

### Brother HL-2460N

The 24-pager from Brother has only 600 dpi print resolution but this doesn't lead to any disadvantages. Equipped with 48MB RAM, it can easily keep up in terms of quality, even when printing Bianca, with its 1200 competitors. And yet the device is speedy – only two devices are faster.

The display looks good, as it uses not only text, but also three types of backlighting to make it clear from a long way off what's going on. Unfortunately the printer reports an overfilled paper output tray as a paper jam and thereby misleads the user.

Configuration is practical via the built-in Web interface, although you have to look very hard for the password in the CD version of the network manual.

In summary, the Brother is a good and reliable printer for office use.



Brother HL-2460N	
Price	£750
Output	24 P/min, 600x600 dpi
Print quality	3 out of 5
Speed	3 out of 5
Cost of printing	2.5 out of 5 (0.97 pence / page)
Overall mark	3 out of 5

### Epson EPL-N2050+

It's obvious that Epson is related to the Xerox printer, but the innards are not as similar as the printer engine would lead you to think. The EPL-N2050+ does not offer Postscript, hence the device had to be controlled in the test with PCL.

A bug prevents resolutions higher than 300 dpi. At 600 dpi groups of lines are displaced by a couple of dozen dots to the right, making it impossible to use this resolution.

This limitation is also responsible for the poor cut off in the quality test. If Epson corrects this bug, the device might cut off better, but at the moment it is in last place for quality.

On the other hand, Epson's control panel is a winner. With six LEDs and eight buttons the Epson is very nice to use.



Epson EPL-N2050+	
Price	£580
Output	20 P/min, 1200x1200 dpi
Print quality	4.5 out of 5
Speed	3.5 out of 5
Cost of printing	4 out of 5 (1.04 pence / page)
Overall mark	3.5 out of 5

### Genicom Micro Laser 210

The printer from Genicom also looks enough like the Xerox to be mistaken for it, but unlike Epson this offers Postscript and 1200 dpi resolution. The high resolution means that four times as much data has to be transferred as at 600 dpi.

The extra sharpness in the Genicom gives a clear typeface. The quality of the photo reproduction does not, however, greatly improve, and the Microlaser is in the middle of the field for this.

It was striking that the device did not automatically switch into energy-saving mode – to do this it was necessary to re-enter the switch off time via the printer menu. But even in energy-saving mode, the fans continued to run.

At present the manufacturer only gives two sources of supply, and an Internet presence.



Genicom Micro Laser 210	
Price	£1028
Output	21 P/min, 1200x1200 dpi
Print quality	2.5 out of 5
Speed	5 out of 5
Cost of printing	3 out of 5 (1.23 pence / page)
Overall mark	3.5 out of 5

### Marking system

Marks in this hardware test are awarded out of a possible 5, where 5 out of 5 represents the lowest possible award and 1 out of 5, the highest.





## HP Laserjet 4100N

Just by looking at the HP printer, you can see the long printer tradition of its American manufacturer. In many details it is persuasive because of its solid, well-thought-out quality. This starts with the expansion slot, which can be used without tools and does not stop even with the very well-made Web front-end.

In all test categories the printer delivered completely satisfactory results and thus it wins second place. When it comes to the costs of consumables, you can see that there is particular commitment. Despite the disposable drum the HP is one of the most economical printers. But the seals on the toner cartridges could be improved – if the cartridge is shaken just before it comes to the end, some toner trickles out. The HP remains true to itself. Printers from HP have the image of an office work horse, which this device lives up to.



### HP Laserjet 4100N

Price	£980
Output	24 P/min, 1200x1200 dpi
Print quality	3.5 out of 5
Speed	3 out of 5
Cost of printing	3 out of 5 (0.98 pence / page)
Overall mark	3 out of 5

## Kyocera-Mita FS-3800N

The crucial construction criterion that sets this printer apart is the almost everlasting photo drum. With it, an impressive page output, as well as extremely low running costs, is possible. In practical terms, this printer needs only toner and paper. At 0.33 pence for toner per printed page it makes even normal copier paper (0.3 pence) a dear item in the printing business.

A sensor ensures that the FS-3800 does not overfill the output tray in its excessive zeal, and the print out is paused in due course, before the papers fly off all over the place. The display certainly provides concise but comprehensible information about current status. The Web interface looks tidy and businesslike. The Kyocera is the ideal printer for small to medium sized offices.



### Kyocera-Mita FS-3800N

Price	£900
Output	24 P/min, 1200x1200 dpi
Print quality	3 out of 5
Speed	2.5 out of 5
Cost of printing	1 out of 5 (0.63 pence / page)
Overall mark	2.5 out of 5

## Lexmark Optra M412n

The smaller of the two Lexmark printers promises low-priced output for the office. It's easy to operate the control panel and the Web interface. We liked the Mark Vision control software. The page output, at 17 pages, is fast but the paper tray holds only 220 sheets and has no fill level indicator. The covers rattle or stick out.

The clamp for keeping the sheets in order keeps slipping out of the loops. In energy saving mode the device demands 23 watts and the high pulse output causes light bulb flickering on the same power circuit. After 90% of total output stripy print outs appear.

In all, both test devices achieve only three quarters of the output claimed by the manufacturer. The result is a cost per page of 1.87 pence, the highest in the test field.



### Lexmark Optra M412n

Price	£770
Output	17 P/min, 600x600 dpi
Print quality	3.5 out of 5
Speed	3 out of 5
Cost of printing	5 out of 5 (1.87 pence / page)
Overall mark	4 out of 5

### Lexmark Optra T620n

The larger of the two Lexmarks is distinguished by its poor quality finish and, as with the Optra M412n, the output tray clamp is shoddy. Instead of the claimed 500 sheets, the paper cassette can only hold 490, the rest of the sheets get jammed between cassette and printer. We're accustomed to better in the £1000+ category.

The Web interface can be described as a success. The super-fast device, at 28 pages per minute, can be smoothly configured or remote controlled with it. What remained incomprehensible was why the device does not recognise the company's own Mark Vision software.

Marks were deducted for the documentation, too, since for a printer in this price class we expect more than just the installation instructions to be printed.



Lexmark Optra T620n	
Price	£1085
Output	28 P/min, 1200x1200 dpi
Print quality	3 out of 5
Speed	2.5 out of 5
Cost of printing	5.0 (1.63 pence / page)
Overall mark	3.5 out of 5

### Minolta-QMS Page Pro 4100 GN

The Minolta-QMS shows that a good device does not always come with an impressive appearance. The Minolta is plain, it doesn't even have a display, the printer configuration is possible only via the Web front-end.

Also impractical is the open, small-dimensioned paper supply and the output flap, which has to be open before starting printing – otherwise a jam forms and the flap cannot be opened.

It is also the slowest in the test, 18 pages per minute is claimed by the manufacturer – the lab result was 16.5.

The big surprise emerged in the quality test, where it showed the rest of the test field what a good photo print is. Sharp and rich in detail and well rastered – only the Xerox can match this quality, but the 'pages per' did not quite make it.



Minolta-QMS Page Pro 4100 GN	
Price	£750
Output	18 P/min, 600x600 dpi
Print quality	3 out of 5
Speed	3.5 out of 5
Cost of printing	5 out of 5 (1.83 pence / page)
Overall mark	4 out of 5

### Oki Okipage 20 plus/n

Initially, the Oki Okipage 20 can scarcely be told apart from its big brother Okipage 24, even the consumables for both printers are identical. Toner change with an Oki isn't a very clean affair: To swap a cartridge, it's rotated through 90 degrees in the holder, which dirties the drum unit. When it is taken out, toner often falls out.

Every 25 pages the printer inserts a short break, giving a comparatively slow print speed. Also, after the end of a print job the message "Data loaded" is displayed for about 30 seconds, although no more data follows. However, the next job can be sent without any problem, and this is then started after a few seconds.

One good point was that Oki has come up with the idea of separating toner and drum. The latter only has to be replaced after 30,000 sheets.



Oki Okipage 20 plus/n	
Price	£800
Output	20 P/min, 600x600 dpi
Print quality	3 out of 5
Speed	4 out of 5
Cost of printing	3 out of 5 (1.42 pence / page)
Overall mark	3.5 out of 5





### Oki Okipage 24 dx/n

The larger of the two Oki printers differs from the small one in its mechanism. Unlike the Okipage 20, it has built-in a duplex unit, which makes it heavier.

The print unit is also identical to that of its little brother, but Bianca clearly showed differences in quality between what are actually identical print units. The Okipage 24 also prints the image darker, as the colour bars of the graphics test also show. Grey areas are also crossed by more stripes.

Oki earns praise for the extremely comprehensive documentation which comes with both printer models. Apart from the manual, the CD includes films on removing paper jams and changing toner (see "Laboratory Report").



#### Oki Okipage 24 dx/n

<b>Price</b>	£999
<b>Output</b>	24 P/min, 600x600 dpi
<b>Print quality</b>	3 out of 5
<b>Speed</b>	3.5 out of 5
<b>Cost of printing</b>	3.5 out of 5 (1.45 pence / page)
<b>Overall mark</b>	3.5 out of 5

### Samsung ML-7300N

Samsung demonstrates some good solutions. We liked the backlit display, which can be raised to make it easier to read. The mains switch is in the only correct position – at the front.

Unfortunately one equally nice feature is not – at least not yet – useable under Linux: the duplex unit. But Samsung has in fact packed a PPD file in the collection of accessories, with the aid of which any generic Postscript driver should be capable of controlling Duplex. But even under the CUPS printing system, which is not exactly short of features, it was not possible to print double-sided.

But the device is not as fast when it comes to printing as it is when warmed up. It certainly wakes up speedily, but the page output is at the rear of the test field.



#### Samsung ML-7300N

<b>Price</b>	£800
<b>Output</b>	20 P/min, 1200x1200 dpi
<b>Print quality</b>	4 out of 5
<b>Speed</b>	4.5 out of 5
<b>Cost of printing</b>	5 out of 5 (1.61 pence / page)
<b>Overall mark</b>	4 out of 5

### Xerox Docuprint N2125

The low operating noise is one of the best features of this device. Apart from the high print rate, the print quality impresses most.

Only the Minolta-QMS can beat Xerox, none of the devices of the same type (Epson and Genicom) even comes close to the quality of the nice raster of Xerox. Images are printed evenly and with good contrast.

Caution is advised when inserting paper. If you put in a 500-sheet stack, the bottom 50 sheets become crimped. Tip: Put in about 100 sheets first and then the rest.

The print is almost marginless, fractions of a millimetre are left white. If this print method is used, on one sheet or another something goes wrong with the mechanism, but otherwise this causes no problem.



#### Xerox Docuprint N2125

<b>Price</b>	£990
<b>Output</b>	21 P/min, 1200x1200 dpi
<b>Print quality</b>	2.5 out of 5
<b>Speed</b>	3 out of 5
<b>Cost of printing</b>	4 out of 5 (1.32 pence / page)
<b>Overall mark</b>	3.5 out of 5

### Minolta-QMS Magi Color 2200 N

The Minolta-QMS Magi Color 2200 was, as an unofficial competitor, the only colour laser printer. Fully equipped with network card, Postscript and PCL module, the price of £1395 appears all the more astonishing. It's more what you'd expect from GDI printers.

The print unit has four large, colour toner cartridges in a carousel. Since only one colour can ever print at one time, colour printing takes longer than monochrome. The print image is good, the colours on our test image were well reproduced, although with a slight orange tinge.

The printer menu was impressive, almost everything can be adjusted, right up to colour correction. The three-minute warm up phase is too long. Recalibration every 24 pages is a nuisance when printing out longer text documents.



Minolta-QMS Magi Color 2200 N	
Price	£1395
Output	20 P/min, 1200x1200 dpi
Print quality	2 out of 5
Speed	3.5 out of 5
Cost of printing	3.5 out of 5 (2.02 pence / page)
Overall mark	3 out of 5

### Laboratory report

The very different levels of equipment and finish of the printers were especially noticeable. Lexmark falls out of the frame with the models Optra M412n and Optra T620n, both printers made a poor impression. In particular the manual paper feed is extremely shoddy, even loaded with 100 sheets it sags visibly, and anyone who collides with it in passing is liable to break off a good sized chunk of it.

In terms of documentation all printer manufacturers can take a leaf out of Oki's book. The manual is more than comprehensive, apart from the usual content such as installation, maintenance and expansion, in the annex there is even the pin configuration of all the ports with signal description, timing diagram and sometimes even component designation. The documentation CD rounds the whole thing off with films on the most important maintenance tasks of the printer. It could hardly be better.



The toner cartridges for the printers are recognised by means of coding plates for Xerox (top), Epson (middle) and Genicom (bottom). The plates can however easily be swapped.

To finish off, one curiosity: Although Xerox, Epson and Genicom use the same printer engine, we were unable simply to change the toner cartridges. Obviously no manufacturer wants to give up the after sales business. Hence the code plates illustrated below were placed on the otherwise completely identical cartridges. The plates can, however, easily be swapped using a knife – so you can always obtain them from the most economical source.

### Conclusion

Printing is no problem under Linux. Apart from minor details such as the Wine stumbling block, laser printers are completely non-critical. But even under the aegis of the penguin not all printers are equal. The differences are enormous.

So the Competence Centre Hardware even found three printers of identical construction which delivered such differing print outs through using different firmware that in the quality test, one came out in front, one in the middle field and one as tail end Charlie.

In printers of identical construction the manufacturers like to try to prevent the use of competitors' toner by the use of lugs. With a little DIY, it is easy to save a pound or two.

One aspect is still worth pointing out: Most printer manufacturers boost their devices as low-ozone or even ozone-free. The test crew determined the complete opposite, however. The penetrating sharp smell of O<sub>3</sub> wafted through the corridors, and sensitive people could feel it on their skin. Tester and volunteer fireman Mirko Dolle even felt obliged to order a breathing protection device from the industrial safety equipment supplier Dräger. Hence the Linux Magazine must issue a warning that office printers are only installed in well-ventilated places. ■

