

The Plot(ter) Thickens

by Beth S. Pollak

Plotter are essential tools for design and detailing firms. Engineers and detailers use them to rapidly print drawings from programs like AutoCAD and to create sets of construction documents or shop drawings. Today's high-technology plotters can create output at unprecedented speeds and quantities. Many also feature scanners that allow users to scan drawings, convert them into computer files, and send the information around the globe electronically.

"We use an Océ 9600," said Ken McCarron, CAD manager for Cagley Harmon and Associates' King of Prussia, PA office. "It can make large-scale drawings 36" wide and any length. It has a copy delivery tray so it can feed the sheet straight out. It has a full flatbed scanner and three drawers for six rolls of paper."

Plotters like the 9600 work quickly and efficiently to custom-plot large jobs. "You can feed 40 sheets of a project to the plotter at once," he said. "You can plot in reverse so that they're collated. You can plot multiple sets, or half-size sets."

A/E design firm RTKL also uses the Océ 9600. "It's a large-format raster plotter," said Bill Houston, regional director of information systems for RTKL's Washington, D.C. office. "It plots much faster than a typical inkjet. It's black and white, and uses toner, like a Xerox machine. Rather than a laser, it uses an LED, a light-emitting diode, for the large format."

Designers frequently use plotter scanners as reproduction machines. "You can scan full-size images into a computer file, save it as a TIF image and send it across the country," he said. "We are constantly using it."

Plotting operations are controlled by a computer terminal. "It's a plotter with a PC connected to it," Houston said. "It has a special circuit board that connects directly to the network. The work station comes in two different flavors—one oriented to a Windows plotter—for firms plotting from CAD programs; and one for a reproduction shop, for people making copies of blueprints."

RTKL also has a large-format Hewlett Packard inkjet for use when color plotting is necessary, like for architectural

drawings or presentation work. "Sometimes firms might send us a drawing that has output for an analysis program that's color-coded, so we'll print it on the inkjet," he said. "But we typically will do black and white for the engineering side."

Similarly, Thornton-Tomasetti uses black and white plotting for engineering drawings, and color output for presentations, architectural drawings and renderings. "For speed and production we use Océ 9600 and XEROX 8830 plotters," said Javier Bersabe, Senior Systems Engineer for Thornton-Tomasetti's New York City office. "The color inkjets are the HP 1050 and the HP 5000."

New Upgrades

Using a plotter is about more than creating documents: Plotters can be important organizational tools.

"Some designers think a lot about their drawings, without thinking about best ways to manage their technical documents to create more competitive, more efficient, more productive distribution systems," said Karen Fitt, vice president of advertising and public relations for Océ North America. "Its amazing how a well-managed, well-archived print distribution system can take all the hassles out of everyday work."

With this in mind, Cagley Harmon and Thornton Tomasetti are both in the process of upgrading to the new Océ TDS 600. "It's very similar to the 9600—they took it and they refreshed it," McCarron said. "But the difference is that it scans to PDF files. The current machine scans only to TIFF files. PDFs have come to be the worldwide format. We'll be able to scan all of our large drawings direct to PDF and create a paperless archive—and PDFs take up much less space than TIFFs."

While many firms have the software to

open PDF documents, other file formats are not as commonly used. "We can send the drawings directly to the area where the job's being done, and keep costs down."

Speed is also important. "The TDS 600 prints 16.4 linear feet per minute; the scanner scans at 32 feet per minute," he said. "Like the 9600, we just tell it how many sets to print. The only drawback is when the paper runs out! But on a large project, it'll go to the next roll without interrupting the printing."

Bersabe says Thornton-Tomasetti is also replacing its Xerox 8830 with the Xerox 510. "We own the Xerox in our office, but it's five years old and we've beat it to death. We exceed the average that the machine can print per year—we almost double it. The machines are running every day, even on weekends."

The new plotters feature upgraded software to expedite the transfer of information from CAD programs to the plotting machines. "Sometimes its difficult to send many drawings at a time to the plotter, but with new software applications, it will be easier to organize and print the drawings," he said. "In one shot we can print 100 drawings with no complications."

The new plotters also feature accounting software. "We'll have better tracking applications for accounting purposes," Bersabe said. "We can chart every job



HP DesignJet 1055cm plus features large-format color plotting.

separately and know where the spending goes."

Like the 9600, the TDS plotters have advanced, but user-friendly applications. "They feature Océ Image Logic™ scanning technology, which analyzes and optimizes images pixel by pixel," Ritt said. "It can enhance poor-quality originals and old drawings because it can distinguish between the actual image and any unnecessary markings, noise or dust. And there is no special configuration required, you just press a single button and make a copy."

Conscientious Consumer

When purchasing a new plotter, it's important to evaluate the quality of the machine's drawing product and its compatibility with CAD standards.

"New plotters have better quality—in the drawings and the output," said James Jacobi, principal and chief information officer for Walter P. Moore. "It's important to us, since we have CAD standards and line weights. The plotter has to be compatible with our software: in the line quality, the resolution, the coverage and shaded areas. We look for things like layering conventions, pen weights and line thickness. We have had instances when two different devices printed the same plot and they looked different. Anytime we do an upgrade to a new machine, we run test plots to ensure that the quality is going to be there."

Walter P. Moore leases its plotters and upgrades them every few years. "Plotters have long lives, and if you purchase one (instead of leasing), you probably won't have access to new features as they are developed," he said. "With interest rates like they have been now, financially, leasing is not a big attraction. But we go with leasing so we can take more frequent upgrades and not worry about offloading older equipment."

But companies like Océ also create regular additions for their plotter hardware and software. "We come out with a new platform of equipment every few years, but we continually add enhancements to it," Fitt said. "Rather than come out with a new machine every year, we'd like it to be a good investment over time, so we add features to give enhanced functionality."

She says Océ has just released its latest enhancement for the TDS series: an XP embedded version of the plotter controller software, to reduce potential problems with viruses and reliability.

Reliability

Another key to purchasing new plotters is evaluating their reliability and the amount of maintenance required.

"If you're constantly trying to maintain plotters, it will hurt you," Jacobi said. "But we're seeing more reliability creeping in as the technology improves. Maintenance problems could include fixing paper jams and smearing of the plots. If you don't maintain your machine, it will adversely affect your productivity."

Walter P. Moore and other firms contract with plotter companies for maintenance service and supplies.

"You don't have to worry about getting paper, toner and maintenance," Bersabe said. "When parts need to be replaced, or if we need a software upgrade, Océ—which is located in the building next door—takes about four hours to respond, and Xerox usually fixes the problem within a 24-hour window."

Plotter Evolution

Plotters haven't always been low-maintenance, quick and clean machines.

"Our first plotters years ago had toner, but it was a liquid toner that was very messy to deal with—you usually ended up with black stains all over your clothes," Houston said. "The second generation of plotters was the same technology as now, but much slower."

Bersabe recalls working with pen plotters. "There were little pens, that would run out after one drawing, so you were constantly changing pens. The way the plotter worked, the paper went back and forth, so it would get destroyed from too many passes of the pen if the drawing was too crowded."

Older reproduction machines required much more supervision and maintenance than today's machines. "They were diazo machines: blue-line ammonia-based chemical machines that had to be vented," McCarron said. "They smelled horrible. You'd start with paper covered with a dried yellow chemical. The machine had high-density fluorescent tubes. Anywhere with pencil or ink would turn blue when ammonia gas was pumped over the page. That was your blueprint. You had a piece of fishing string to cut the roll of paper and you had to snap it fast. Everybody hated doing that, but it was the way to get the end result."

He says today's machines are simple compared to their predecessors. "It's great not to have to deal with specially

coated paper and the ammonia smell. Today's machines can auto-fit a page, rotate a drawing and cut it exactly. They're easy to feed. We know exactly how long it will take to plot a job. You just have to add the toner when it's low, and keep going."

What's Next?

Future technologies could include even faster output, more advanced software—and lower-cost, higher-quality color plotters.

"If there's anything that I'd like to see, it's more cost-effective color plotting," Jacobi said. "Scanning technology improved dramatically over last 10 years, and color plotting is the next big thing. Now it's very expensive to do because of the toners, and the value that's derived from it is not always commensurate with the cost. But there's a big demand for them: people love to use them, they are effective for transmitting information, and the drawings look good."

In October 2003, Océ released its new color TCS 400, which features a color scanner. According to Océ, the TCS 400 processes large color CAD files three times faster than the latest color inkjet machines. "It's the first integrated multi-function printing, copying, and scanning solution for color technical documents," Ritt said.

While some contractors and design firms are moving towards a "paperless" process with the help of new three-dimensional design software technology and electronic data interchange, it doesn't mean that paper drawings will be eliminated altogether. Some designers still prefer to print out and check hard-copy drawings.

"Even with a 21" monitor displaying a 3-D model, a 48"-wide drawing is easier to check on paper," McCarron said.

Jacobi agrees that plotting is going to be around for a long time. "It's going to take a while before you see an absence of drawings," he said. "Three-dimensional software and visualization have improved the quality of design information," he said. "But not all the trades are at the same level of computer literacy. By the time that paperless processes really are established, this magazine won't exist anymore on paper."

In the meantime, engineers and detailers are choosing the best of the latest plotter technology: going with high speed and high quality, ease of use and low maintenance. ★