

*While many offices first look at CAD for its production efficiencies, James Stewart Polshek and Partners looked at the creative possibilities first.*

or-greater multifrequency monitor that meets the Swedish Board for Technical Accreditation's maximum recommended values for electric and magnetic fields. The firm's architects share a C-size Hewlett Packard 7550A pen plotter for in-house test plots, as well as a Versatec 8500 Series electrostatic plotter for large-format output. Moreover, JSPP has a high-speed modem (19,200 baud) for sending files to its plot bureau, and sharing files with consultants and others.

All CAD computers are networked via a central computer running Novell's SFT Netware with duplexed, external 650MB drives. According to Okoh, the duplexed drives provide tremendous fault tolerance as data on a primary drive are mirrored automatically to a secondary drive, thus virtually eliminating the possibility of data loss. Furthermore, since the drives are external, a failed drive can be replaced without disrupting people at work, which cuts costly down-times.

Complementing JSPP's CAD system are numerous "satellite" '486DX and '386DX-based computers (each of which also is CAD capable and ready) running Microsoft Excel for spreadsheets, schedules, management, and financial analysis and reporting; Aldus PageMaker for desktop publishing; WordPerfect for word processing; Micrografx Designer and Graph Plus, Alias Upfront, and Corel Draw, Deluxe Paint II,

and Picture Publisher for graphics work other than drafting; and a Benelog Tracking System for logging shop drawings.

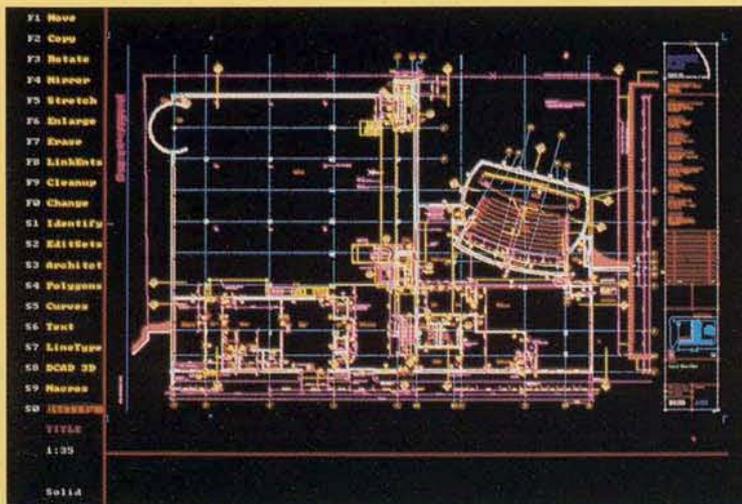
Printing is done on several networked Hewlett Packard Laserjet Series III, IID and II printers. Most Series IIs are outfitted with Postscript boards for faster and clearer text and graphics printing. The firm's "satellite" PCs are networked through a second server also running Novell's SFT Netware. This file server is seamlessly bridged to the CAD server, thus making it possible to access and share both CAD and non-CAD files across the network and to absorb sudden workload increases.

"In setting up and configuring a computer system, in addition to making it as simple as possible to use, there should be as much input as possible from those who will ultimately use it daily," says Okoh. "The idea is to provide our people with tools powerful enough to do their work without sacrificing safety, comfort, or efficiency."

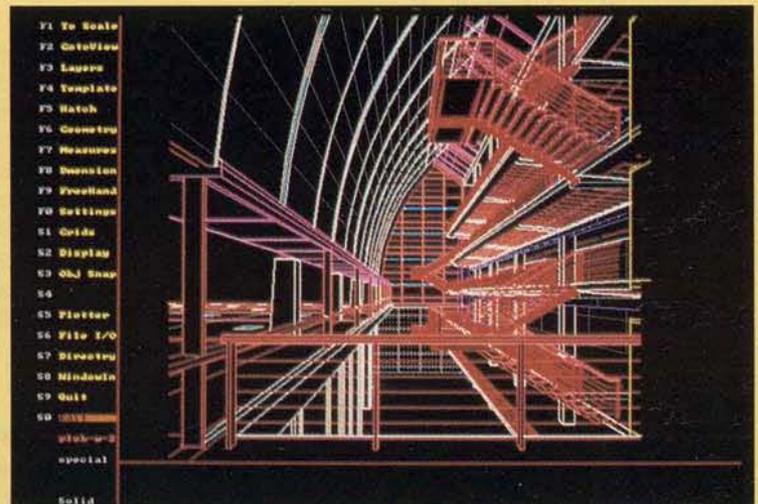
CAD did substantially boost JSPP's productivity. "My advice to those interested in their own CAD system is to learn as much as they can about how PCs, networks, and software work," says Weinreich, "even if they will not be setting it up. This will help communicate unique needs to specialists who will. And a few basic computer management skills will help handle minor daily problems. ■

## **CAD's Evolution in Polshek's Office**

- 1984. First use CAD by agreeing to be a beta tester for a manufacturer. Get 3-D/2-D software to run on one PC. Package proves slow, unsophisticated, and of little use.
- 1988. CAD permanently introduced with purchase of CADKEY's DataCAD package and two '386-20MHz workstations. Two architects are trained to use the program as a design tool for mainly 3-D modeling.
- 1989. Three additional architects are trained in 2-D and 3-D modeling. Hardware upgrades to '386-33MHz and '486-25MHz computers.
- 1990. Purchase of two additional workstations and the first set of construction documents done entirely with CAD. Installation of a dedicated CAD network with automated daily file backups.
- 1991. '486-33MHz PCs replace four slower units. Direct modem connection established to blueprinting service for all plotting. Two projects placed fully on CAD, and other projects partially.
- 1992. Firm up to six workstations. Develops screen-capture and image-painting techniques. Five projects on CAD and more expected.



*First floor plan showing colored lines that translate into varied line widths on prints.*



*Interior perspective showing great wall and tiers.*

## How One Firm Broke into CAD Through Design, Not Production

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By John Hughes

James Stewart Polshek and Partners used CAD from the first for 3-D modeling, but not without initial problems. Despite hardware upgrades in 1989 to '386/33MHz and '486/25MHz machines, JSPP's stand-alone PCs were isolated in a distant corner of the office. Anyone wanting to use them had to leave their desks and teammates. It was also difficult to track and protect CAD files. "Keeping track of and protecting drawings became a chore that could only be solved by networking," says Benedict Okoh, JSPP's systems manager. "The machines also were put on an automatic tape-backup system that runs every 24 hours to protect against data loss."

The decision to network all of the firm's PCs was made in 1990, allowing JSPP to develop its first complete set of construction documents with CAD. The project selected was Inventure Place, Home of the National Inventors Hall of Fame (photo above right), an 80,000-square-foot technology and science center in Akron, Ohio.

The project is three distinct blocks set on a landscaped plaza. A stainless-steel wing rises above the plaza and shelters a wall. Within, five tiers carry exhibits exalting innovation. Below the plaza is an underground exhibit "laboratory," where visitors explore invention concepts using a hands-on approach. A four-story service building contains a lobby, gift shop, cafe, classrooms, access to an underground large-screen theater, mechanical spaces, and a resource center. A 200-foot-high tower completes the composition.

JSPP first used CAD to build a 3-D model of downtown Akron and illustrate how the Hall of Fame would fit in. (The model has since become useful for another commission the firm secured about three blocks away from the Hall of Fame: the Akron Convention Center.) As the architects focused on the Hall of Fame itself, the project team continually updated its 3-D database, which now covers the entire building down to handrails and stair treads. "The Hall of Fame's 3-D

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model has been both a design and analytical tool for studying the character of spaces and details, and for showing how the building's functions relate," says Donald Weinreich, a JSPP senior partner.

### Easier response to program changes

When JSPP began design development, the client asked the firm to produce documents for a building to be built in phases. So the architects produced documents for a 37,000-square-foot first phase. They came up with their own layer naming system and developed drawings with about 20 layers, which show column grids, structure, enclosure, glazing, furniture, dimensions, and ceiling systems. The layers would allow information to be easily transported to other drawings of similar areas in later phases. "On this first project, we placed great emphasis on the quality of the drawings," says Weinreich. "Using colored lines on the screen indicating seven pen widths, we were able to establish a drafting standard that mimics high-quality inked linework."

At the end of each project phase, JSPP filled a tape with all of the data as a record set. The architects continued to develop and embellish the data to complete the construction documents. CAD became invaluable when, toward the end of construction-documents, the client changed the scope of the project and gave the go-ahead to develop the entire 80,000-square-foot building as one package.

"This would be very inconvenient if you were drawing in a conventional manner," says Weinreich. "How do you transfer all the information from one drawing to another without going through the enormous expense of paying for mylar washoffs? CAD made it simple to change the size of sheets and add or extend all of the building components to create a much bigger project. An added bonus was that, in the end, our drawings still looked new. In this case, CAD benefitted the client and kept us from having to do a lot of drudge work."

### Keeping use flexible

After JSPP's CAD success on the Hall of Fame, the technology sold itself. Now junior draftspeople and associates use it. They are encouraged to fit it to their own needs and to



National Inventors Hall of Fame.

consider it as one of many tools at their disposal. No one has had any formal CAD training; new users are trained on the job by those with more experience, although they must show enough interest to become competent fairly fast. According to Weinreich, JSPP can have people working productively after about 30 hours of learning time. "CAD has worked well for some of us and less well for others," says Weinreich. "The more general exposure one has had to computers before learning CAD, the better off one is. Computers demand a level of precise thinking that many people find constraining and annoying until they get used to it."

Now CAD covers the range of drafting tasks within JSPP's offices. The system is a comfortable tool for about 10 of the firm's architects, who do everything from developing perspectives and modeling complex buildings to working out details and generating door and window schedules.

### Managing the system

JSPP's systems department is managed by Okoh, who is responsible for researching, developing, and integrating new software and hardware products into the office, as well as for supporting PC users, troubleshooting, and overseeing the daily operations of networks and systems.

Although DataCAD is still JSPP's CAD software of choice, the firm has expanded its automated arsenal significantly in the last few years. JSPP's primary CAD stations are '486/33MHz and '486/25MHz PCs, each with at least 16MB of RAM, a 200MB hard disk, a high-resolution graphics card, and a 16-inch-