

**W**hen you're ready to print your images, you have two options: send the images out to be printed, or do it yourself. Sending images out – either to a local finisher, or to an online service – is the cheaper way to go, but when you print images yourself, you'll have much more control. In addition to being able create test prints and then refine your image, you can try printing on different types of media, which can yield very different results.

While there are several different color printing technologies available today – inkjet, laser, dye sublimation – for serious photo work, the only one you need to concern yourself with is inkjet printing.

When shopping for a printer, you'll want to consider the following.

## **Archivability**

After you've perfected a print's color, the last thing you want is for the color to fade or alter once the print is hung on the wall. A printer's archival characteristics are a measure of how well the print will hold up over time in real-world display conditions. A print with good archival qualities will go for years without fading or changing color.

Some ink colors are more vulnerable to light than others. Yellow, for example, fades much faster than other primary ink colors. Because the color in a print is composed of a mix of primary inks, if the yellow begins to fade, the colors in an image are no longer mixed properly, and the hues begin to skew.

The interaction between inks and paper also affects the life of a print. For example, when ink sits in an emulsion on the paper's surface, the emulsion encapsulates the ink, giving it extra stability. In a less stable ink/paper duo, the ink seeps deep into the paper, where it's more prone to light, humidity, and acids in the paper.

There are two main categories of ink: pigment and dye. Until recently, pigment inks were the only way to get extreme longevity out of a print. However, pigment inks typically have a much narrower color gamut than dye inks, so pigment-based inks often yield images that lack bright reds and blues.

Over the last few years, this difference has, well, faded. The latest generation of pigment printers has a much wider gamut, while the latest generation of dye printers provides much better longevity. Consequently, you no longer have to make an immediate "dye or pigment" choice when considering printers. Instead, you can examine both image quality and longevity claims to decide which printer is right for you. Whether that printer turns out to use pigment or dye-based inks doesn't really matter.

Obviously, it's impossible to know the lifespan of a print from a printer that's only a year or so old. Wilhelm Imaging Research is a laboratory that specializes in evaluating and predicting the archival qualities of printed output. You can find stats for specific ink/paper combinations created by specific printers at *www.wilhelm-research.com*. These stats are the industry-accepted standard for longevity predictions.

A traditional silver-halide print (the type made in a darkroom) will last from 20 to 40 years. If your printer claims longevity of at least 30 years, you'll know that your prints will last at least as long as the photographic prints that have been made and sold for the last 100 years or so.

Note that some people take the Wilhelm Imaging Research numbers with a few grains of salt. The WIR numbers are based on subjecting a print to a particular stress condition for a certain amount of time. The procedure does not test a print for how it holds up under years' worth of variable light and climate conditions (seasonal changes, being moved around, etc.). As such, many people think it's wise to reduce the WIR numbers by 25 to 50 percent. Even after this reduction, many printers will still yield much better longevity than traditional wet darkroom prints. Also, note that if a paper/ink combination is rated for 50 years, that doesn't mean that on the first day of year 51, you'll be looking at a blank piece of paper. Rather, after 50 years or so, the print will begin to exhibit hue shift and fading, some of which might be barely perceptible. It could still be many more years before the print looks outright bad.

When considering archival quality, you should also think about durability. How waterproof is the output from a particular image? Does it scratch easily? Can it hold up to repeated handling? Depending on how careful you are (and what will be done with your prints), some of these issues may be more important than others.

## **Image Quality**

In the end, you'll want to base your printer buying decision on overall output quality. The best way to judge final quality is to make prints on your candidate printers. Many printer vendors provide free samples, although these have often been crafted to show off the printers' strongest points. The ideal test is to print your own images on the printers you're considering. Some photo stores will let you do this, and you may find friendly people in online photography forums who are willing to print a couple of sample pages for you.

You'll be best served by printing tests on both matte and glossy papers, as these yield very different results. You'll also want to pick an image, or images, with a broad range of colors (both in terms of hue and lightness), and light and dark areas, and areas of fine detail. Once your sample prints are in front of you, evaluate the following properties:

**Color.** How is the color overall? Don't consider color accuracy, since accuracy is dependent on how well you drive the printer, and right now, you're just doing simple tests. Instead, look at overall range of color. Can the printer produce bright reds, greens, and blues? How are the colors in between? Do the colors look vibrant, or are they dull and flat?

**Continuous tone.** Can you see visible printer dots, or does the print appear to be continuous tone? Pay close attention to bright highlight areas (clouds, specular highlights on glass or metal), as these areas usually show visible dots when the printer is having troubles. Also, look at the transition zones (the gradients around these highlights) and ensure that they're smooth.

**Neutrality.** If you intend to do a lot of black-and-white printing (more accurately called *grayscale*), you'll want to do some grayscale tests as well. Printing neutral gray tones is very difficult for a printer, and until recently, it wasn't possible to get a truly neutral gray print from an inkjet.

Even if you're not planning to print grayscale images, check the neutral tones in your image (clouds in skies, for example) to make sure they're neutral. True neutral can be a hard thing to spot because your eye does a pretty good job of correcting grays that aren't truly neutral. What you're trying to spot are color casts (usually green, but sometimes reddish or blue) in tones that should be gray. To ease your search, keep an actual black-and-white photographic print handy, as a reference to what true neutral really looks like.

**DMax.** The blackness of the black a printer can produce is measured as a property called *DMax*. Blackness is very important because as your ability to produce a black increases, so does the contrast range you can reproduce. Go for the blackest black possible. Because matte papers usually yield blacker blacks than glossy papers, test on both types.

**Detail.** How good is the detail in the image? Detail is also a function of how well you drive the printer (and how good your source image is), so don't lend too much weight to this parameter unless you're confident you know what you're doing.

**Metameric shift.** View the prints under different kinds of light [md]direct sunlight, shade, tungsten light, fluorescent, mixed lights [md]and look for shifts in overall color. If you see a shift, your print is suffering from metameric shift, which is most prevalent in pigment-based printers and most visible in gray tones. (Metameric shift is sometimes mistakenly referred to as *metamerism*.)

**Bronzing.** A print whose black tones appear reddish-brown is suffering from bronzing. To spot it, view prints from an angle and pay particular attention to the shadow areas.

**Gloss differential.** When printing on glossy papers, some printers yield blacks that have more of a matte finish than the other colors. In such a print, the overall image will appear glossy, but when viewed at an angle, the blacks will appear varnished with a matte finish. Some printers have a special "gloss optimizer" that's sprayed over the print to even out the gloss.

**Overall quality.** Finally, assess the overall quality of an image. Stand back, look at the prints, and decide whether you like one better than the others. It's okay if you're not sure why you like one print better. Sometimes, it's an unquantifiable combination of factors that combine to produce a superior print.

If you have special printing needs the capability to print on watercolor paper or cloth, for example examine output on those media as well. Just because a printer prints well on one kind of media doesn't mean it will perform as well on another.

The good news is that if you're looking for a fine-art quality photo printer, the latest generation of printers from Epson, HP, and Canon are all excellent. Epson still has a slight lead, but when comparing competing models you'll probably find very little difference in image quality, which means you can make your decision based on printer features and media supply.

## Features

Since current fine-art, archival photo printers (as of spring, 2009) are yielding prints of excellent, nearly indistinguishable quality, you can base the bulk of your buying decision on features. A number of features and options can make one printer a better choice than another, depending on your output needs, computer system, and what and how you like to print.

**Output size.** One of your most important decisions will be output size. Is letter size as big as you need, or might you like to go up to 13" [ts] 19"? A 13" [ts] 19" printer offers more flexibility, but also takes up more space. If you want larger still, you can go for 24", 36" or larger. However, don't expect to get into a 24" printer for less than \$1,200. It takes a lot of data to make a large print. If you're shooting with a three-megapixel camera, a 13" [ts] 19" print won't look too good. Basically, don't pay for more printer than you can use.

**Borderless support.** When considering image size, take note of whether the printer can create borderless prints and at what sizes. Just because a printer can output 13" [ts] 19" doesn't mean it can produce a borderless 13" [ts] 19" print.

**Connectivity.** These days, all printers come with a speedy USB-2 interface, which is all you need to connect to most Macs and PCs. Some printers also offer FireWire ports, which can offer a degree of convenience, as they don't require you to tie up a USB port. Perhaps the most significant connectivity option is an Ethernet port with built-in network support so you can easily share the same printer among different computers.

**Paper handling.** How easy is it to load and unload the printer? Does it provide a straight-through paper path that will allow you to feed thicker, heavier media? If not, what's the thickest media it will support? If you plan to put the printer up against a wall, then you might want to look for a model with a top-loading feeder.

**Roll feeder.** Some printers offer the option to print on rolls. Rolls can be cheaper per print than cut sheets and offer the option to print odd aspect ratios, which make them ideal for printing panoramas and other less-common sizes.

**Ink usage.** Some printers are more economical with their inks than others, which equates to a lower cost per print and makes for more hassle-free printing, since you won't be running to the ink store as often. Ink usage is not something you can evaluate on your own before buying, but many printer review sites will provide you with good information on ink consumption.

**Ink swapping.** At the time of writing, some Epson printers require you to swap out one black ink cartridge for a different type any time you want to switch between matte and glossy papers. In addition to being a hassle, this consumes a fair amount of ink. Due to the way the Epson print heads work, it must "re-charge" the print head with new ink, which can use up a significant volume of ink if you regularly change from one paper type to another. Other printers don't require you to switch cartridges manually, but they still go through an internal switching process, which can take time, and may or may not consume extra ink. You'll want to do a little research and investigate this property before you settle on a particular model, because this will greatly affect your ink usage and printing flexibility.

**Longevity.** If selling fine art prints is your goal, you'll want to consider the longevity of the prints a particular printer can generate. Fortunately, most vendors are very good about publishing longevity claims, and the entire industry is pretty much in agreement that the data provided by Wilhelm Imaging is an acceptable standard for archival estimation. Remember that longevity is not just a function of ink; the type of paper you print on also impacts whether an image will fade or discolor. Pay close attention to longevity claims to ensure the printer in question delivers the archival qualities you want on the type of paper you want to use.

**Quality of the print driver.** In general, most print drivers these days are very good; however, HP and Canon have taken the lead in ease of use and flexibility with some of their printers. For Photoshop users, both companies have developed special Photoshop plug-ins for some of their printers, which allow for much easier printing. As we'll see later in the chapter, Photoshop printing often involves multiple dialog boxes. With a custom plug-in, printing becomes a simple matter of using a single dialog box.

**Portability.** Epson and HP both make dedicated 4" [ts] 6" printers that are very small, and easily moved about. In addition to allowing you to quickly and easily produce 4" [ts] 6" images, some of these models offer the option of battery power, allowing you to take them anywhere to produce prints in the field. In a way, these printers turn your digital camera into a Polaroid[md]a small, portable device that can produce prints anywhere. Currently, these devices are all four-color printers, meaning they don't produce images with the quality you'll get from a more advanced photo printer.

**Extra features.** Depending on the price point you're shopping at, you may find additional features. For example, HP's large-format Z-series printers include built-in paper calibration devices that can generate profiles automatically for any type of paper. Other printers might include special software for printing PostScript files or offer very high speed for high-volume printing. Obviously, these are specialized features, but can be very handy if you need them.

Finally, printers have a resolution property, just like cameras. You'll see printers that list resolutions of 1440 dots per inch or 2880 dots per inch. When it comes to printer selection, this number is pretty much meaningless. Printer dots are very different from screen pixels, and dot *size* is as important as *number* of dots. So don't worry about keeping track of this number when evaluating a printer. Just pay attention to final image quality and pick the printer that produces images you like.

## Stand-alone Ink-jet Printers

One of the great advantages of digital photography is the ease with which you can edit and correct your image before printing. However, if you've been out shooting snapshots with a decent camera, you might not care so much about finicky correction—you might just want a decent print. For these situations, having to transfer your images to your computer can be a frustrating time-drain. To address this issue, many vendors make ink-jet printers with built-in media slots and the capability to print without connection to a computer. The good news is that these printers use the same engines as printers you connect to a computer, meaning you don't have to compromise on image quality to get this ease of use. And, of course, you can still print from your computer for those times when you want to correct and fiddle with your images.

In addition to all the usual print quality and connectivity concerns, when shopping for a printer with stand-alone capabilities, you'll want to be sure it provides support for the type of media card your camera uses. If you're looking at a printer made by the same manufacturer as your camera, there's a good chance you'll be able to print to the printer directly from your camera via your camera's serial cable. Some printers offer a built-in LCD so you can easily select the images you want to print.

If the printer doesn't offer a screen, it should at least offer the capability to print out a contact sheet showing thumbnails of all the images on the card. This will make it easy to select the images you'd like to print.

Some stand-alone printers allow you to print out a page of thumbnails, with check boxes for various print sizes. You can then check off the images you want at specific print sizes and feed that "order form" back into the printer. It will then print out the selected images according to your specs, all with no computer involvement.

Finally, some printers offer built-in image correction. These are usually simple tools such as Auto-Levels adjustments, or the capability to convert to black-and-white or sepia tone. Although no substitute for what you can do using your image editing software, these features do provide a quick and easy way to punch up a simple snapshot.