

HP Color Planning Guide

Evaluating color printers is easier than you think.



Color has arrived

The question in most offices — large and small — is not “whether” to incorporate color printers into their operations, but rather “when and how.”

Color printing in the office is no longer limited to a specialized department or niche marketing firms or large-scale enterprises with considerable financial resources. Today, color printing is an essential tool in everyday business, a necessity for competing in a fast-paced and dynamic marketplace.

In fact, the question in most offices — large and small — is not “whether” to incorporate color printers into their operations, but rather “when and how.”

As you consider expanding the color printing capabilities in your own office, important questions will arise that affect not only your purchasing decision, but also your strategies for effective use of color printing throughout the organization. This guide provides answers to common questions about color printing that will make you a better and more-informed user of color printing.

Each section of this guide provides a different perspective for evaluating printers. You may not need to read the entire document before choosing a printer. Any one of the sections may provide the answers you need. If you find you need more information, simply move to another perspective (section). Each section begins by posing a question:

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Basically, you are trying to identify which printer type is best for your office. The types of office printers included within this guide are personal inkjet printers, personal laser printers, business inkjets, large/wide format inkjets, and office laser printers, however the focus is on network printers — HP Business Inkjets and HP Color LaserJets.

In addition to this Color Planning Guide, HP offers a wealth of online resources to help you learn about color and make the best color printing choices. To learn more, visit our newly updated color website at www.hp.com/go/color or talk to your HP authorized reseller.

Why is color important?

In today's marketplace, documents are read or rejected within seconds, and purchasing decisions can take mere hundredths of a second. With that kind of pressure, how can you make sure your document gets noticed — let alone read and remembered?

Color can be used to draw attention to key information, emphasize immediacy or a call-to-action, and create an emotional connection. It is one of the most effective business tools available.

More specifically, using color can deliver tangible and quantifiable benefits. According to the Pantone Institute, readers are up to **78%** more likely to remember a message printed in color than black and white. Color actually improves brand recognition by **80%**, and speeds learning and retention by **78%**. And independent tests by twenty direct mailers for business-to-business, consumer, and fundraising campaigns show that adding color increases both response and sales.

There's much more that color can do, but the bottom line is this: Color printing delivers results and a measurable return on investment.



a newsletter and spreadsheet in black and white



and the same documents in color

“Color communicates information up to 70% faster than black and white.”

Jan V. White
Color for Impact

1 Which technology is right for you, inkjet or laser?

First, you need a good understanding of the differences between inkjet and laser printer technologies.

How inkjet technology works

Thermal inkjet printers use tiny nozzles to emit especially small ink droplets directly onto the paper media. HP inkjet printers can accomplish superior print quality because they use exceptionally small ink droplets. In fact, some printers use as many as 40+ droplets to make just one printer dot.

The primary ink colors available are cyan, magenta, yellow, and black. Some inkjet printers use a special photo cartridge to provide additional ink colors such as light cyan, light magenta, light gray, dark gray, and dye-based photo blocks. Inkjet printers combine various colors to produce the wide range of colors required by digital imaging applications.

Traditionally, black ink is provided via a single cartridge and cyan, magenta, and yellow are combined to form a triple color cartridge. This can be rather costly if each color is not used at the same rate, since all colors are replaced when any one is depleted. Research has shown that the typical user generally uses each color at approximately the same rate, minimizing waste. However, a business user may not use all colors at the same rate if they print a lot of “branded” pages that reflect a single color scheme or logo. Single color cartridges are now common, as well as sophisticated ink delivery systems that effectively reduce costs and increase ink capacity.

One such advancement is the **Modular Ink Delivery System (MIDS)**, which forms the basis for enhanced speed, reliability, low cost and ease of maintenance. The system features separate printheads and ink cartridges, combined with built-in “smart chip” intelligence. By separating the ink cartridge from the printheads, the ink supply remains in a permanent, fixed position, allowing the carriage to move more quickly.

Fixed-position ink supplies allow a greater amount of ink to be stored in the ink cartridges, which means less frequent replacement. A smart chip monitors the ink used by counting every drop that passes through each printhead. This ensures that only the amount of ink required is dispensed, so ink lasts longer.

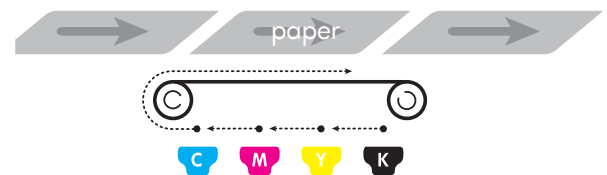
Paper type, also referred to as “media,” can have a dramatic effect on thermal inkjet image quality. Inkjet printers can use a variety of paper types, including general office printer paper. For photo printing, the best results are achieved with special media. This is because the ink droplet tends to spread once it hits the rough surface of ordinary office paper. In contrast, special media are smooth and have a composition or coating that quickly dries the droplet to prevent spreading. Photographic results can be achieved on thick, special media with a high-gloss coating.

Inkjet printer process



Tiny nozzles emit ink droplets onto paper.

Laser printer process



Toner is attracted to “laser spots” then transferred to paper.



How laser technology works

Laser printers produce printed pages by using a semiconductor laser diode to strike a photoconductive drum with a highly focused light. After the light is focused and the drum is initialized, the laser beam discharges specific printer dot locations. When complete, the drum will contain an electrical image of the page to be printed. After the drum has been imaged, toner is attracted to each laser spot and then transferred to paper.

Multi-pass color laser printers have one imaging drum that is used four times, once for each toner color. This dramatically affects performance, and results in different printing speeds for color and black and white print jobs. In contrast, **single-pass** (also known as “in-line”) color laser printers have four imaging drums. This significantly improves speed by reducing four passes to just one pass.

The final step of the laser process (or **EP process** as it is also known) is fusing. This consists of a high-temperature roller and a pressure roller that meld the plastic toner particles to the paper. This firmly binds the toner to the paper's fibers.

Due to the high temperature of the fusing rollers, laser printers have limited support for special paper types. Glossy coated paper media and labels containing glue may have difficulty with the heat from the fuser. Standard office printing or copier paper is preferred for laser printers and largely contributes to their low cost of ownership.

HP customers have a choice

HP Personal Inkjet Printers

- lowest acquisition price
- higher cost per page than HP Business inkjet or HP Color LaserJet printers
- designed for personal printing (higher intervention and lower duty cycle than business inkjet or color LaserJet printers)
- small footprint, good for mobile or desktop use
- special media flexibility (photo paper, greeting cards, glossy media, etc.)

HP Business Inkjet Printers

- most attractive price/performance ratio of HP color printers
- higher duty cycle, designed for power users or to be shared
- HP's lowest color cost per page with modular ink delivery system
- special media flexibility comparable to personal inkjets

HP Color LaserJet Printers

- most durable print outs
- print quality less dependent on media type
- HP's lowest monochrome cost per page for color printers
- highest duty cycles — scalable from personal to network use
- highest supplies yield for fewer interventions
- generally higher performance/speed

HP All-in-One Printers

- save space and money by consolidating fax, printer and scanner in one all-in-one device
- are economical—including models that offer separate ink cartridges and cost-saving operation
- offer a range of choices to get the ideal performance, duty cycle and connectivity needed by today's workgroups
- offer digital sending in select models

HP Designjet Printers

- wide and large format output
- ideal for schematics, posters, banners, photos, presentations and signage
- greatest media flexibility with support for canvas, fine art, vinyl, and other specialty options
- wide range of sizes and price points

2 How will the printers be used?

Although inkjet printers and laser printers share similar ease-of-use features, there are fundamental technology differences that work better in certain printing applications. For instance, inkjet printers work well with specialty media including glossy photographic paper, labels, T-shirt printing solutions, and postcards. This is because inkjet printers, unlike laser printers, do not use hot fuser rollers. The fuser rollers on laser printers can get extremely hot (approx. 300° F), and this heat can melt glossy coatings or glue used with labels. If you expect to print mostly on specialty media, an inkjet printer may be the right choice for you.

Another benefit of using inkjet over laser is simplified maintenance. There are no drums or transfer belts that need replacement. Inkjet printers also tend to be smaller and weigh less, which makes them ideal for desktop printing. The small footprint and low purchase price make it convenient to have a pool of loaner devices to quickly replace other units in need of service.

On the other hand, laser printers are better suited for printing plain paper, lengthy business documents. These printers are workhorses that excel at printing multiple copies of business documents and presentations. Laser printers can also house high-yield consumables and various paper trays that significantly reduce the total cost of printing by requiring fewer interventions.

Inkjet printers provide versatile printing on a wide range of media — from ordinary office paper to photo papers, transparencies, brochure paper, labels, business cards and more.

Laser printers provide a high duty cycle and durable output for high volume printing.

Ease-of-use issues arise when printers are improperly deployed. For example, imagine the frustration level of too many users trying to share a single personal inkjet printer. Contention is high and consumables and paper have to be frequently replenished. Likewise, consider how counterproductive it would be to have a large workgroup color laser printer placed on an already overcrowded desktop.

Important advances in office printer technology are making them easier to use. For instance, HP has developed **automatic color matching and calibration features** that ensure users get the best color output. **sRGB** is another technology supported by all HP color printers to ensure that web pages and office documents print consistently no matter which product you are using.

The latest workgroup and department color printers from HP also have **embedded web servers** to make them easier to manage on the network. With a standard web browser, you can easily view the status of print devices and reconfigure them if needed. For even greater productivity gains, you can use **HP Web Jetadmin Printer Management Software** to manage all your network printers through one web page. You can even configure the printers to send email notifications or pager alerts when they require attention or supplies.



Individually, printers may have additional ease-of-use features. For example, entry-level HP Color LaserJet printers feature a lifetime fuser assembly and a simple replacement procedure for toner cartridges. Workgroup printers like the HP Color LaserJet 4650 and 5500 Series Printers employ a vertical design that provides a straight paper path to prevent jamming.

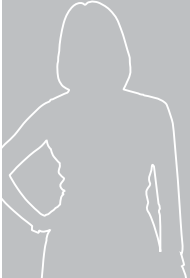
Remember, there are some fundamental differences between inkjet printers and laser printers in regards to ease-of-use. To ensure your satisfaction with your selection, the single most important point is to use these printing devices as they were intended. Avoid using personal printers in a shared environment and keep shared printers away from the desktop.




"I need a low cost color printer for personal use."




HP Deskjet




"I need to increase personal productivity at a low cost per page."



HP Officejet



HP Business Inkjet



HP Color LaserJet



"I need a low cost network color printer that can expand as my business grows."



HP Color LaserJet



HP Business Inkjet

Discover a wealth of information, tips and online tools at the HP Color Printing Center www.hp.com/go/color4



"I need the latest color technology and highest performance to increase office productivity."



HP Color LaserJet



"I need professional quality wide/large format printing on a variety of media"



HP Designjet

3 What printing capabilities do you require?

Printing capabilities primarily considers a printer's functionality. In other words: "What can the device do?"

Print quality is an obvious choice when evaluating printing technologies. **Media support, paper handling,** and **compatibility** also deserve equal consideration. Print quality alone is irrelevant if the printing solution is not compatible with your environment or if the media you want to print on are not supported. In addition, paper-handling requirements can be equally important to print quality and compatibility. Combined, these attributes result in a more accurate assessment of a printer's ability to meet your needs.

Print Quality

Many factors influence print quality, three will be focused on here: dpi (dots per inch), number of colors per dot, and dot growth or wicking.

DPI is the traditional measurement and indicator of a print device's output quality. With the advent of color printing however, other factors have a dramatic effect. In particular, increasing the number of colors per dot greatly improves image quality. Amazingly, some inkjet printers with only 600 dpi print resolution are able to produce photographic results due to the range of colors they can fit into a single dot. The image enhancement technology that provides this capability in inkjets is referred to as HP PhotoREt and has forever changed the usefulness of dpi as the sole metric for determining print quality.

These imaging enhancement techniques are also used by HP Color LaserJet printers HP Color LaserJet printers (referred to as ImageREt) with similar results. However, due to the differences between inkjet and laser printing technologies the amount of improvement in image quality varies.

A 4 to 5 picoliter droplet of ink is incredibly small. Over thirty droplets are used just for one printer dot. Controlling and varying these droplets allows many

different colors to be produced in a very small space (a single printer dot). In contrast, laser printers use toner particles that are approximately 5 to 6 microns in size. This is incredibly small also, but not as small as an ink droplet. Fewer colors can be produced in the same amount of space (a printer dot), therefore more halftoning, or using more printer dots is required. The result is that inkjet printers can potentially provide superior image quality at a lower dpi than laser printers at a higher dpi. Ironically, the historical emphasis on dpi as the critical factor for assessing print quality has made these print quality improvements difficult to explain. To further complicate matters, text and vector graphics are unaffected by these image enhancement techniques and for this type of output dpi remains the key indicator of quality. The bottom line, use your eye, not dpi, when evaluating image quality.

What does this mean? While today's inkjet and laser printers all print text, graphics and images with excellent quality, inkjet printers have a slight edge for photographic or image printing and laser printers have an edge for durability and printing text and graphics.

But the story doesn't end there because a higher dpi and more colors per printer dot may not be enough information for choosing the right solution. To determine why an increase in dpi doesn't directly translate into better print quality we have to discuss print media which in turn affects dot growth.

Print quality is also dependent on the composition of the print media, which in turn affects dot growth. Inkjet printers fire ink drops on the paper and as the liquid is absorbed the ink can spread and grow larger, like water being absorbed by a paper towel. This also affects color quality. To prevent this effect, specially coated paper is required to slow the absorption rate, thus reducing dot growth. To compensate for this effect when using plain paper, inkjet printers are set to normal mode, which reduces the amount of ink used. Even if an inkjet printer is capable of 1200 dpi resolution, output quality will be compromised by this normal mode setting and dot growth. Special media can be used to reduce these effects.

Laser printers don't have this issue because the toner is made of small micro-fine plastic spherical particles that are not absorbed by the paper. Instead the particles are melted and pressed with hot fuser rollers onto the surface of the paper. Dot growth is minimal and excellent results can be achieved with plain paper. In addition, laser printers use edge enhancement techniques that further improve text and graphics quality. Black text, as well as other text and graphics requiring only primary toner colors (i.e., no halftoning), is incredibly sharp and crisp. A laser printer with 600 dpi resolution and enhancement technologies can match and in some cases surpass the output capabilities of conventional 1200 dpi devices on plain paper.

So what does media-type mean to print quality? With inkjet technology you will see a greater range in print quality based on the type of paper used, with photographic results on specialty media. Specialty papers (or conversely, low-grade recycled papers) have less of an impact on image quality with laser technology.

Media support

Media support, which principally covers papers, is an area where inkjet printers and laser printers differ considerably. The first concern is media size and weight. Consider the types of documents that will be printed. Do you need wide format or automatic duplexing (two-sided printing) capabilities? Will you be printing envelopes or other unusually small page sizes? What about card stock or other thick media, including transparencies? If so, you can eliminate all products that do not support your specific needs.

HP media compatibility list

HP LaserJet compatible media

- LaserJet paper
- Multipurpose paper
- All-in-one paper
- Office recycled paper
- Printing paper
- Color laser paper
- Copy and print paper
- Soft gloss laser paper
- LaserJet tough paper
- High gloss laser paper
- Cover paper
- Color LaserJet transparency
- LaserJet monochrome transparency

HP Inkjet compatible media

- Printing paper
- All-in-One paper
- Multipurpose paper
- Office paper
- Tri-fold brochure
- Brochure & flyer paper (matte and glossy)
- High-gloss film
- Transparency film
- Banner paper
- Iron-on transfers
- Greeting cards (textured and linen)
- Photo greeting cards
- Photo paper (glossy and matte)
- Satin photo media

HP Designjet compatible media

- Bonded and coated paper
- Technical paper
- Film (technical and graphic)
- Photographic paper
- Proofing paper
- Backlit material
- Self-adhesive material and laminate
- Banner or sign material
- Fabric/textile material
- Fine art printing material

Visit www.hp.com/go/supplies to learn more.



Laser technology has more limited support for special media due to the high temperature of the printer's fuser rollers. Thick media can alter the distribution of heat and the toner may not fuse properly. Special labels are also required because the adhesive can melt. Inkjet printers on the other hand, can easily accommodate a wide range of media including photographic paper, CD and DVD labels, T-shirt transfers, cloth, transparencies, card stock, business cards and more.

If your printing needs include both plain paper and special media, determine which is predominant and choose an appropriate technology designed for the majority of documents you expect to print. If necessary, use both technologies to capitalize on the strengths of each. This is very common in today's office environments.

Paper handling

Paper handling can also be a deciding factor in determining whether inkjet or laser technology is the right choice for your printing needs.

Common paper handling accessories include input and output trays, duplexers (which enable printing on both sides of the page), mailboxes and sorters, stackers, staplers, as well as other finishing devices. Input and output trays and the duplexer maximize unattended operation and reduce operational costs while the other options are well suited for supporting large workgroups or lengthy print jobs. If you need advanced finishing or output capabilities such as stapling and mailboxes, a department-class HP color LaserJet printer is probably the best solution. For workgroups, efficient solutions may include HP Business Inkjet printers or workgroup and departmental-class color HP Color LaserJet printers which feature duplex capabilities along with expandable input/output capacity. Some advanced features (such as duplexing) can even be found in some personal-class inkjet and laser printers.

HP Printer Naming Guide

- c = Color inkjet printer
- d = Includes duplexing unit for automatic two-sided printing
- g = Optimized for graphics
- h = Includes high input/output capacity for heavy duty printing
- mfp = Multi-function printer that includes added memory and features
- n = Network ready with a built-in HP Jetdirect print server
- ps = Includes true Adobe® Postscript® Level 3
- s = Includes stapler or stacker device
- t = Extra paper tray

Compatibility

Evaluating compatibility can help ensure the right printer has been selected. Important areas to consider include:

- Printer Languages
- Connectivity
- Network Protocols
- Operating Systems
- Software Applications

Traditionally, laser printers were better suited to meet these compatibility demands but, with advances in technology, reached an advanced level of network capability.

Inkjet and laser printers deploy two different printing methods, PDL-based and host-based, to meet a variety of user needs. It's important to determine which printing methodology fits your printing environment.

With PDL-based printers, print data is transferred directly to the printer for rendering and, therefore, doesn't rely on the sender's computer for processing. PDL-based printers are compatible with a wide variety of operating and network operating systems, and are recommended for shared print environments of two or more users.

Host-based printers rely on the host computer to render the print job before sending it to the printer. While acquisition costs are generally lower for these printers, the host computer may be slowed while processing print jobs. The printers also require a specific driver for each supported host computer and unique operating system. Host-based printers are compatible with select Microsoft® Windows® and Macintosh® operating systems, and are ideal for one or two users working with one of these supported operating systems.

HP Color LaserJet 9500

The HP Color LaserJet 9500 series printer creates superior image quality and color, even on wide-format HP media and films. The optional document-finishing features accommodate your department, office, or promotional publishing needs.





The **HP Officejet 9100** all-in-one series delivers cost-effective, high-performance document management with speeds of up to 25 pages per minute black and 22 ppm color in Fast mode.

4 What are your performance requirements?

Which are faster, inkjet printers or laser printers?

Traditionally, laser printers have outperformed their inkjet counterparts. **Pages per minute (ppm)** is usually the metric to indicate how long it takes a printer to produce a printed page. It refers to how many of these pages can be produced within one minute.

The number of pages a printer can produce in a minute represents only one component of the printing process: engine speed. It does not take into account document complexity, spooling time, contention, transmission speed, language processing, or paper handling. Whether taken individually or combined, these factors can affect overall print job time. Measuring this **“throughput speed”** instead of engine speed alone yields a more accurate performance assessment. This does not mean that engine speed specifications are now irrelevant. On the contrary, they represent a printer’s performance potential.

However, you should consider variances that might affect performance such as computer types, software used, and document complexity. Larger paper sizes, duplexing, and transparencies can reduce performance as well. Choosing higher quality print modes can also slow down the printer. Also, some laser printers employ power save features that require a warm-up period before actual printing can begin. You’ll need to consider all of these and determine which of them you’re likely to use and how they will affect performance.

Shared office printers, as opposed to personal desktop printing solutions, also include contention issues. This is because two or more users may attempt to print at the same time. Typically, the printer receives only one job, while others are required to retry until accepted. This can be a serious problem if too many users share a single print device.

This problem often goes unnoticed because most print jobs are redirected to a queue on a print server residing on the network. It solves the contention issue, but at the expense of network bandwidth. Print jobs, which can be the largest consumer of network resources in most offices, now have to travel twice on the network: once to the print server and again to the shared network printer.

If you have considerable network bandwidth, this will not be a problem for you. But with the migration to color office printers and increasing multimedia content found in many organizations, your network may become sluggish and frustrating for all users. The result of this contention is that a printer’s throughput speed will suffer dramatically. In the case of HP office laser printers and business inkjets, this has been addressed by the inclusion of embedded technologies that effectively reduce the impact of contention. These technologies include **multiple frame buffers, job overlap, HP Jetdirect 10/100 network interface cards, and multiple TCP/IP session support**. These printers also have optional disk drives that can be used to minimize network traffic and document processing time, thus improving your ability to manage printer contention and factors that affect throughput speed.

Generally speaking, office laser printers and business inkjet printers perform well in shared printing environments, while personal inkjets and personal laser printers are better suited for the desktop.

The bottom line: Consult independent testing data. Look for results testing your type of documents, if possible.

Discover a wealth of information, tips and online tools at the HP Color Printing Center
www.hp.com/go/color4

What are your performance requirements?

HP Designjet 130



HP Designjets

HP offers a range of printers incorporating inkjet technology tailored to meet specialized needs of large/wide format prints, proofs, and photos. A few popular choices include the HP Designjet 500 and 5500, as well as HP's most affordable 24" graphics printer, the HP DesignJet 130 shown here.

Comparing monochrome and color printing speeds

	Mono laser-quality speed	Color laser-quality speed
HP Business Inkjet 2300 ¹	9 ppm	5 ppm
HP Business Inkjet 2600 ²	5.5 ppm	4 ppm
HP Business Inkjet 3000 ³	14 ppm	8 ppm

¹"Laser-quality speed" benchmarks the page-per-minute speeds of the HP Business inkjet 2300 series printers against the HP Color LaserJet 4600 at comparable print quality. This comparison is based solely on HP's internal tests.

²"Laser-quality speed" benchmarks the page-per-minute speeds of the HP Business inkjet 2600 series printers against the HP Color LaserJet 4600 at comparable print quality.

³"Laser-quality speed" benchmarks the page-per-minute speeds of the HP Business inkjet 3000 series printers against the HP Color LaserJet 4600 series printers at comparable print quality. This comparison is based solely on HP's internal test.

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HP is the only printer vendor to receive an "A" rating in *PC Magazine's* service and reliability survey for 12 consecutive years and an A+ the past two years.

5 How important is reliability?

Printer reliability is primarily concerned with three components: device readiness, availability, and the ability to consistently complete the print job request with acceptable output quality, without failure.

Occasionally, printers take themselves offline and are unable to service other print requests until some specific maintenance procedure is performed. Some of these maintenance tasks, or interventions, are simple, and others may require a service technician. Regardless of the type of intervention required, the goal should always be to minimize the amount of time the printer is unavailable, referred to as printer downtime.

The key to achieving high reliability (uptime) with networked office printers is proper placement and a good understanding of a printer's maintenance requirements and procedures. Proper placement is about choosing the right size of printer to match a workgroup's needs. Too much printing capability can be excessive, but too little can create a number of reliability issues. Repair costs are likely to be higher due to excessive wear and tear on the print engine. The right solution is designed for the current printing environment, with some capacity to grow.

You can use the printer's duty cycle as a guide for selecting the right printing solution. Duty cycle represents the printer's maximum usage level per month. However, from a productivity standpoint, you should also consider paper tray capacity, speed of printing and printer availability needs.

If your required print volume would result in running a printer at or near the maximum duty cycle, you could expect frequent interventions such as paper reloading, and cartridge replacement—which would impact device readiness and availability. Where you are concerned about "right sizing" your printer for the tasks it will handle, you should consider picking a printer which has a duty cycle that exceeds your maximum output needs by a substantial margin, so that your productivity remains high.

Some level of maintenance is required for every printer. It's important to know what maintenance procedures need to be performed and the frequency. At a minimum, paper and ink or toner will need relatively frequent replenishment. Be prepared for these printer events by keeping a small inventory of supplies near the printer or somewhere centralized and easily obtainable. With personal inkjet and laser printers, this is easily accomplished by desktop users, but becomes increasingly complex when more users attempt to share them on a network.

Shared business inkjets and office color laser printers are less convenient on a desktop than in a shared setting due to their larger size. However, they have additional features like greater input and output capacities, as well as high-yield consumables that minimize printer intervention. This increases printer availability and reliability.

The key to achieving high reliability (uptime) with distributed office printers is proper placement and a good understanding of a printer's maintenance requirements and procedures.

If you have many different models of printers in your office environment, managing the consumables and maintenance supplies can become a formidable task. Fortunately, shared printers such as business inkjets and office color laser printers, and even some personal printers contain **embedded software technologies** that help with supplies-related issues.

These printers feature embedded web server software that enables the printer to send email notification messages or pager alerts to support staff, suppliers or service organizations. Local supply inventories can effectively be eliminated. Consumables and other supplies can arrive just in time and consequently improve the printer's availability to service print requests. With this technology, it is even conceivable that a service representative might appear before a printer requires maintenance or consumables.

HP shared printers ship with an embedded web server that provides the ability to remotely manage the device via a standard web browser. Support personnel can use this feature to view printer status and possibly correct printer problems without actually visiting the printer. One caveat: If you have a large quantity of these web-enabled printers, it can be cumbersome to manage each printer individually with a browser. For this reason, these printers also include HP Web Jetadmin software to manage all of your printing devices collectively in one web page.



HP Color LaserJet 3500
The HP Color LaserJet 3500 series printers offer affordable, vibrant color and time-saving simplicity in a space-saving design.

Monthly Volume or "Duty Cycle" of Select HP printers

HP Color Inkjet cp1700 printer series

Monthly volume: 5,000 pages

HP Business Inkjet 2300 printer series

Monthly volume: 10,000 pages

HP OfficeJet 9100 all-in-one series

Monthly volume: 10,000 pages

HP Business Inkjet 2600 printer series

Monthly volume: 12,000 pages

HP Business Inkjet 3000 printer series

Monthly volume: 30,000 pages

HP Color LaserJet 1500 printer series

Monthly volume: 30,000 pages

HP Color LaserJet 2550 printer series

Monthly volume: 30,000 pages

HP Color LaserJet 3500 printer series

Monthly volume: 45,000 pages

HP Color LaserJet 3700 printer series

Monthly volume: 55,000 pages

HP Color LaserJet 4650 printer series

Monthly volume: 85,000 pages

HP Color LaserJet 5500 printer series

Monthly volume: 120,000 pages

HP Color LaserJet 9500 printer series

Monthly volume: 200,000 pages

6 Are you concerned about the total cost of printing?

Purchase price alone doesn't determine total cost of printing. To determine which printing solution best addresses your cost concerns, you need to look at the total cost of printing. This includes operational costs incurred during the lifetime of the printer. These additional costs, plus the purchase price of the printer, represent the **total cost of ownership (TCO)** for a printer.

The low price of personal inkjet printers implies inkjets are a low-cost alternative to color lasers. Depending on usage, a personal inkjet printer's operation costs can be higher than laser printing and even surpass it in terms of overall lifetime costs. This is why it is important to take a closer look at costs before choosing a printer.

What are these additional operational costs? For starters, there are ink and toner supplies. Every time you print, toner or ink will be transferred to paper and eventually require replenishment. The amount of color used in documents and the number of pages printed, will determine the cost of replacement ink and toner over time, as well as the frequency for purchasing these supplies.

You should also consider the cost of the paper. Although plain paper is relatively inexpensive (at less than a penny per page), some specialty coated glossy media can cost more than a dollar per page.

Laser printers also have parts that require periodic replacement. Imaging drums, transfer assemblies, and fuser units are common maintenance items for laser printers. These items tend to be more expensive than consumables, but require replacement much less frequently. For example, a toner cartridge may last for 3,000 pages whereas a transfer belt is good for 100,000 pages. Ironically, even though laser printers have these additional maintenance items, they may be more cost effective than personal inkjet printers. This is because toner cartridges have higher yields than inkjet cartridges. Laser printers also tend to be shared devices, which means more pages will be printed on them. Adding more users to a printing device is probably the single most effective technique for reducing the cost of printing.

For these reasons, plus the fact that laser printers primarily use plain paper, they are generally considered to be the most cost-effective printing solution for the office. However, business inkjet printers combine the low price of inkjet printers with high-yield consumables to offer the lowest cost per color page of any HP color printer. This combined with a relatively low acquisition price contributes to a low TCO.

Other expenditures worth consideration include repair fees, training, utilities (power), and workgroup productivity issues. If substantial, include these costs into your estimate of the total cost of ownership for a printer.

If you really want to get control of printing costs, you should also examine your current fleet of printers. Redeployment techniques can eliminate underused printers and reduce the cost of using others. Not only will your printing environment be optimized, but you'll also maximize your return on your printing investments. Tracking software is available to help determine usage patterns and levels. It automatically logs printing information that can be used to manage your cost of printing on an ongoing basis and highlight areas that need improvement.

Cost-per-page, acquisition price, reliability and support come together to make up a printer's Total Cost of Ownership.

Are you concerned about your total cost of printing?



For some users, these issues may be insignificant. However, for large corporations that are transitioning to office color printers, the printing costs can be significant. By considering the total cost of printing for all devices, you can regain control of this traditionally unmanaged business expense.

You can learn more about reducing costs through balanced deployment strategies and do a self-assessment on-line at www.hp.com/go/assessment.

HP Color LaserJet printers offer HP's lowest cost per monochrome page among color printers.

Redeployment techniques can eliminate underused printers and reduce the cost of using others.

HP Business Inkjet printers offer HP's lowest cost per color page.

Explore HP's Print Cost Calculator at www.hp.com/go/print-calculators

Go to hp.com for more details about each product category.

	Laser Technology	Inkjet Technology
	HP Color LaserJet printers	HP Business Inkjet printers
Acquisition price ¹	\$499–\$9650	\$199–\$1399
Cost of ownership factors ² (cost per page)	Among HP’s color printer family, HP Color LaserJet printers offer the lowest cost per page for black and white printing and a low cost per page for color pages.	Among HP’s color printer family, HP Business Inkjet printers offer the lowest cost-per-color page and low cost per page for black and white printing.
Media capabilities www.hp.com/go/supplies	Optimal for high volume, plain paper printing. Limited support for specialty media.	Supports a wide range of media types.
Print quality	All technologies offer excellent print quality for text, graphics and image printing. However, HP color LaserJets have a slight edge for text and graphics and quality is less dependent on media type used. Include HP ImageREt 2400 and HP ImageREt 4800 technology.	All technologies offer excellent print quality for text, graphics and image printing. However, inkjets have a slight edge when printing images. The use of specialty media can increase photographic print quality. Up to 4800x1200 optimized dpi.
Speed/performance mono and color	Mono: up to 24 ppm depending on model; Color: up to 24 ppm depending on model.	Mono: up to 26 ppm draft mode, 14 ppm normal mode depending on model; Color: up to 22 ppm draft mode, 8 ppm color normal mode for laser-quality speed. ³
Networking or shared printing	Personal and network-ready models available.	Personal and network-ready models available.
Duty cycle, monthly	30,000 – 200,000 pages	5,000 – 30,000 pages

¹Estimated U.S. retail price, actual price may vary.

²Cost-per-page is a function of page coverage, print quality, paper costs, power consumption as well as other product consumables such as print drums, belts, etc. To best project what your actual cost per page would be, visit www.hp.com/go/color and try our print cost calculator which allows you to enter your projected page coverage to calculate costs specific to what your usage would be on HP Color LaserJet and business ink printers.

³Laser-quality speed benchmarks the page-per-minute speeds of the HP Business Inkjet 3000 series printers against the HP Color LaserJet 4600 series printers at comparable print quality. This comparison is based solely on HP’s internal test.

HP Deskjet printers	HP Officejet all-in-one devices	HP Designjet printers
\$39–\$499	\$149–\$999	\$799–\$19,995
HP Deskjet printers offer the lowest acquisition price for affordable entry into color and black and white printing.	Among HP’s color printer family, HP Officejet all-in-one products offer the lowest acquisition cost for versatile print, copy, scan and fax capabilities in a single, compact device.	Cost of ownership factors: Among HP’s color printer family, HP Designjet products offer the most versatile range of output sizes and media for cost-effective wide-format and large format print production.
Supports a wide range of media types.	Supports a wide range of media types.	Supports a very wide range of media types.
All technologies offer excellent print quality for text, graphics and image printing. However, inkjets have a slight edge when printing images. The use of specialty media can increase photographic print quality. Up to 4800x1200 optimized dpi.	All technologies offer excellent print quality for text, graphics and image printing. However, HP Officejet products, like other inkjet products, can offer slight edge when printing images. The use of specialty media can increase photographic print quality. Up to 4800x1200 optimized dpi.	All technologies offer excellent print quality for text, graphics and image printing. However, HP Designjet products, like other inkjet devices, have a slight edge when printing images—especially when high-quality large format images are desired. The use of specialty media can increase photographic print quality. Up to 2400x1200 optimized dpi.
Mono: up to 20 ppm draft mode depending on model; Color: up to 15 draft mode depending on model. No laser-quality rating available	Mono: up to 25 ppm draft mode depending on model; Color: up to 22 ppm draft mode, depending on model. No laser-quality rating available.	Color: up to 11 ppm for letter size, up to 45 seconds for a 2" x 3" drawing, depending on model
Network capabilities vary from model to model and in some cases require an optional external network device.	Personal and network-ready models available.	Personal and network-ready models available.
500 – 5,000 pages	1,000 – 10,000 pages	900+ pages

When it's HP, it works.

As you consider which HP product to choose, realize you've already made a sound decision. HP is the undisputed leader of the printer industry. Backed by two decades of experience, innovation, and an annual investment of billions in research and development, the products you find in this guide offer unsurpassed performance and reliability.

It's no surprise that HP received an A rating in *PC Magazine's*¹ annual Service and Reliability Survey, stating that HP continues to lead the printer market on every cost, quality and reliability measure for the 12th consecutive year and an A+ the past two years. HP quality and reliability—when it's HP, it just works.

Buy online, by phone, with a reseller, or direct with reseller support—it's easy to get the HP products and supplies you're looking for, when and where you'd most like to buy them.

¹PC Magazine A+ Readers Choice Awards, August 2003. PC Magazine Reader's Choice Award is a trademark of Ziff Davis Publishing Holdings Inc. Used under license.

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HP Color Printing Center www.hp.com/go/color4

5981-9227ENUS, 05/2004

