State of the Art of CAD Utilization in Japan

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Hardware:

The AIJ [Architectural Institute of Japan]has performed a series of questionnaire surveys concerning computer utilization among its membership; surveys were done in 1985, 1987, and 1988.

Illustrated below in Figure 1, the results of these surveys indicate that at the Design Development stage, the percentage of schematic drawings done on main-frame computers fell from 62% in 1985 to 45% in 1987, and plummeted further to only 18% last year. A similar trend was found in the Construction Document stage: about 50% in 1985, 48% in 1987, and last year only 18%.The use of main-frame computers is dropping rapidly.

Meanwhile, PC usage has increased even more dramatically.In 1985 no survey respondants indicated that they were using PC's for executing working drawings. But by 1989, fully 54% of working drawings were being drawn on PC's; this year, a figure of over 70% is expected.

As recently as 1985, the relative lack of PC processing power combined with a scarcity of adequate architectural CAD system software resulted in PC's being utilized primarily for word processing, simple structural computation, and sun-shadow calculation. But today's low-cost, powerful PC's are running much advanced architectural software packages, and so many architectural design and engineering firms have introduced PC CAD systems into their offices.

With about 80% of architectural firms having less than 10 employees, main-frame computers are economically infeasible, justifying the preponderance of PC's in small design offices. However, even large firms previously using main-frame computers have been shifting to PC's for drawing production, while their main-frames are being relegated to CG (Computer Graphics) or Database applications.

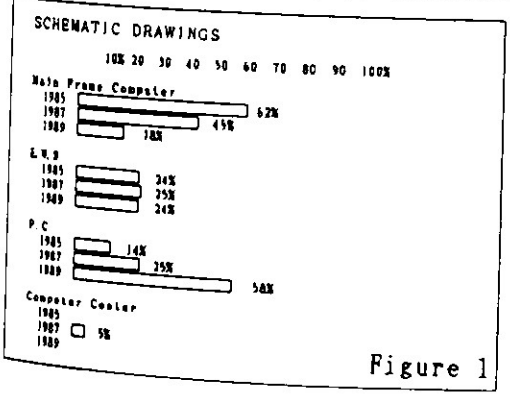
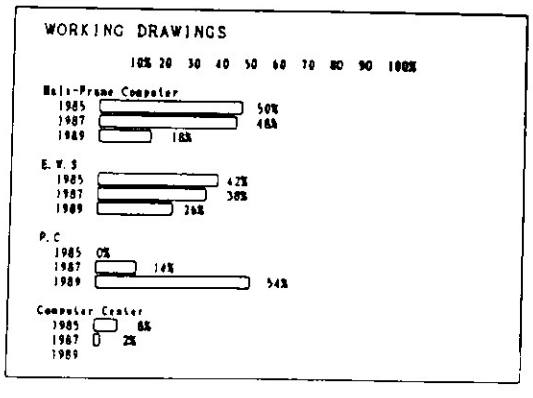


Figure 1



PC Hardware in Japan

A survey of PC utilization done by the magazine Nikkei Computer Graphics, illustrated in Figure 3, appears in the April 1990 issue. It indicates that, within the architectural field in Japan, about 70% of PC's in use are produced by NEC [Nippon Electric Company], with IBM PC's and Apple Macintoshes trailing far behind with 8% and 2%, respect ively.

PC CAD Software

Figure 4, adapted from the same article in Nikkei CG, describes statistics on software users in the architectural field in Japan. The top three systems are Auto-CAD (Autodesk, Inc.) with about 30%, DRA-CAD (Kozo System, Inc.) at 17%, and CANDY (ASCII, Inc.) at 13%. With so many users moving to PC CAD systems, an important issue for the fut ure will be efficient interfacing among PC's, as well as between PC's and main-frames and engineering workstations.

Case Study: BUS Inc.

BUS Inc., an 30-person architectural design and CAD service bureau, was established in May 1987. Without a single conventional drafting board, BUS Inc. is currently executing all design and production work using PC CAD systems. Having accumulated considerable expertise in this field, BUS Inc.is frequently consulted by a variety of architect-ural design firms in Japan. While many architectural firms in Japan are still using conventional drawing methods, expectations are that in the near future, a considerable percentage of these firms will be employing PC's for both design and drafting tasks.

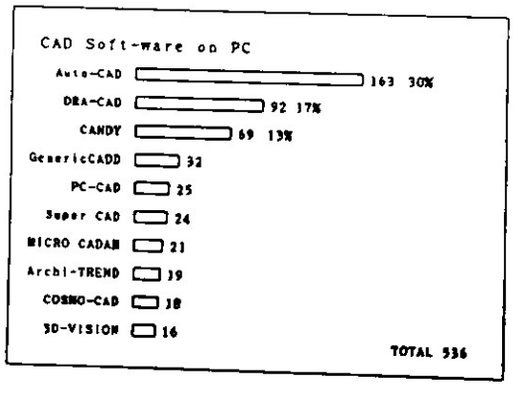


Figure 4

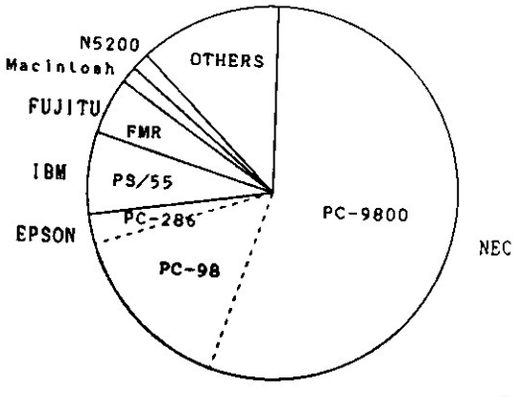


Figure 3

Figure 5 illustrates the hardware and software installation at BUS Inc, predominantly NEC 9800-series PC's running DRA-CAD graphics software. Initially relying wholly on mouse and keyboard for data input and XY-plotters for output, the company has come to employ a full range of state-of-the-art I/O tools. For input, image scanners with automatic vectorization software and digitizers are in full use; laser printers, color printers, thermal plotters, and color image-recorders enhance the quality of output; cutting plotters are employed to automate the model-building process, while modem speed data transfer between Bus and clients.

The CDP Building in Tokyo

Now under construction, the CDP Building was designed by NTT (Nippon Telephone & Telegraph Co.), with production design and drawing by BUS Inc. Rising to a height of around 105 meters,the building will comprise 34 stories of primarily office space(28 floors above ground), with a total floor area of 70,089㎡.

Landmark Tower in Yokohama City: CAD at the Construction Site

Designed by Mitsubishi Estate Co., Ltd., architectural drawings were completed by BUS Inc; it, too, is presently under construcion. A combined office/hotel/shopping complex, its maximum height is around 296 meters, with 70 stories totalling 392,283㎡ of floor area. Easily the largest building database compiled by Bus Inc.,drawings are beingt ransmitted via DXF format to remote CAD systems at the construction site.

Figure 6 shows the CAD network system: different CAD systems use d by different companies are connected with by a LAN [Local Area Network].

Conclusion

With so many architectural design firms in Japan implementing a wide range of PC CAD systems, data compatibility via interchange formats, as well as efficient networking to transmit this data, will present to most significant challenges to automation in the building professions.

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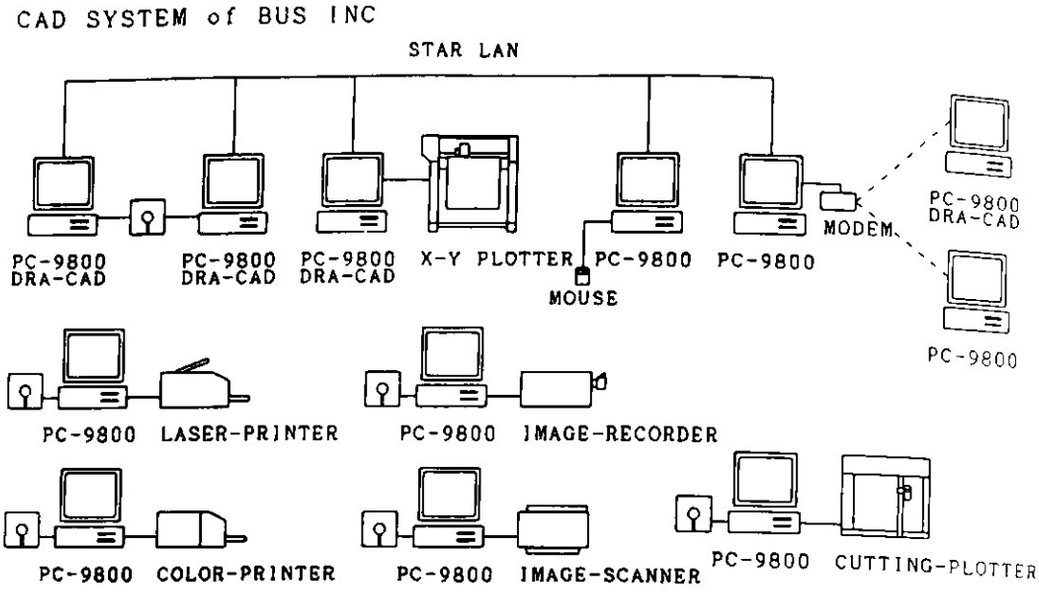

Figure 5

CAD Network System at Construction Stage of MM21 LANDMARK-TOWER Building

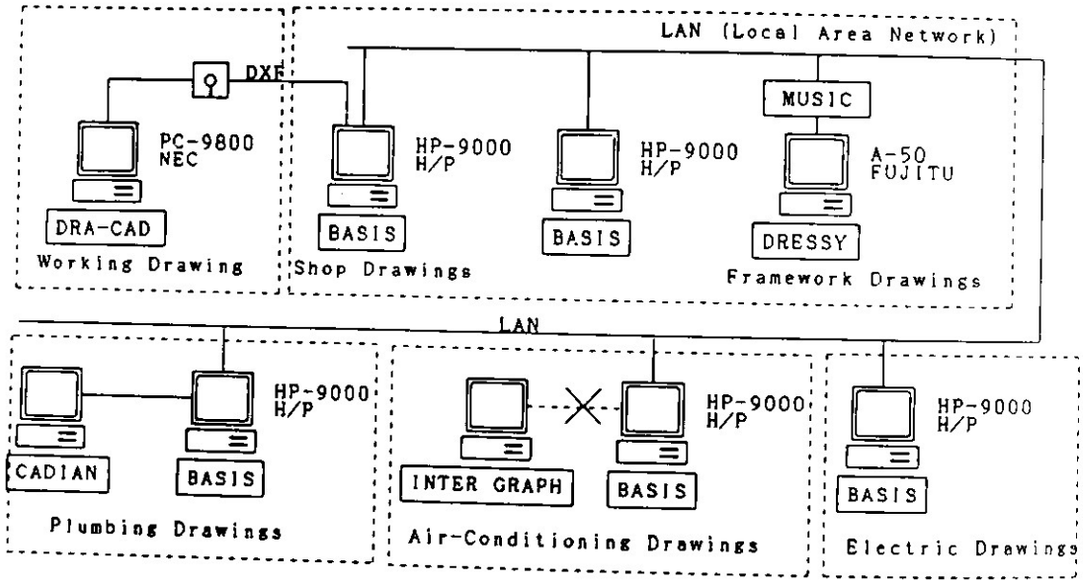

Figure 6