9	6.5	8.1	405	87.5%	99.4%	80.0%	92.1%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	2.6	.0	2.0	34.8	12.5%	.6%	20.0%	7.9%
All Hardware Companies	2.4	2.1	.0	250.1	11.6%	31.6%	.0%	56.8%
All Turnkey & SW Companies	18.1	4.5	10.1	190.0	88.4%	68.4%	100.0%	43.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 87
TITLE: 1989 Market Share
APPLICATION: IC Layout
PLATFORM: All Platforms
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	.5	.1	.2	6	21.3%	24.6%	20.0%	27.1%
European Silicon Systems	.4	.1	.3	2	17.1%	17.5%	22.6%	9.0%
Digital	.3	.2	.0	2	12.3%	35.1%	.0%	9.9%
Hewlett-Packard	.1	.1	.0	9	4.3%	12.3%	.0%	39.0%
Other Companies	.9	.1	.7	3.3	45.0%	10.5%	57.4%	15.0%
All Companies	2.1	.6	1.2	22.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	1.8	.5	.9	20	82.9%	82.5%	77.4%	91.0%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	.4	.1	.3	2.0	17.1%	17.5%	22.6%	9.0%
All Hardware Companies	.4	.3	.0	12.9	17.5%	50.9%	.0%	57.8%
All Turnkey & SW Companies	1.7	.3	1.2	9.4	82.5%	49.1%	100.0%	42.2%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 88
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Mentor Graphics	2.6	.6	1.3	34	13.7%	10.2%	14.1%	6.4%
Hewlett-Packard	2.5	1.4	.2	148	13.5%	22.9%	2.4%	28.0%
BETRONEX	1.5	.0	1.5	0	7.9%	.0%	16.6%	.0%
LPKF	1.4	.9	.4	143	7.7%	14.0%	4.8%	26.9%
Racal-Redac	1.1	.0	.9	4	6.1%	.0%	10.5%	.7%
Assigraph	1.0	.0	.8	11	5.4%	.0%	8.9%	2.0%
Intergraph	.9	.4	.2	9	4.8%	6.3%	1.8%	1.8%
Computervision	.9	.4	.2	7	4.6%	6.1%	2.1%	1.3%
Dazix	.7	.2	.3	7	3.8%	3.5%	3.3%	1.3%
Digital	.7	.5	.0	6	3.8%	8.7%	.0%	1.1%
Secmai	.6	.4	.2	4	3.4%	5.9%	1.8%	.7%
Academi Systems	.6	.1	.4	7	3.3%	2.0%	5.0%	1.4%
Compaq	.6	.6	.0	95	3.1%	9.4%	.0%	17.9%
CADAM	.4	.0	.3	0	1.9%	.0%	3.5%	.0%
IBM	.3	.2	.1	9	1.8%	3.8%	.6%	1.7%
ALS Design	.3	.0	.2	5	1.6%	.5%	2.6%	.9%
Ziegler	.2	.0	.2	8	1.3%	.2%	2.4%	1.5%
Sycotronic AG	.1	.0	.1	0	.6%	.0%	1.0%	.0%
Apple Computer	.1	.1	.0	18	.5%	1.3%	.0%	3.3%
Autodesk	.0	.0	.0	0	.2%	.0%	.5%	.0%
Schlumberger (Applicon)	.0	.0	.0	0	.2%	.2%	.2%	.1%
CAD-UL	.0	.0	.0	1	.2%	.2%	.2%	.1%
DECAD	.0	.0	.0	0	.2%	.0%	.2%	.0%

(Continued)

© 1990 Dataquest Incorporated May

Market Share

TABLE NUMBER: 88 (Continued)
TITLE: 1989 Market Share
APPLICATION: PCB Layout
PLATFORM: All Platforms
REGION: Rest of Europe
UNITS: Millions of Dollars/Actual Units

					Market Share			
Company	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped	Total Revenue	Hardware Revenue	Software Revenue	Wkstns Shipped
Other Companies	2.0	.3	1.6	14.0	10.8%	4.9%	17.6%	2.6%
All Companies	18.7	6.1	8.9	529.2	100.0%	100.0%	100.0%	100.0%
All U.S.-Based Companies	11.5	4.7	3.9	347	61.6%	77.3%	44.0%	65.7%
All Asian-Based Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All European-Based Companies	7.2	1.4	5.0	181.8	38.4%	22.7%	56.0%	34.3%
All Hardware Companies	2.9	2.3	.0	257.3	15.8%	37.7%	.0%	48.6%
All Turnkey & SW Companies	15.7	3.8	8.9	271.9	84.2%	62.3%	100.0%	51.4%

Source: Dataquest
May 1990

© 1990 Dataquest Incorporated May