

## Pica printer

**Should you choose a laser or an inkjet printer? Eleanor Turton-Hill explains the technology, the pros and cons of each, as well as other things you should consider before making your decision.**

**B**uying a printer is not a simple business these days. Even on a small budget of around £300, there's a whole range of products from which to choose. Here, I've provided an overview of what's available on the market, as well as explaining the pros and cons of different printer technologies.

### Laser or inkjet?

The first thing you need to decide is whether you want a laser or an inkjet printer.

Laser printers produce much better quality black and white documents than inkjets, and they churn them out much faster. And laser printers are designed more for the long haul — that is, they turn out more pages per month, at a lower cost per page, than inkjets. So if you need an office workhorse, the laser printer may be your best option. Another consideration, which is important to offices, is the handling of envelopes, card and other non-regular media, and laser printers tend to score far higher on this front than do inkjets.

Nevertheless, inkjets have one massive attraction over lasers: they produce colour more economically than laser printers — and that's what makes them so popular among home users. Inkjet printers are much smaller and cheaper than lasers, and they produce better quality output than the dot matrix. Research in inkjet technology is making continual

advances, with each new product on the market showing improvements in performance, usability, and output quality.

The down side is that while inkjets are generally cheaper to buy than lasers, they are more expensive to maintain. Cartridges need to be changed more frequently, and special coated paper, which produces a better quality output, is expensive. Nevertheless, unless you're printing in large amounts, you may well find that a colour inkjet printer is the best solution for you. Colour inkjets are in many ways more versatile than mono-lasers and so become a much more attractive package.

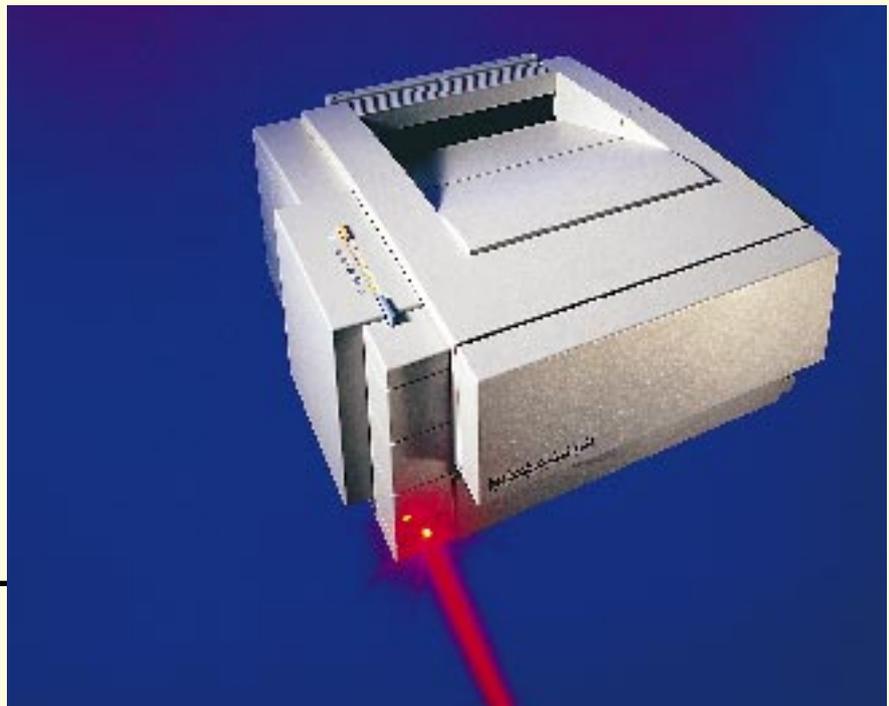
If your budget stretches to the £500

mark it may be worth considering buying one of each. You can get hold of a decent colour inkjet now for about £200, and the cheapest lasers start at about £280.

### CMYK

Colour is rapidly becoming a standard function for inkjets. There are still a few monochrome inkjet printers on the market, but most of the new models which have appeared during the past year offer colour functionality. Most inkjets these days are able to print in both colour and black and white, but the way they switch between the two modes varies.

The basic design is determined by the



*A printer like this LaserJet 5P from Hewlett-Packard will give good-quality output at workhorse rate*

number of inks in the machine. Printers containing four colours — cyan, yellow, magenta, and black (CMYK) — can switch between black and white text and colour images on the same page with no problem. Printers equipped with only three colours can't.

Many of the cheaper inkjet models have room for only one cartridge. You can set them up with a black ink cartridge for monochrome printing, or with a three-colour cartridge (CMY) for colour printing; but you can't set them up for both at the same time.

This makes a big difference to the operation of the printer because each time you want to change from black and white to colour, you must physically swap the cartridge. When you use black on a colour page it will be made up of the three colours, which tends to result in an unsatisfactory dark green or grey colour, usually referred to as composite black. If you can afford it, it's well worth spending a little extra money on a four-colour model.

### Quality of output

The quality of output from colour inkjet printers ranges from poor (with dull colours and visible banding) to excellent, approaching photographic quality. The quality of results from an inkjet is heavily affected by the paper quality being used. The way inkjets fire ink directly at the paper means that poor quality, absorbent paper leads to visible feathering of characters. High-resolution paper, or glossy paper, produces much brighter colours and crisper edges on graphic and photographic images.

### Where chemistry comes in

One of the major goals of inkjet manufacturers is to develop the ability to print on almost any medium. The secret to this is ink chemistry, a subject closely guarded by most inkjet manufacturers. Hewlett-Packard, Canon, and Epson, to name but three, invest large amounts of money in research and are making continual improvements in ink pigments, lightfastness and waterfastness, and suitability for printing on a wide variety of media. These advances in ink technology are bound to find their way to the desktop over the next few years.

Laser printers are not affected by paper quality to the same extent as inkjets. In the case of the former, the major influence on quality is the resolution capability of your printer. Until recently, 300dpi (dots per inch) was about the best you could expect from an office printer, but now the market is littered with 600dpi printers. These will

## How do colour laser printers work?

**L**aser technology gives much better quality colour results than inkjet, but laser printers are more expensive to make; consequently, colour lasers have not hit the mass-market in anything like the same way. Most colour lasers are massive pieces of equipment (about the size of a deep-freeze) and cost several thousands of pounds, which restricts their market to large, corporate organisations and medium-sized businesses.

The printing process in a laser is far more complex than that of an inkjet, which accounts for its high production cost. A colour laser is essentially four monochrome printers in one box. The problem with colour printing is how to get four different colours of toner onto the same piece of paper. Dye sublimation, thermal wax and some inkjet printers run the paper through four times but this is not practical in a laser printer: the heat would cause problems with many types of paper and transparency; and everyone is used to laser printers using ordinary copier paper.

In some colour lasers, the drum goes around four times; first the yellow is put onto the drum, then the cyan, then the magenta and finally the black. By using toner with different properties it is possible to put one on top of the other. The end result is the entire image, on the drum, which can then be transferred to the paper and fused with heat.

The problem with doing things this way is that the black toner, the last one to be applied, has to be attracted through three layers of existing toner. The electrostatic charge on the drum is not strong enough to do this through solid toner so the colours are dithered and a gap is left in areas of colour to leave room for the next layer of toner.

To get round this problem, some colour lasers use an offset process. The toner is rendered onto an electrostatic belt made of mylar plastic which has the same properties as the drum. The colour is then transferred to a second drum which goes around again for the next colour. Because the belt is cleaned each time, and because there is only ever one layer of toner to be attracted to the belt, the colours are better with this system, but it needs more moving parts, is thus more complicated, and so will wear faster.

A few years ago a colour laser would cost you well over £10,000. Technological advances have brought the colour laser down to about £5,000 which has no doubt widened its market, but unfortunately it is still way beyond the pocket of most small businesses and individuals. Continual research into the printing process may bring about an affordable colour laser in the future, but it is often argued that the restrictions inherent in the laser printer process will make it impossible to reduce the cost or size of the machine.

produce significantly better results, particularly when printing scanned images or graphics. At 600dpi, four times the number of dots are produced per inch of paper, resulting in a smoother tone gradation and a final image which looks pretty much like a black and white photograph.

Laser printers are not fully media-independent, and the quality of paper you use will affect the output to some extent. The jagged edges of unenhanced 300dpi print are visible when using ordinary copier-grade bond paper. At 600dpi or enhanced 300dpi the quality improves, but a resolution any higher than this will not be noticed unless you invest in a better quality paper.

Using poor quality paper in laser printers has other side effects. The drum inside the printer can become scratched, rapidly wearing out the surface and leading to deterioration in print quality and, inevitably, replacement of the drum. It is important to follow the manual's guidelines on paper quality and weight which is usually recommended as 75gsm copier paper at about £2.50 for 500 sheets. Higher

quality paper at 80 or 90gsm costs more than twice this amount for a smoother print.

The way paper is stored is important too, as extreme heat or humidity can affect the way it feeds through the printer. Curled or damp paper soon causes paper jams and seizes up the system.

If you do a lot of printing on heavy-weight paper or card, take note of the way the paper passes through the printer. The normal paper path involves turning the sheet through an S-shaped bend, but many lasers include a straight-through path which prevents the paper from curling as it travels through the machine. Others additionally provide an envelope feeder which will allow you to stack and feed multiple envelopes so you don't have to manually feed them as single items. ■

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