

Color and Black-and-White Printing: What's the Difference?



What's the difference between color and black-and-white printing? It may seem like a simple question on the surface. But when it comes to everyday office printing, there are more differences between the two than you may realize—in cost, technology, functionality and other factors—and more similarities, too. If you're thinking about incorporating more color into your office printing environment, you need to understand all these differences and similarities in order to make effective (not to mention cost-effective) choices.

"To put color print pricing in context, in 1994 a typical departmental-sized black-and-white laser printer would cost you around \$5000 with a per-page price of about 8 or 9 cents. For less than that cost today, you can have a high-quality color printer. The idea that color is too expensive for in-house, everyday use is as antiquated as that 1994 black-and-white laser printer."

—Don Jones, *The Definitive Guide to Office Color Printing*

Areas of comparison

The primary differences and similarities between color and black-and-white printing fall into several general areas. When making purchasing decisions, each of these areas should be evaluated based on the types of documents being printed and the number of users.

- **Cost and value:** Black-and-white devices still cost a little less, but color delivers more effective communications.
- **Technology:** Color and black-and-white printing build on similar printing technologies, but color brings an entirely new dimension to output, along with new criteria for output quality and effectiveness.
- **Performance:** Color printing today is similar to black-and-white printing in several surprising ways, offering comparable speeds, ease of use and expanded functionality.
- **Networkability and manageability:** Today's color and black-and-white printers are equally manageable as networked devices.

Cost and value

One of the greatest barriers in recent years to the widespread adoption of color in everyday office environments is the belief that it simply costs too much. And, in fact, color printers traditionally have generally been much more expensive than black-and-white devices. “In the past, color printers cost several thousands of dollars, and per-page costs could be as high as \$12,”¹ according to Don Jones in *The Definitive Guide to Office Color Printing*. Today, that price has come down dramatically, but the belief in the marketplace that color costs too much remains to some extent. “Unfortunately, the legacy of color has left many users with the perception that color is expensive,”² as CAP Ventures has pointed out.

So just how big is the cost difference between color and black-and-white today? Not very—especially when you factor in the value that color can add to many everyday communications.



Closing the gap on cost

In terms of simple acquisition costs, the difference between color printers and black-and-white printers is not nearly as great as it once was. In Hewlett-Packard’s portfolio of color printers, for example, business inkjet printers start at less than \$200 and laser printers start at less than \$500. And while you can certainly find black-and-white laser printers in HP’s portfolio that start at less than \$500, purchase price isn’t the only consideration to keep in mind here. Value is as important as, if not more important than, price.

Factoring in value

Color may add to the cost of acquiring printers in everyday office environments, but it’s important to remember that color also adds *value*. And as the gap on price closes, that added value increasingly offsets the additional expenditure. Further, when color is deployed precisely when and where it is needed, as part of a balanced deployment, the overall cost may be lower than if it is done as a blanket upgrade.

Color adds value by making communications more effective, which in turn can make people and organizations more productive. For example, color coding reduces visual search time by up to 80 percent,³ color improves comprehension by up to 73 percent,⁴ and messages printed in color are up to 78 percent more likely to be remembered.⁵

Some types of communication are just inherently more effective when they include color. Think of detailed technical drawings or long, complicated spreadsheets, in which color can be used to distinguish various images or call attention to different points which would otherwise take much more time and effort to discern.

Technology

When color is added to the printed page, the devices involved use new technologies and capabilities to add a new dimension to a document. In this context, color is very different from black-and-white printing by virtue of the qualities and concerns it inevitably must introduce.

Defining print quality differently

Traditionally, the measurement of a printer’s output quality has been resolution, usually expressed in terms of dots per inch (DPI). Color inkjet printing, however, is different. Modern inkjet printers work at a sub-DPI level, producing tiny droplets of ink that can fit by the dozens inside a single DPI dot. Inside each of these dots, sophisticated color-mixing technology is used to enhance the colors and produce high-quality images. For this reason, some color printers with a lower DPI rating can actually produce higher image quality output because of the level of color droplet control they exercise.

Another technology-related factor that relates to print quality in color printers is a phenomenon called dot growth, or wicking, that is unique to inkjet printers. Dot growth refers to the spread of ink as it is absorbed by paper. Sometimes, when you use plain paper with an inkjet printer, the paper fibers spread the ink too much, reducing image quality. Using paper with a lower ink absorption rate eliminates the problem. Dot growth isn’t an issue with laser printers because they use a different mechanism to transfer printed images to paper.

Matching colors accurately

Black is black. But blue and other colors come in a whole range of shades. That’s one big difference between color and black-and-white printing. With color, you have to be concerned about ensuring that the colors you use match and are consistent from device to device—that, for example, the blue you see on your computer screen resembles the blue you see on the page you print. Color matching technology is used to compensate for the differences between how different devices process and display color.



Performance

Performance, like cost, is an area of much misunderstanding when it comes to assessing the differences between color and black-and-white printing. Just as color printing costs are no longer so much more than black-and-white printing costs, the two are now also far more comparable in performance.

Building up speed

It used to be that color printing was slower than black-and-white, but that's no longer always the case. HP today sells color devices that print at comparable speeds in color *and* in black-and-white. The HP Color LaserJet 3700, for example, prints up to 16 pages per minute (ppm) in color or black-and-white, and the higher-end HP Color LaserJet 5550 prints up to 27 ppm in either mode. (Not all laser printers have the same ppm rating for color and black-and-white, however; some do print more rapidly when printing in black-and-white.)

Adding functionality

Some have surmised that another reason for the slow adoption of color devices for everyday office printing has been that color printers just did not have all the functionality of black-and-white devices—such as printing flexibility (including duplexing), media choices (from plain white paper to transparency sheets), high-capacity paper trays, and multiple finishing options (stacking, stapling, etc.). Today's color printers have all these features.

Networkability and manageability

Organizations that operate networked printing environments need color devices that can function as networked devices and be easily managed on the network. Early color devices were not exactly network-friendly. Initially, laser printers were the only color printers that included network connections and built-in print servers; now however, many business inkjet models are network-ready, as are many multifunction products (MFPs) with color printing capabilities. High-quality, network-ready color printers today also offer management features, such as HP's Web JetAdmin software for detecting, resetting and configuring printers on the network (as well as plugins for controlling who can print in color). In terms of networking and management, you'd be hard-pressed to find *any* difference between black-and-white and color printers today.

Black-and-White vs. Color

	HP LaserJet 4350n	HP Color LaserJet 4650n
Price*	Starting at \$1,599*	Starting at \$1,799*
Print speed	Up to 55 ppm (black-and-white only)	Up to 22 ppm (color and black-and-white)
Resolution	1200 x 1200 DPI (with HP ProRes 1200 and HP FastRes 1200)	600 x 600 DPI (with ImageREt 3600 technology)
Paper trays	Up to 5 input trays	Up to 4 input trays
Two-sided printing	Automatic duplexing option	Manual duplexing
Connectivity	USB 2.0 port, IEEE 1284-B compliant parallel port, two open EIO slots, HP Jetdirect Fast Ethernet embedded print server	USB 1.1 port, bi-directional IEEE 1284-C parallel port, HP Jetdirect Fast Ethernet internal print server

Comparison of selected features of the HP LaserJet 4350n black-and-white printer and the HP Color LaserJet 4650n model.

*Estimated HP U.S. prices from www.hp.com as of February 2005. Actual prices from other locations or Websites may vary.

Key terms

Color matching. The process of ensuring that color information in one context (such as on a computer monitor) is as much the same as possible when it appears in another context (such as a printed page).

Dots per inch (DPI). A measurement of the resolution of the output of printers.

Fusing. The final step in the laser printing process, in which plastic toner particles are made to adhere to paper by the use of heat.

Ink. A translucent liquid that, in inkjet printing, is applied directly to paper by spraying.

Inkjet printing. Type of color printing in which ink is sprayed directly onto paper and can be combined with each other directly to create different colors.

Laser printing. Type of printing in which lasers are applied to a photoconductive drum, creating an image that is ultimately transferred to paper or other printer media.

Resolution. The number of dots a printer can produce, usually expressed as dots per inch (DPI).

Speed. The rate at which a printer can produce pages, measured in pages per minute.

Toner. A black or color powder that is affixed to paper with heat.



Notes

¹ Don Jones, *The Definitive Guide to Office Color Printing* (realtimepublishers.com, 2004), 9.

² Workgroup Color: The Next Frontier," CAP Ventures *CAP Stats*, 13 May 2003.

³ Jan V. White, *Color for Impact* (Berkeley: Strathmoor Press, 1997), 3.

⁴ Virginia Johnson, "The Power of Color," *Successful Meetings*, June 1992.

⁵ *HP Color Planning Guide* (citing the Pantone Institute), 2004.