Technofile: photo printers

If you're buying a new printer for outputting digital images, making the right choice means knowing your pixels from your picolitres. Tom Gorham explains all

Digital cameras may be a great alternative to their traditional film-based counterparts, but when it comes to printing snaps quality can be something of a stumbling block for the unprepared.

While standard colour inkjets or laser printers are capable of reasonable photo reproduction, if you want to emulate the glossy finish of your local processing lab, you're out of luck. Unless, that is, you invest in a dedicated photo printer.

Thanks to booming sales of digital cameras, printers specifically designed to print photos are the hottest printing peripheral on the market. But what exactly are they and why do budding digital photographers need one?

There's little doubt that a dedicated photo printer is worth the investment for anyone who takes their digital photography seriously. The traditional view is that the main difference between standard and photo printers is that the latter are slower and more costly to run. But while there's a grain of truth in this statement, photo printers are only slower when printing at the very high resolutions ordinary printers are incapable of.

And the extra running costs can be put down to the wider range of printing inks that photo printers use to improve reproduction. Whereas standard printers use the basic CMYK (cyan, magenta, yellow and black) inks, photo printers employ additional colours (light cyan and light magenta being the most common) to iron out impurities and cover picture areas where results would otherwise be patchy.

Photo printers also benefit from enhanced functionality, and many models allow you to transfer your photos directly to the printer without needing to be attached to a PC.

So the question should be less whether a photo printer is worth the money, but more how do you sift the real gems from the photo-printing dross?

Printer technologies

Most of the photo printers on the market work using either inkjet or dye-sublimation technology. Dye-sublimation (or dye-sub) printers work by diffusing gaseous dye over paper, producing a high-quality print free of the distinctive pattern of dots common to inkjets.

Their output quality makes dye-subs popular in high-end graphics environments, but their superior image reproduction has allowed them to also carve out a niche in the portable photo printer market.

Although dye-subs have a reputation for being expensive, it is only partially justified. While large A3-based dye-subs can still set back the purchaser a five-figure sum, portable photo printers (outputting pictures no larger than 4x6in) cost little more than a mid-range inkjet.

However, versatility isn't a strength of dye-sub printers, and their demand for specific paper types, coupled with the improved resolution support of inkjet alternatives, makes them look less compelling.

Unless you have extremely specialist requirements, it's more likely that you'll be investing in an inkjet photo printer. While the concept of the inkjet will be familiar to most consumers, it's less well known that the technology can itself be broken down into two common types: thermal and piezo. Both work in broadly similar ways, squirting ink through a printhead as it passes over paper fed through the printer.

The difference is the method they use to transfer the ink. In thermal inkjets, the nozzles of the printhead are heated to create a vapour bubble which forces a droplet of ink on to the paper – for this reason, thermal inkjets are often referred to as bubblejets.

You'll find thermal inkjets manufactured by HP (which developed the technology in the 1980s), Canon and Lexmark. Piezo printers, on the other hand, squirt pressurised ink through the nozzles by charging the printhead with electricity. Piezo technology is most commonly used by Epson. In practice there is little difference between piezo and thermal inkjets, and long-held beliefs, such as the increased accuracy of piezo printers, have petered out.

Specifications

So what features should you look for in the perfect inkjet? However impressive the specifications, it's important to put raw numbers into context. When working with photos, features such as maximum print resolution are less important than the ability to produce vivid, accurate colour.

This is lucky, since working out a suitable image resolution is often a subject of some confusion, due to the different ways in which cameras and printers refer to the resolution. In the case of printers, resolution is measured in dpi (dots per inch), or the number of individual dots a printer can print along a horizontal line an inch long. Digital cameras, on the other hand, use the total number of pixels in an image as a reference point: 3.4Mp (megapixels), for instance.

But remember: even if photo printers can offer high resolutions, you may not be able to make use of this level of detail – the printer can only fulfil its potential if the digital camera takes snaps at a high enough resolution setting. Similarly, high resolutions are generally only useful if you're using dedicated photo paper. It's wasted on more absorbent sheets.

Just as important as a printer's resolution is the size of the ink droplets

High street options

Even if you're one of those trusting souls who believes printer manufacturers' claims pertaining to length of cartridge life, there's no escaping the grim truth that the cost of cartridges and specialist printing paper can dampen the enthusiasm of the most ardent digital photographer.

As a result, alternative printing methods – uploading digital images to an online image printing services or using high street printing outlets – remain a viable alternative. But are they any cheaper in the long term?

Competition is keen among online photo developers, a fact illustrated by the prices charged. Two of the biggest, Fotango (www.fotango.co.uk) and Photobox (www.photobox.co.uk), charge just 49p to develop a single 6x4in print, a cost comparable to standard film development. Prices are every bit as competitive with larger orders – Fotango charges £5.49 for a set of 40 6x4 prints.

The print ordering procedure is straightforward. Once you have created an account online, you can upload photos and order prints. A gallery feature typically lets you view and share images with others as soon as you upload them. There remain two disadvantages to printing your pictures online.

You'll have to budget extra for postage, and you'll have to wait a few days for the prints to arrive by post which undermines the feeling of immediacy that makes digital photography so appealing.
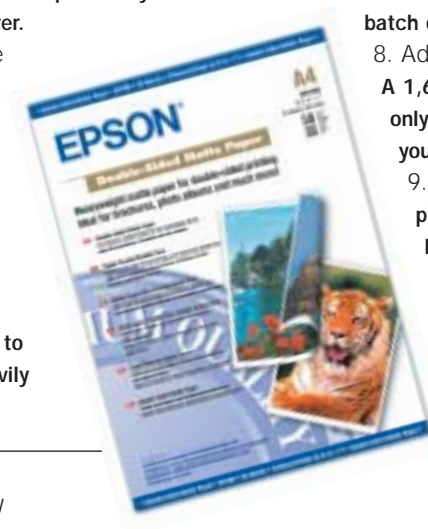
For those who need instant gratification, relief may come in the form of high street digital photo developers, many of whom have installed kiosks that can print out from digital originals.

Mitsubishi will shortly release the £7,000 EPS8000, a standalone instant photo printer designed for installation in shops and pharmacies that can print pictures from CD-ROM or memory card.

Images can be printed directly to paper or burned on to CD in under a minute. It guides users through the printing process with onscreen prompts, and a few basic retouching features (for instance, cropping and lightening) are offered.

Top 10 tips for perfect prints

1. Start with good quality images **If possible, take pictures in good light to enhance colour. If images lack contrast or depth, touch them up in an image-editor before printing.**
2. Use the right paper **Standard office paper is too absorbent to cope with the detail offered by photo printers. Use heavy photo stock for printing photos – preferably the paper recommended by the manufacturer.**
3. Check the manufacturer's website for patches **Printer drivers are frequently updated to provide functional improvements.**
4. Crop images before printing **There's no point wasting ink and paper unnecessarily.**
5. Use highest quality settings **Dropping your camera's resolution will allow you to squeeze more pictures on to a memory card, but you'll lose out heavily on detail.**

6. Calibrate your monitor **Adjust display settings so that what you see on the screen will give an accurate preview of what your printer produces.**
7. Perform a trial run **Avoid expensive printing errors by using your printer's draft settings to print out an image on standard photocopying paper before sending the final batch of photos to the printer.**
8. Adjust resolution to make an image bigger **A 1,600x1,200-pixel image printed at 400dpi will only measure 4x3in. Halve the resolution and you'll have a more respectable 8x6in snap.**
9. Print at the highest quality **If you're using photo-quality paper, check the settings in the Print dialog box.**
10. Convert Jpegs to Tiffs first **It's important to make file format changes before you manipulate your images. Tiffs are a lossless format and as such don't lose information when they are compressed.**

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it deposits on the paper. Just about every photo printer on the market is capable of producing droplet sizes measuring four picolitres or less. Much smaller than this and the droplets will be imperceptible to the human eye.

Colour management

Colour fidelity is another critical factor. It doesn't matter how vibrant the colours produced by the printer if they aren't the same as those previewed in your monitor or digital camera viewer.

Consistent colour across compatible input and output devices is much easier now that Windows incorporates a built-in colour management utility, ICM (image colour management). Look for a printer that includes ICM or ICC (International Consortium of Colour) colour profiles that your image-editing application can use to ensure colour fidelity.

Another less well known protocol is Exif (exchangeable image file). When a picture is taken, this protocol can embed information about the colour space and settings. Used in conjunction with an Exif-compatible printer, this information guarantees uniformity. On Epson printers, you can get the latest version of Exif by buying a model with Epson's proprietary PIM (print image management) standard.

Running costs

Don't ignore the cost of consumables when buying a printer – these represent a major outlay over the period of a printer's natural life. In particular, look out for the cost of ink refills. A disadvantage of many colour printers is that, when a single ink cartridge runs low, you have to replace the entire colour cartridge.

With six or more colours in photo printers, this drawback is even more pronounced. Some printers offer separate cartridges for each colour, so you can replace individual colours as and when necessary. This can result in a small saving in ink costs, even if individual cartridges often cost comparatively more than a single set.

The quality of paper used by your printer also has a direct effect on its output. One problem that plagued some early photo papers was a fading effect over time. Some paper manufacturers have introduced archival quality papers which, when used in conjunction with pigment-based inks, such as those offered by the Epson Stylus Photo 2100, guarantee the colour-fastness of an image for a number of years.

Standalone use

As digital photo cameras become more common, one inevitable trend is a growing independence from the PC. For users who want only to print or perform basic adjustments to images, the presence of a PC and the complexity of image-editing software is often just an unnecessary hindrance.

If you fall into this category, look for a printer that allows direct input by transferring a flash memory card from your camera to your printer. Direct photo printing isn't new. There are a number of dedicated 4x6 dye-sub printers offered by manufacturers such as Canon and Sony for use with their cameras, and this technology is now appearing in the mainstream inkjet market.

First, choose a printer that can cope with your camera's memory card. We looked at flash memory cards in some detail in last month's Technofile, but most direct photo printers support at least one the three main types of memory card: CompactFlash, SD (secure digital), or Sony's proprietary Memory Stick. At worst, if the printer has a PC Card slot you should be able to purchase a suitable adaptor for any flash memory.

One obvious problem with direct print photo printers: how can you tell what

Features comparison

	Model	Telephone	Website	Price (ex VAT)	Warranty	Type of technology	Maximum resolution	Maximum print size	Memory card support	DPOF support
Budget	Epson Stylus C62	0800 220 546	www.epson.co.uk	£65.00	1-year onsite	Piezo inkjet	1,440x720dpi	A4	no	no
	Lexmark Z65 colour jetprinter	08704 440 044	www.lexmark.co.uk	£99.00	1-year onsite	Thermal inkjet	4,800x1,200dpi	A4	no	no
Intermediate	HP Photosmart 7350	08705 474 747	www.hp.com/uk	£165.00	1-year onsite	Thermal inkjet	1,200x1,200dpi	A4	yes	yes
	Canon S830D	0800 252 233	www.canon.co.uk/ bubblejet_printers	£254.47	1-year onsite	Thermal inkjet	2,400x1,200dpi	A4	yes	yes
	Epson Stylus Photo 950	0800 220 546	www.epson.co.uk	£274.89	1-year call-out	Piezo inkjet	2,880x1,440dpi	A4	no	no
	Canon S900	0800 252 233	www.canon.co.uk/ bubblejet_printers	£280.00	1-year onsite	Thermal inkjet	2,400x1,200dpi	A4	no	no
Advanced	Epson Stylus Photo 2100	0800 220 546	www.epson.co.uk	£509.79	1-year onsite	Piezo inkjet	2,880x1,440dpi	A3+	no	no

you're printing? There are different ways of circumventing this problem. Some feature a small LCD image preview display which allows you to set print options or they may sport a TV output socket, which previews the images on a standard TV screen.

Some photo printers can be connected directly to a digital camera using a USB cable. Unfortunately, this solution generally isn't as versatile as memory card support, since it tends only to work properly between cameras and printers of the same make.

Direct printing inevitably means that you won't be able to fully manipulate or correct images before printing, although if your camera offers DPOF (digital print ordering format) support, as many Canon and Kodak models do, it's worth investigating photo printers that make use of the technology.

DPOF is a standard adopted by several camera and printer manufacturers to allow users to set printing options, from basic choices of what pictures to print to how to crop images directly on a camera

and transfer them to a printer. DPOF information is stored on the camera's memory card, so when it is inserted into a DPOF-supporting printer, the selected pictures will print automatically without further user intervention.

The level of DPOF implementation will depend on the particular camera, but on the printer side, support isn't limited to dedicated photo printers. The ability to determine what pictures should be printed is making it a hit in business environments and DPOF is even appearing in office MFDs (multifunction devices) such as Brother's MFC 840, a combined scanner and printer.

Software

If you've bought a budget scanner in the past, you were probably pleasantly surprised by the avalanche of free software CDs that came with it. But don't expect printer manufacturers to display the same generosity.

Although a couple of manufacturers bundle Adobe's excellent Photoshop Elements program, most printers come with little more than software drivers and basic printing utilities. There are exceptions, however, and Epson's Stylus Photo 890, which can print direct to CD, comes with its own CD-label design software. Some of the Canon printers

← Canon's mid-range S900 is on the expensive side but with each ink colour kept in a separate cartridge, this saves waste and means cheaper running costs

are supplied with basic image organisation applications. Generally though, it's expected that you'll already have the relevant programs in your software library.

Connection options

Over the last three years, USB rather than parallel has become the default connection for printers. USB 2.0-ready printers -- backwards compatible with the old standard – are still in the minority. But this isn't critical: although speed is certainly an issue when printing digital photos, in practice the major bottleneck to the speed of a photo printer will be the actual print mechanism rather than the connection method.

The right printer

• Budget category Finding a quality budget photo printer isn't as hard as you might expect, with some excellent options available for less than £100. The Epson Stylus C62, for example, boasts both good photo quality and reasonable media costs – important factors at this price.

Although its photo reproduction quality doesn't quite match its high specifications, the Lexmark Z65 Colour Jetprinter is an excellent all-rounder offering text output which is much improved over previous Lexmark offerings.

The unit boasts two paper input trays and can automatically detect the paper type in the media tray. And if you plump for the optional ethernet-capable version of the printer, you'll have a versatile office network printer.

Preview panel	Connection	Droplet size (picolitre)	Exif/PIM	Stated print speed (pages per min)	Dimensions (wxdxh)	Weight	Number of colours	Cartridge life in pages/ cartridge cost (mono/colour)
no	parallel, USB	variable	yes	14ppm/13.9ppm	480x260x181mm	3.32kg	4	640 (£11)/300 (£16)
no	USB	variable	no	21ppm/15ppm	445x305x216mm	5.1kg	4	600 (£22.23)/450 (£25.94)
no but uses text-based LCD	USB	4	yes	17ppm/11ppm	475x390x160mm	8.1kg	6	450 (£24.99)/400 (£29.99)
optional 1.5in TFT colour screen	USB 2.0	4	yes	4ppm/4ppm	430x301x188mm	5.8kg	6	280 (£8.99)/280 (£8.99)
no	parallel, USB	2	yes	8.8ppm/7.3ppm	515x663x299mm	7.6kg	6	628 (£8.50)/440 (£8.50)
no	USB	4	yes	7ppm/7ppm	443x319x185mm	5.8kg	6	270 (£8.99) /270 (£8.99)
no	parallel, USB 2.0, FireWire	variable	yes	7.4ppm/3.1ppm	631x864x409mm	11.2kg	7	540 (£8.80) /330 (£10.34)

• Intermediate category With most photo printers sandwiched in the £100 to £300 price range, photo printing options expand immeasurably as your budget increases.

Canon's two mid-range printers, the S900 and S830D, are on the expensive side but compensate for this with cheaper running costs. Each ink colour is kept in a separate cartridge, saving waste.

Both models also offer excellent photo quality, including Exif support. But the S830D stands out with its USB 2.0 connection (the S900 is USB 1.1 only) and DPOF capabilities. The S830D also includes a slot for most flash memory/ PC Card types and offers direct printer support for Canon digital cameras and camcorders.

Epson's mid-range offering, the Stylus Photo 950, offers unique features at this price level, including the ability to print on to CDs using a built-in tray. You'll need printable CDs to use this facility, but when used with the correct media, the results are excellent. It also includes a dual feed mechanism – either standard paper or roll – and comes with its own paper cutter.

The HP Photosmart 7350 is an example of how a stated print resolution can mean little in practice. The printer's native resolution of 1,200x1,200dpi pales against its competitors, but it boasts an optimised resolution using a proprietary technology, PhotoRetIV, that boosts resolution to 4,800dpi and produces results almost on a par with those of the more expensive Canons or the Epson.

But aside from excellent print quality, what sets the Photosmart apart is its versatility illustrated by the sensible incorporation of two separate paper trays, one specifically designed for 6x4 prints. The Photosmart can also connect to HP digital cameras via a USB cable (disappointingly not included) so you can preview and print images without a PC.

For users of other brands of camera, accessible slots for most common memory cards, navigable by small mono LCD panel, are included.

The only down side of the Photosmart lies in its use of two tri-colour cartridges. These are expensive to replace and mean you can't print true black unless you substitute one of these cartridges, making the printer unsuitable if you're printing a lot of black text.

• Advanced category For serious photo reproduction, you'll soon come up against some limitations, particularly in terms of output size. The printers we've looked at

← Mitsubishi's EPS8000 , a £7,000 standalone instant photo printer that can print pictures from CD-ROM or memory card, is due for commercial release shortly

so far will serve you well if you want to print up to A4 format, but they will choke on anything bigger.

A further hike in the budget would get you Epson's Stylus Photo 2100. The appeal of this comparative monster is that it can support A3 and beyond, allowing you to generate full A3 prints with room for crop marks. But size isn't all it has to offer. Colour fidelity is excellent and its use of pigment-based inks results in a claimed colour-fastness of up to 75 years with appropriate paper.

The lack of direct printing options shouldn't detract from the Epson's appeal. If you're serious about accurate colour printing, you'll need to perform some retouching on the images first anyway.

Verdict

Perhaps the most crucial advice that can be given to anyone buying a photo printer is to examine the output before buying. But for those who want quality on a budget, we can certainly recommend the Epson Stylus C62.

As a mid-range printer, despite the unarguable quality of the Canon S830D and the Epson Stylus Photo 950, it's hard to see past the versatility and value for money of the Photosmart 7350.

If quality is more important than budget, the Epson Stylus Photo 2100 is the connoisseur's choice. ■