

# High-Quality Color Inkjet Office Printers

The HP DeskJet 1200C and 1200C/PS printers are a new class of HP DeskJet printers for office applications. They offer black and color printing, fast print speeds, scalable typefaces, expandable memory, networking options, PCL 5 and PostScript™ languages, and HP LaserJet printer compatibility.

by Douglas R. Watson and Hatem E. Mostafa

When HP introduced the PaintJet<sup>1</sup> and DeskJet<sup>2</sup> printers in 1987 and 1988, customer expectations of personal printers were changed. Customers learned to expect quiet operation, exceptional color, and low cost with good throughput in an affordable personal printer.

Together, these two printers provided a full-featured printing solution. However, each printer had limitations that kept it from being the single desktop product for all printing needs. The DeskJet delivered high-quality plain paper text with industry-leading speed in an affordable printer, but there were still opportunities to improve print quality when printing on a variety of papers including the newly appearing recycled papers. The PaintJet delivered high-quality color at a low price but lacked plain paper capability and the 300-dpi text that the HP LaserJet printer family had made a minimum requirement for general-purpose office printers. The DeskJet 500C printer<sup>3</sup> introduced in August 1991 added plain paper color capability to the product line. The DeskJet 500C and the two-pen DeskJet 550C continued the march of inkjet technology toward the mainstream office.

In May 1992, the HP PaintJet XL300 printer delivered the first true laser-quality color capability for the mainstream office. This product offered exceptional print quality. Its price and size positioned it as a superior shared or networked solution.

After assessing customer needs, product development teams were formed for the new HP DeskJet 1200C printer and several new print cartridges. The objective was to deliver a high-performance personal and office printer combining all of the best features of the existing products while extending the technology in the areas of throughput, quality, and cost. During the development cycle the opportunity to apply the print cartridges under development to the large-format market became apparent. A team was formed to adapt the cartridges to the DesignJet 650C large-format drafting plotter to meet those needs. The R&D teams accepted the challenge of incorporating all of these goals in one program, delivering the benefits of this new technology in two products with seven new but highly leveraged print cartridges.

## Customer-Driven Development

The design objectives for the DeskJet 1200C were set with the overriding goal of moving color into the mainstream office market using inkjet technology without sacrificing the

features to which customers had become accustomed in laser printers. This resulted in the following specific objectives:

- Laser-speed text printing—more than four pages per minute (seven pages per minute was ultimately achieved, and six is specified)
- Industry-leading color quality on plain paper
- Fast color throughput—one to two minutes per page
- Color cost per copy better than any technology at any use rate
- Desktop form factor—less than 20 inches wide
- Improved transparency and glossy paper performance
- Product cost less than or equal to laser printers of equivalent capability
- Ink supply sensing for network or batch print jobs.

In addition to being asked to deliver the first truly mainstream color printer for the office, the DeskJet 1200C and print cartridge program team was also charged with delivering the solution to the marketplace in less than two years, a record time for such an advanced product/print cartridge system. To meet this aggressive time-to-market goal, the printer and print cartridge teams had to make fundamental changes in the processes by which such print systems are developed.

To translate the list of objectives into designs, teams were formed to choose the best implementation solutions without regard to whether a particular solution was implemented in the product, print cartridge, or media. These teams, called *seam teams*, were composed entirely of and led by engineers. At an extraordinary rate, they developed technical solutions to the objectives that offered the highest quality and the lowest cost. The result is a well-tuned high-performance printer that delivers all of the major desires identified by customers.

On the printer development team, the traditional roles of design, manufacturing, and reliability engineering were all combined into a single role: that of the development engineer. The development engineers became solely responsible for the design, manufacturability, assemblability, testability, and reliability of their parts. This structure greatly empowered the engineering team and allowed rapid, global optimization of major design and architectural decisions. New rapid prototyping techniques were developed to improve both the accuracy and the timeliness of early prototype



**Fig. 1.** The HP DeskJet 1200C and 1200C/PS printers are 600-by-300-dpi black and color inkjet printers for office applications.

units. In addition, new aggressive tooling strategies shaved months from the traditional tooling cycle times. Finally, early supplier involvement, including early interaction of HP production people with all the design aspects of the product ensured rapid convergence of all manufacturing issues. As a result of this streamlined development process, the laboratory phase of the development cycle for the HP DeskJet 1200C printer was completed in the shortest time in the division's history.

The other DeskJet 1200C articles in this issue describe in greater detail the design solutions arrived at by the seam teams. The remainder of this article describes the features and capabilities of the HP DeskJet 1200C printer and the HP DeskJet 1200C/PS PostScript printer.

### DeskJet 1200C Features

The DeskJet 1200C and 1200C/PS printers (Fig. 1) are the most advanced HP DeskJet printers, building on the features of earlier DeskJet printers and adding features that are new to the family.

Using a new family of inkjet print cartridges, the new printers print black text with a resolution of 600 by 300 dots per inch (dpi) and HP Resolution Enhancement technology (Fig. 2). Print speeds are six pages per minute for black text and one to two minutes per page for color (Fig. 3). The design duty cycle is 8,000 pages per month.

The new printers raise inkjet technology to a new level of print quality, producing sharp, black text and a spectrum of colors on plain paper using four new 104-nozzle print cartridges—cyan, magenta, yellow, and black—with new ink formulations. To ensure the blackest, sharpest text and maximum graphics quality, the black cartridge contains pigmented ink. The cartridges have large-capacity ink reservoirs and ink-level indicators.

The DeskJet 1200C memory is 2M bytes, expandable to 26M bytes, and the DeskJet 1200C/PS memory is 4M bytes, expandable to 20M bytes. The expansion memory comes from the same SIMM products used in the HP LaserJet 4 and 4Si printers and is available in increments of 1M, 2M, 4M, and 8M bytes.



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John Adams  
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John:

I just came across a product that fits right in with our conversation at lunch last week. Remember when you told me how impressive your competition's presentation looked, with full-color overheads and color charts in the proposal? Well, I have the answer for you.

Ruth Jones, our always-a-step-ahead PC coordinator, clued me in on Hewlett-Packard's DeskJet 1200C printer. This one's really worth checking out, John. Even though it prints dynamite color, the HP DeskJet 1200C is an all-around office printer that thinks like your HP LaserJet—no fooling. It uses the same printer language, typefaces, print margins—you can even use the same LaserJet accessories! (Yes, including those HP JetDirect cards you're using for easy networking.)

About that color—it's worth the price all by itself. The DeskJet 1200C prints out the rich, professional-looking color you've been dreaming about for months—the kind your competitors would love to have. Ruth tells me this printer can do millions of colors, just the thing for that new color monitor of yours.

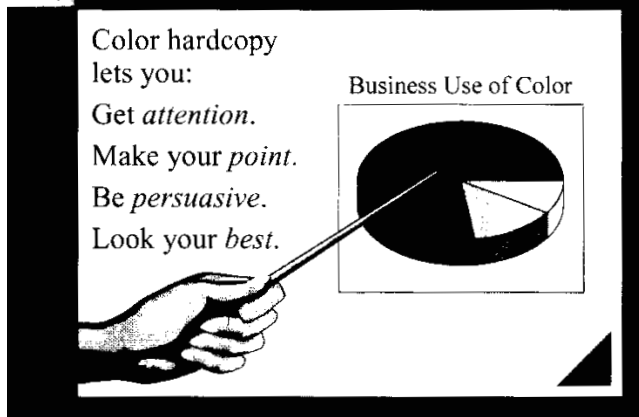
So how do I know this is such a swell product? Simple—after seeing a DeskJet 1200C in action, I knew this was the printer for us. Did I mention that it's from Hewlett-Packard? It was an easy decision, believe me. I know you've been wanting to bring color into your office. Somehow, I have the feeling that the DeskJet 1200C is the printer you've been waiting for. Let me know if you want more info.

On the run (as usual),

Jim Smith  
Information Systems Manager

**Fig. 2.** Black text is printed at six pages per minute in fast mode and four pages per minute in high-quality mode.

## ★ Using Color in the Office



**Fig. 3.** Color printing takes one to two minutes per page.

A PostScript Level 2 Module is available to add PostScript language capability to the DeskJet 1200C printer. The module provides the same PostScript Level 2 functions as the DeskJet 1200C/PS printer. Both the DeskJet 1200C/PS and the DeskJet 1200C with the PostScript module provide auto-switching between interfaces and between the PCL 5 and PostScript languages.

Drivers for the new printers are available for Microsoft® Windows and Apple Macintosh environments.

### **LaserJet Printer Compatibility**

The new printers are the first DeskJet printers that are HP LaserJet compatible. The DeskJet 1200C shares with the LaserJet 4 such features as:

- Color PCL 5 language including the HP-GL 2 graphics language
- 45 internal scalable typefaces—35 Intellifont and 10 TrueType™
- HP Resolution Enhancement technology
- Interchangeable scalable and bitmapped typeface cartridges
- Interchangeable SIMM memory and HP JetDirect cards that are also compatible with the HP LaserJet IIISi printer
- RISC-based processing
- High-speed Centronics parallel port
- Automatic switching between Centronics and network interfaces through optional HP JetDirect cards
- Automatic switching between PCL 5 and optional PostScript language
- Support for explicit language switching as found on the LaserJet IIISi printer.

### **Acknowledgments**

We wish to acknowledge the engineers, scientists and managers who throughout this program dedicated themselves to delivering to HP customers the highest value possible. Through their efforts traditional technical and performance barriers fell rapidly, making possible a new class of DeskJet printer for the office.

### **References**

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2. *Hewlett-Packard Journal*, Vol. 39, no. 5, October 1988, pp. 51-98.
3. *Hewlett-Packard Journal*, Vol. 43, no. 4, August 1992, pp. 64-102.

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