FLAAR Reports
Digital Imaging, Software, Media, and Inks
FEBRUARY 2004

Which is Better?

Color Laser or Color Inkjet Printer?

Contents

Caption for front cover: Above; Xerox Tektronix laser printer. Below: HP Designjet 20ps inkjet printer

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Abstract

All FLAAR Reports are based on one of our readers asking for assistance with a particular problem. If enough people ask about the same subject, and we don't already have a FLAAR Report to answer the situation, we try to research and write one. Of course all this assumes the subject is within our coverage (digital imaging from input to output, scanners, digital cameras, wide format inkjet printers, finishing (trimming and lamination)).

Here is the letter that triggered this report.

Subj:
GMS Feedback

Date:
1/27/2004 5:34:38 PM Eastern Standard Time
To: *FLAARMAYA@aol.com*

Hello,

I was reading your excellent website (http://www.laser-printer-reviews.org/Tally_8204_11x17_A3_color_laser/product) and noticed the invitation to provide input if we had used a new laser printer. Just today I purchased a Minolta GMS 2300 DL and I must say I am very disappointed in it. I did get clean, crisp, well-cut text, but the pictures were very disappointing. I reprinted a brochure consisting of color photos and text originally printed on an HP inkjet. Everyone preferred the brochure printed by the inkjet. The GMS does not provide the detail or rich color I can get from that silly HP inkjet and the sepia toned photos did not have the same definition either. I should note that these pictures were never more than 4x4 in size.

The GMS does not allow much in the way of fine-tuning or allowing for different paper textures, such as standard to glossy, etc. and fiddling with the contract, sharpening, etc. is time consuming at best because you have to reprint a test page for each and every correction.

We don't print out a ton of color brochures and materials, but I was getting frustrated not only by the cost of inkjet toner, but the lack of paper options - hence by foray into laser printers.

I am not sure I will keep this GMS - I will call support tomorrow and see if they can trouble shoot some of this with me.

Wish me luck!
Sincerely,
Karen

Karen is one of thousands of people facing the dilemma, should I buy an inkjet or laser printer? In the FLAAR digital imaging resource center at two universities we have abundant experience with both laser printers and inkjet printers. We we are in a unique position to provide the reasons to go for one, or the other, or avoid one, or the other.

As with everything in life, there is no one perfect printer. Most large corporations have one inkjet and one color laser. That's what we do at FLAAR and we are definitely not a large corporation. But inkjet is far too expensive and slow for producing bar charts and pie charts. And laser is not yet really good enough for full-color photographs.

Pros and Cons, Laser vs Inkjet

Pros	
Laser Printers	**Inkjet Printers**
☐ You can print duplex (both sides) easily (if you printer has a duplex unit attached)	☐ You can print on metal foil, canvas, silk, cotton, watercolor paper, and more
☐ You can print on plain ordinary paper (but see caveat below)	☐ Printers are free if you buy a computer
☐ Costs are reasonable, between 10 and 25 cents per page Costs are reasonable, between 10 and 25 cents per page	☐ Otherwise printers are relatively low cost compared with laser printers
☐ Although color laser printing is slow, it is not as slow as inkjet	☐ Quality, if you use special paper, is awesome from o Canon o Epson o HP o Lexmark is more for pie charts and bar charts, not as much for photos
☐ Quality of text and line work is excellent	☐ Color management readily available (albeit expensive and with learning curve)

Downsides	
Laser Printers	**Inkjet Printers**
☐ Little or no color management capabilities	☐ Ink costs over a thousand dollars a liter (about a quart), per color
☐ Color is not always dependable	☐ Prints on plain paper are ugly
☐ Most laser printers are intended for pie charts and bar charts, not photographs	☐ To get good results you must use special (expensive) inkjet paper
☐ You do not get the quality at home that you see in trade show demos	☐ Image may easily smear or scratch off
☐ You never get the speed that the manufacturer claims; speed is misleading	☐ Text and line work may be a tad fuzzy due to wayward ink droplets
☐ You may get banding (totally different kind than with inkjet)	☐ A single printed sheet costs about $1 in ink and paper combined. This adds up.
☐ Solid wax ink technology (Tektronix) may easily scratch or scrape off	☐ Speed claims vary from misleading to outright lies
☐ Initial cost of the printer is expensive	☐ You may get banding that shows the path of the printhead across the paper
☐ You can print only on paper, not on canvas or silk	☐ The printer may waste paper and ink due to bad software or poor mechanics
☐ Although you can "print on any paper" results look best only on special paper	☐ Prints with dye ink fade before they ought to.
	☐ Prints with pigmented ink don't last as long as hyped claims say they will
	☐ Some printers are cheaply made and a real pain (Epson 1520 and Epson 3000)
	☐ Yes you can use color management but o tools and software are expensive o steep learning curve
	☐ You may desire or need RIP software (roughly $2500 to $3500, and up).

Comparing Laser Printers to Inkjet Printers

Longevity: inkjet vs laser

We do not review desktop-sized inkjet printers because of problems with fading. An Epson inkjet print with the original dye inks will fade in a few days in a sunny room or after a few months inside even if no sun. There are some new inkjet printers with non-fade inks but be sure you get all the color spectrum you need (non-fade inks on inkjets have limited gamut). Only way to be sure is to take the same image and test it on an inkjet and then on a laser printer. In any event, we prefer laser printers especially now that you can get closer to photo-realistic quality in 11 x 17 inch size.

With some Epson inkjet printers the paper itself will discolor from ozone. So even presuming the ink will last, the media self-destructs (sometimes after a few weeks).

A laser print may potentially last as long as the paper itself lasts. Laser paper is more likely to last than inkjet paper.

The 200 year longevity claimed by Epson for their inks has not been accepted by the industry. Kodak was the first company to speak out on these problems openly. The commercial testing company that started the 200 year claims closed down for many months. When they finally reopened, the longevity claims collapsed an entire century because Epson had to change their ink formula, again. A few weeks later, Epson removed the 200 year claim from their web site. Indeed Epson is not even claiming a single year of longevity with any warranty. So clearly people realize that inkjet prints will not last as long as was presumed.

As for longevity of laser prints, it is estimated that the color will last about as long as the underlying paper.

Making lots of copies: inkjet vs laser

If you tried to print 100 copies of anything on any inkjet printer you would quickly (if several hours is quickly) understand why an inkjet is totally inappropriate. Since FLAAR does not sell printers and does not accept advertising we can let you know the raw facts on printers. Inkjet printers are made to do single copies; they are too slow to print multiple copies.

Epson 5500 printer at BGSU-FLAAR

Inkjet printers are deliberately cheap. The inkjet companies want to give you the printer as close to free as possible so they can then sell you overpriced ink and paper. A single sheet of paper plus ink costs about $1 a sheet. Your printing costs may quickly exceed your rent or your car payments (and then the prints fade!). Some Epson inkjets can't do black-and-white (they look green). We get more complaints on the Epson 1270, 1520, and 3000 than all other printers combined. Only after complaints got loud enough did Epson finally come out with their new seven-color system with a special black to avoid their earlier problems. Metamerism is not as serious with Epson printers today as it was two years ago.

But if you need to print a book, use a laser printer. Desktop publishing is what laser printers are all about. However doing 200 copies with a color laser is by no means very fast either. Most laser printers have to make four passes, once with Cyan, then with Magenta, then Yellow, then black.

Printing on both sides: inkjet vs lasers

In case you need to print on both sides the jargon for this is “duplexing.” This means you need a “duplex” accessory to your laser printer. Inkjet printers do not have duplex units because normally inkjet can not print on both sides because the paper is coated only on a single side. Double-sided inkjet paper is available from a few places but tough to find.

Some printers over-saturate the image with excess ink, which leads to buckling (ripples in the paper, like waves). That causes the printheads to hit the crest of the ripples, sometimes destroying the print-heads if they are piezo.

Left:Xerox Tektronix laser printer. **Right**: Tally booth exhibiting at SGIA trade show.

On a laser printer it is easier to print on both sides because you can use uncoated paper. However you absolutely have to have a duplex unit to print on the other side (in most cases, and especially if you do not wish to ruin the insides of your laser printer). If your printer does not accept a duplex accessory, you can forget printing on both sides! Why can’t you just print on one side, turn the paper over and print on the other side as on earlier printers?

Because the toner on the first side will become unstuck from the heat inside the printer. This toner will then stick itself to the insides of the printer and mess up all subsequent sheets that come into contact with it. It cost me just under $500 to repair my Lexmark after I attempted to do manual duplex printing on both sides.

Ink cost: inkjet vs laser

A laser printer will cost more to buy the machine, but paper and toner costs are reasonable. An inkjet printer is priced very cheaply in order to ensnare you into being stuck buying their overpriced ink. With an inkjet printer the cost of ink and media can mount up rather quickly.

Toner cost for a laser printer is much less costly than ink cost for inkjet.

Selection of variable materials: inkjet vs laser

You can run almost any material through an HP 1050 or 1055cm (large format inkjet printer). FLAAR has entire reports on the dozens of kinds of media you can run through other Hewlett-Packard Design-Jet (wide format inkjet) printers. Textiles, metal foil, silk, magnetic material all can be printed on with inkjet.

Desktop inkjets can print on a wide variety of materials, though most of the exotic media are on rolls for the wider commercial inkjet printers, not so much for home use.

Laser printers take paper and a few other materials. Some laser toners allow rudimentary dye sublimation transfers onto T-shirts. “Melted wax” Xerox-Tektronix solid-wax printers are good for overhead transparencies (the sheets you used to illustrate lectures before the advent of PowerPoint).

Helpful information on media for your laser printer is on http://cp.ru/goods/Inform/prl/books/07-chp7.html

If you need really great paper for color laser, see if Tecco material from Germany is available in the USA. This is not ordinary paper so only inquire if you are serious. I believe they have a special paper for making postcards.

Above: Media samples of Xerox-Tektonix printers.
Below: Tecco media at Best booth.

Capability of printing on thick or stiff material: inkjet vs laser

Printing postcards, cover stock and other thick material is tough on either inkjet or laser printer. Most inkjet material will not fold neatly. Since your inkjet media has to be coated (in almost all cases) you can only use what is already coated. True, if you are very adept you can coat some bizarre unique material, but such a coating would be too uneven if applied by hand or brush.

Getting card stock through most laser printers is tough. Be sure you test before you buy a whole skid or an entire truckload.

Quality of printing: inkjet vs laser

Laser printers do an excellent job of letters, especially if they have PostScript capability. Inkjet printers may fail to avoid jaggies (stairstep outlines of text or line art). To get an inkjet do produce letters without jaggies requires using Adobe PostScript interpreter. This implies buying a RIP software. RIP software includes more Adobe or an emulator. A RIP for a wide format inkjet printer costs about $2,500; often the software costs more than the printer!

Most of the better laser printers have Adobe PostScript built into them (which is why a laser printer costs more than a cheap inkjet, since the inkjet has inadequate software). Now some printers are adding Raster Image Processor software too.

The top models of QMS and Tektronix do a good job of reproducing photographs if your original photograph itself is of professional quality. Office laser printers such as Lexmark and HP do okay with photos (HP is better nowadays).

In desktop inkjet printers, Epson and Canon produces outstanding quality but most of the images fade quickly. Lexmark and HP are more for business printing on average paper, such as pie charts and bar charts. Downside is lack of longevity. In that respect laser is still better.

Nicholas photos of Guatemalan Mayan textiles printed on the HP 20ps.

Variability among prints: inkjet vs laser

With an inkjet printer you will tend to get all the prints more or less the same color as long as you stick with one single kind of paper. Not precisely identical color, but similar. In terms of color consistency: the same image, on the same printer on two difference days. Inkjet will not always be identical color from day to day, but laser color may be off even more. Where you really get severe color differences is switching from one paper to another brand on the same inkjet printer. Since each paper mill uses different chemicals on their inkjet coatings, the ink reacts differently. It takes color management tools and software to calibrate the printer, ink, and each brand of media. FLAAR has an entire Series of reports on what it takes to accomplish this with inkjet printers.

With a laser printer, if you print many copies, or print some first and then re-submit and print more another day, the colors may vary. So precise color matching is not yet perfected on most desktop laser printers. However the newer printers being released this year do have improvements in hardware and software trying to overcome these well known deficiencies.

If you have one of the few laser printers which can accept RIP software, then you can control your colors better. As mentioned above, this implies that you learn color management.

Summary and Conclusions

In summary, laser printers use dry toner or melted wax on plain paper. Inkjet printers use colored water whose chemicals interact with other chemicals in a special layer called inkjet receptor layer. So an inkjet can print onto any material which is covered with these chemicals, be it metal, cloth, synthetic, or paper.

If you want photo-realistic quality, this requires an inkjet printer. You will see photo-realistic quality on laser printers in trade show booths. But unless you are Ansel Adams it is unlikely you will achieve the same quality in your home or office on a laser printer. But with an inkjet, if you photo is of nice quality you can get a good print.

A lot also depends on how well you know Adobe Photoshop. You can't just take an image from a digital camera and expect the printer do to a stunning job. The images that you see at trade shows (both on laser printers and on inkjet printers) have been tweaked and specially prepared to lure you into buying that brand. Our test lab can do the same, but when we print normal .jpg files in a PDF report the results look a bit scruffy on most laser printers (due to the compression of the JPEG software). Yet whenever we take the time to print a high resolution photograph from our large format digital cameras, the result looks like you see in a trade show booth.

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