STOP THE PRESSES

PRINT AT HOME

By Harley Ogier & Siobhan Keogh

Printers have evolved subtantially since they crawled out of the primordial swamp during the early 1950s. We take a look at today's home and small-business offerings to see just what new tricks and technologies are on offer in 2011 »

W hat were once purely dumb output devices based on typewriter technology from Remington Rand have become computers in their own right, capable of printing common formats such as images and even PDF documents directly from memory cards and flash drives. Many contemporary models sport touchscreens to facilitate this, and the ability to print images is often coupled with basic resizing and cropping or even more advanced adjustment and editing features.

We set out to find a range of contemporary home printers showcasing a variety of technologies – such as HP's ePrint and Lexmark's Flash Scan. Here you'll find five all-in-one colour inkjets, and a single-function colour laser. Watch our upcoming issues for other makes and models, as we put them through the PC World test centre using our rigorous set of standardised printer tests.
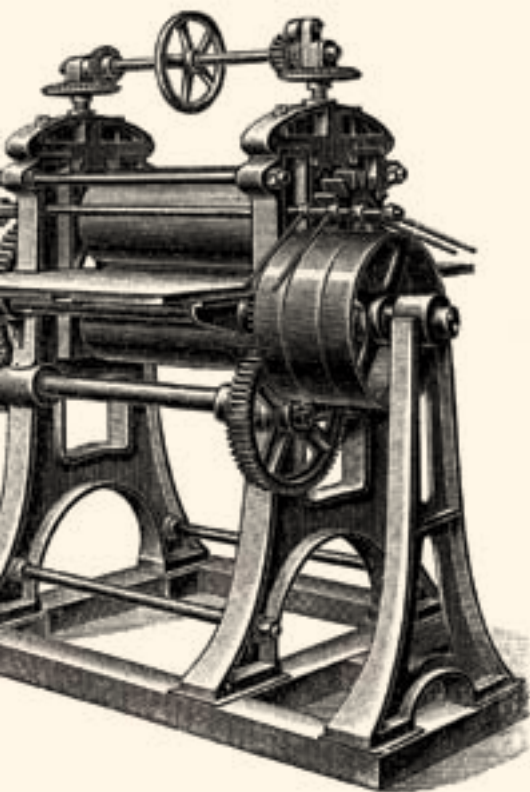
JARGON BUSTER

ALL-IN-ONE

Printers with built-in scanners. Why not just "two-in-ones"? The "all" refers to the combination of printer, scanner, copier and fax. These days, many All-in-Ones implement their fax functionality through software: the scanner acquires the image, which is then sent via your PC's fax-modem or an internet service. This saves the printer from having to include its own modem and require a direct connection to your phone line.

SINGLE-FUNCTION

Printers *without* built-in scanners: the opposite of "All-in-Ones".

LASER

Laser printers work using toner – a fine carbon and polymer dust – instead of ink. An image is scanned onto a rotating drum using a laser, with the areas exposed to light attracting toner, and passing it onto the page as the drum rotates. Intense heat provided by a "fuser unit" is used to fuse the toner onto the page, providing an immediately touchable and smudge-free print.

Colour lasers use four toners – Cyan, Magenta, Yellow and Black – dithered in the same way as an inkjet printer. How the four toners are applied varies by make and model – some printers apply each sequentially using the same mechanism, while other,

INKJET

Inkjet printers work by direct delivery of ink from a reservoir onto the page, through a series of controllable nozzles (hence the "jet" part of the term). Colour models use multiple ink colours which are "dithered" (combined in a dot pattern) on the page to produce different tones. Most traditionally these inks are cyan, magenta and yellow ink, though you'll find five- and six-colour models that use additional colours such as light cyan, light magenta, or "photo grey" to produce more accurate results.

Advantages of the inkjet printing process are colour accuracy, the ability to use glossy paper, and overall quality of photographic reproduction. Downsides include ink drying time (smudges are possible when dealing with just-printed pages), cost of printing, and standby life of ink cartridges – once you've begun printing, the cartridges will dry up over a period of months until they're solid and useless. If you're only printing colour occasionally, this can become a problem. If you're printing photos every day, you should be alright.

LED

A laser-alternative that debuted in the mid-1990s and is now seeing a major resurgence. Many vendors known for their laser technology now offer a range of LED-based models.

LED printers replace the mechanical laser-and-rotating-mirror assembly of a laser printer with a densely packed grid of LEDs: this is solid-state technology, with no moving parts. The drum rotates beneath the LEDs, which print whole rows of the page at a time, instead of scanning dot-by-dot along each line. This leads to increased print speeds, while the reduction in mechanical complexity allows for smaller printers.

You'll find LED printers in place of lasers, in any of the same form factors, in single- or multi-function devices, monochrome or colour. Think of this technology as being like the LED backlighting now used in many LCD screens. That technology offers an improvement over traditional CCFL (fluorescent) backlights, but you've still got an LCD screen. In much the same way, an LED printer is really just a laser with a different light source. You'll get improved performance in many regards, but the technology is founded on the same principles.

higher-end models contain a separate drum and laser assembly for each colour.

Lasers are generally quicker than inkjets and produce hardy, more water-resistant prints. However, colour lasers can't match the photo quality of inkjets and are more likely to display artifacts such as banding and noise.

On the upside, the standby life of toner is lengthy – a cartridge will last years without any kind of "drying out", making lasers the more economical choice for people who are infrequent printers.

HP Photosmart Premium e-All-in-One C310a

HP RECENTLY RELEASED its latest line of printers, and they're not just there to print black and white copy onto plain A4 anymore. The HP Photosmart incorporates some of the best features of smartphones into a printer: a touchscreen interface, apps, wireless printing and e-printing. It's a much needed update to an old technology that's struggling to be relevant as paper documents become less and less necessary.

The default settings on the Photosmart Premium didn't produce great quality colour photos on photo paper, and it was even worse on plain A4. With a little bit of tweaking of the preferences, though, we managed to get some very high-quality prints. The colour was vibrant (although some of the colour appeared *too* vibrant, as if some HP software had deliberately "corrected" it so it was no longer true to the original image), the contrast great, and the sharpness was impressive. Unfortunately there was a certain amount of "banding" on some of the images – clear vertical columns running down the image that shouldn't have been there. Photo prints also got smudged sometimes as a result of wet ink.

Plain text prints weren't the sharpest we've ever seen, but smudging wasn't too bad in that department.

Copy quality was slightly above average, with successive copies producing gentle blurring rather than any great, sudden loss of detail or colour accuracy.

The e-printing capability means that the printer has its own email address, to which anyone can send prints. After printing our standard set of test images, we handed out the printer's email address to a couple of other *PC World* staff members, so they could email attachments to be printed. We successfully printed JPEG, PNG, PDF, .doc, and .docx files without any trouble, but the printer wouldn't support the TIFF image we tried to send it.

While e-printed documents printed on A4 paper as intended, photographs were automatically printed on the 4 x 6-inch paper we'd loaded into the photo tray. In all our testing, we couldn't find a way to make emailed photographs print on A4 paper while 4 x 6 was available.

All e-print documents go via HP's server, which should helpfully tell you when its received your job, or if there's been a problem. Sadly, we were getting "print completed" or "print failed" email messages several *hours* after the fact. When we did receive them, there was no way to tie these messages to specific print jobs – attaching a thumbnail of the image we'd sent, or at least including the filename, would have been nice.

One of the coolest features of the Photosmart is the range of applications you can use from its touchscreen. Most of the apps are for kids – such as the Dreamworks app that lets you print colouring pages, puzzles and masks – but there are some practical things too, like an app that prints off maps for you, and one called HP Cards that can print a selection of cards for every holiday.

Unfortunately, using these apps is made difficult by the printer's resistive touchscreen. Sometimes we would lightly touch it, intending to scroll across the screen, and it would open an app. At other times repeated forceful pressing couldn't select the option we wanted. A more finger-sensitive capacitive touchscreen would be much easier to use given the swipe-gesture-based interface – but more expensive.

While the Photosmart does photos and does them quite well – if you get the settings right – some of HP's new tech needs to be honed, and the finicky ePrint is a nice idea let down by its multiple small flaws. If you want nice – not perfect – photo printing at a decent price, the Photosmart does a good job. If you just want something to do very basic colour and black and white printing, the Photosmart can do it, but you'll be paying more than you need to.

Epson Workforce 633

THE WORKFORCE 633 is a four-colour (cyan, magenta, yellow and black) all-in-one inkjet printer. That means it scans, copies and prints, and like all of the printers we've looked at this month, can be controlled from your computer over your wireless network. Left your laptop at the office? You can also print straight from a USB flash drive or SD card.

The print quality of photos from the Workforce was exemplary – images printed in the highest possible quality on Epson's photo paper were exceptionally detailed and some of the nicest we've seen. The six-colour Epson printer we tested, the Artisan 725, produced significantly better photo quality, but only because of the increased depth of colour from the two extra inks.

The Workforce 633 was actually better at black and white printing than the Artisan,

however. The black text was, well, *black*, which made it easily readable.

Photo prints on plain paper were average or slightly above. Copies were nicely detailed, but bloomed out to over-saturation over several generations.

Impressively for the price, the Workforce includes both a flatbed and sheet-fed scanner, so you can scan 30-page documents just as easily as single 4 x 6-inch photographs.

If you're looking for something small for your cramped home office, this printer is not going to fit. It's big, clunky, and certainly not stylish enough for the tech fashionistas out there. If you have a little bit of space, don't need intense colour and don't care how your printer looks – who's going to notice, anyway? – then the Workforce will serve you well. At $299, the price ain't too bad, either.

AT A GLANCE

Four-colour inkjet printer

Sharp prints on photo paper

Colour pales in comparison to the six-colour Epson Artisan 725

30-page sheet-fed scanner

EPSON WORKFORCE 633

RRP incl GST: $299   Contact: epson.co.nz

Unless you're a photographer or designer who needs vibrant colour, you won't regret buying the Workforce 633.

★★★★☆

Epson Artisan 725

IF YOU WANT to print photos and only photos, the Artisan 725 from Epson is a sure bet.

Tiny details such as cats' whiskers are perfectly delineated, sharp to a degree that many other inkjets we've tested can't replicate. Six-colour inkjet technology gives great colour accuracy: what you get on screen is very much what comes out on paper. No odd colour-casts, gradients or other anomalies.

Colours on regular, unedited photographs aren't quite as vibrant as you'd find on, for instance, the HP Photosmart C310a. If you want rich, oversaturated colours, you're going to have to modify your photos to get that. Which is, in our opinion, exactly how

it should be. When your printer accurately reproduces what you see on screen, getting prints exactly the way you want them becomes very easy.

The downside? We've been talking about prints on Epson's glossy photo paper. On cheap, plain copy paper? The results are far less impressive. The level of detail suffers a bit (though it remains fairly high in comparison to other models), and colours become rather under-saturated. The Artisan also has a tendency to blur text a little, making it less than ideal as an all-around home printer.

It does have the nifty ability to print surfaces onto inkjet-printable CDs and DVDs, which is nice if you have photo

collections, movies or other such discs to label. A built-in CD tray makes this easy, with perfect alignment every time.

Sadly, the flatbed scanner lacks that perfect alignment: copies were often a few degrees off straight. Annoying when you're scanning forms or documents, in particular. Plain-paper copies also couldn't match the detail of the Workforce 633.

As a glossy, 4 x 6 and A4 photo printer, the Artisan 725 is a strong performer. However, it's best paired up with a cheap monochrome laser to handle text printing jobs, where its own performance is weak.

AT A GLANCE

Exceptional level of detail

Gorgeous, rich colours on photo paper

Scanner seems to suffer alignment issues

EPSON ARTISAN 725

RRP incl GST: $329   Contact: epson.co.nz

One of the better photo printers out there, with superb colour accuracy. Sadly, weak when it comes to text.

★★★½☆

Lexmark Genesis S815

THE LEXMARK GENESIS S815 is a delightfully pretty piece of tech. It stands proudly upright, while its competitors squat their bulk over the better part of your desk. The front is finished in piano black – the sort to attract fingerprints like nobody's business – and its LCD touchscreen is set into that front panel so seamlessly that the interface could be painted right onto the surface.

We loved it at first sight.

As innovative as the design is, however, it's what's inside that matters. Let's set this printer's printing technology aside for a minute, and take a look at its scanner.

Your typical flatbed scanner works by mechanically moving a narrow image sensor along the bottom of the bed, scanning one line of your image at a time. Sheet-fed scanners work much the same, only the image moves while the sensor stays in place. As anyone who has ever scanned a page will know, this can take a while.

The Genesis takes a completely different approach. Beneath the scanner's bed (which is actually vertical, due to the printer's upright design), you'll find a mirror. That mirror reflects your document, photograph or other scan-able object toward a camera and flash unit. Close the lid, and the camera fires: taking a snapshot of the whole scanner bed at once. As far as it appears to the user, the process is instantaneous.

Scan quality is high, while copy quality is average in terms of both detail and colour accuracy: copies are limited by the S815's ability to reproduce on paper what it scans.

Need to scan fifty photographs? Or, for that matter, five hundred? This is your scanner. Forget that it's even a printer. The Genesis is going to save you so much time, some people are going to find it's worth it for the rapid scanner alone.

For everyone else… how *does* it perform as a printer? Well, sadly the answer is "decidedly average".

We started our testing with brand-new ink cartridges, out of the printer box. Less than twenty full-colour A4 photographs, and we were out of cyan, yellow and magenta. Black had around

two-thirds remaining. So, small sample cartridges?

Those initial prints were substandard – blurry, with inconsistent, below-average detail like a low-quality JPEG image. Roller-marks clearly punctuated the pages like a series of little pin-pricks. We attribute the bad print quality to several factors: we printed straight from a memory card, rather than a PC. This appears to have limited the quality somewhat. We also used too heavy a photo paper, leading to the pronounced roller-marks. Finally, the initial head-cleaning and calibration may have eaten up more ink than we thought, leaving the cartridges substantially drained before we even started with the photos.

Fortunately, a fresh set of ink cartridges and thinner photo-gloss paper stock saw the Genesis producing far nicer prints than before. Colour reproduction was reasonable and detail was high, though there was some decided aliasing (pixelated jaggedness) on starkly contrasted edges. Roller marks also remained present on all images, though to a lesser degree with the thinner paper.

Plain text appeared acceptably sharp and black overall, but some ink-bleed around the edges of characters was occasionally visible, giving them a "fuzzy" look.

The Genesis is an attractive device, and a brilliant rapid-fire scanner. However, it's also nearly twice the price of most of its competitors. At such a premium, it can't just be a brilliant scanner: it has to be a brilliant printer, too. That, it sadly is not.

If scanning and copying are what you do, consider the Genesis. If you're after a printer first and a scanner second, this is not the model for you.

AT A GLANCE

Camera-based high-speed scanner

Responsive touchscreen interface

Not the greatest photo quality

LEXMARK GENESIS S815

RRP incl GST: $599   Contact: lexmark.co.nz

Innovative, rapid and accurate scanner technology, but print quality is average and the price is high.   ★★★☆☆

Canon Pixma MG6150

CANON HAS BUILT quite a reputation for quality photo printing with its Pixma range. The MP990, which we reviewed in July, got a four-star rating for its solid all-round performance, and the MG6150 isn't a bad printer either. It has a number of nifty features such as printing over WiFi and via flash-drive, but that's what we've come to expect from any new printer in this price range.

The Pixma is designed for photo printing, and pictures we printed were of a high quality on glossy photo paper. The colours

were true to the images on screen – one of the most accurate depictions of colour we've seen lately.

After much deliberation, though, we had to conclude that the MG6150's prints couldn't match the competing Epson Workforce 633 or Artisan 725 for detail. The Artisan was also capable of the same rich colours the Pixma is so good at – perhaps even better.

Printing colour photographs on plain paper, the Pixma was flat-out terrible. It emphasised existing graininess in photos, blurred out details and was incredibly patchy in dark areas. Most of our photo prints on plain paper were completely unusable for anything but packing material.

Copies were highly detailed but suffered from notable undersaturation, tending toward greyscale over several generations.

Monochrome text printing is not really what the Pixma is for, and this becomes pretty apparent when you compare plain word documents produced by the Pixma

and other printers. The Pixma's black is not pure black, which makes reading slightly more difficult, and like most inkjets it was also prone to smudging the text during and immediately after printing.

If you're looking for a printer that does high-quality photos on photo paper, the Pixma is a good choice. If you're primarily printing text and line art, you may want to consider something else.

AT A GLANCE

Extremely high-quality photos on photo paper

Low quality photos on plain paper

Text isn't dark enough, and is prone to smudging

CANON PIXMA MG6150

RRP incl GST: $329 Contact: canon.co.nz

Pretty pictures on pricey paper, but not a great generalist printer.

★★★☆☆

HP LaserJet Pro CP1025nw

HP'S LASERJET CP1025NW does text well – just as you'd expect of any laser printer, from the tiniest consumer model to the largest floor-standing industrial offering. What's surprising is how well this little colour laser handles photographs, especially when compared to the performance of similarly priced inkjet offerings.

The CP1025nw uses a four-toner printing process to deliver accurate if slightly under-

saturated colours, on plain copy paper. Glossy photo paper isn't going to work well with any laser – matte paper is your only option. However, toner is comprised of carbon and plastic: matte paper goes in, and a somewhat-shiny image comes out. It's not the same as nice high-gloss inkjet paper, but it's notably glossier than inkjet-on-plain-paper prints.

If you intend to print on plain paper, you're going to get better results out of the CP1025nw than most inkjets.

Unfortunately, its photographic prints are prone to "banding" (vertical columns running down the image), especially in areas of relatively flat colour such as uniformly blue skies. This is a common problem among laser printers, also seen in some inkjets. However, commonality doesn't make it any less disappointing.

The CP1025nw boasts a substantive feature set, with support for both wired and wireless network printing. However,

it lacks the scanner found on most similarly-priced inkjet models. In the laser range, all-in-one devices sit at a somewhat higher price point, so this model has value as a feature.

If you primarily print text documents, websites and maps, but want the option to run off the occasional photograph, the CP1025nw is a good choice: just as long as you don't need to scan anything.

AT A GLANCE

High print speed

Good plain-paper photo quality

No scanner

HP LASERJET PRO CP1025NW

RRP incl GST: $329 Contact: hp.com/nz

Perfect text printing and passable photo quality, but you'll have to go larger and pricier if you also need a scanner.

★★★½☆

Make & Model	PCW Rating	RRP incl GST	Technology	Ink / Toner Colours	Scanner	Ideal use
HP Photosmart Premium e-All-in-One C310a	★★★☆☆	$349	Inkjet	5	Flatbed	Printing without a PC
Epson Workforce 633	★★★★☆	$299	Inkjet	4	Sheet-fed, Flatbed	Small-office printing & scanning
Epson Artisan 725	★★★½☆	$329	Inkjet	6	Flatbed	Photo prints
Lexmark Genesis S815	★★★☆☆	$599	Inkjet	4	Flatbed	Rapid photo scanning
Canon Pixma MG6150	★★★☆☆	$329	Inkjet	6	Flatbed	Glossy photo prints
HP LaserJet CP1025nw	★★★½☆	$329	Laser	4	None	Text, line-art & plain-paper photos

CONCLUSION

IN OUR TEST, Epson's Workforce 633 came through as the strongest all-rounder. It combines print quality, scanner/copier capabilities and good plain-text printing in a blocky, utilitarian package. Epson also takes the cake for best photo printer, with the Artisan 725. However, the Artisan's high performance is strictly limited to photographs.

The novel technologies found in HP's Photosmart C310a (ePrint) and Lexmark's Genesis S815 (Flash Scan) both have their own niches, and will be incentive enough for some to buy. However, neither printer is a phenomenally strong offering overall.

BUYING ADVICE

When setting out to purchase a printer for your home or small office, there's one thing you need to work out before you set foot in store: what you're going to be printing, most of the time.

It's common to answer this question with "photos", especially in the case of a home printer. It's also all-too-common for people to buy photo printers, costly ink and print supplies, then find that printing photos isn't an everyday activity.

Why did you buy a digital camera? Perhaps to cut down on that per-shot cost associated with film. Or perhaps because you were scanning all of your precious

family photos, and thought it better to collect them on the PC instead of a multitude of photo albums. So it doesn't make sense, when buying a printer or replacing and ageing model, to reverse your progress of digitising your photos by basing your purchase on the idea that you'll be printing them all out again. That's not to say a few prints aren't great to keep around, or send to family in the old-fashioned post. Ask yourself: do you want, or need, *enough* prints to justify a pricey desk-warmer dedicated to producing them?

If you really do print numerous photos, an inkjet printer is going to be the most sensible investment. Ink ain't cheap, and neither is premium glossy photo paper. However, choose the right printer, match it with the right supplies, and you're going to get stunning prints every time. Remember that photo printers come in 4 x 6-inch, A4 and A3 options – and invest in the one that fits your photo printing needs.

If the reason you're buying a printer is to print out documents, information from websites and the occasional Google Map, a laser or LED printer is a better option. Text quality will match or exceed that you'll get from any inkjet, and toner works out a fair bit cheaper per-page than ink. Toner also has a longer life once it's unwrapped and installed in your printer, making it better for someone who might go three weeks without

printing more than a couple of pages, then run off a 50-page document. Many university students fit this sort of "occasional printer" label.

Lasers beat inkjets for print speed when you're looking at a few dozen pages of text, so if 50-page documents *are* on your "likely to print" list, that's something to consider. No one likes waiting for a printer to finish. **PCW**