white paper

HEWLETT® PACKARD
Expanding Possibilities

HP | DesignJet | CP Series Printers

Fast Print Speeds and High Image Quality, RIPs Rise to the Challenge

Print-for-Pay businesses today demand fast print speeds and consistently high image quality. They also require enhanced productivity in order to increase the volume of print jobs they can handle and thereby lift profits. Increasing the speed of a large-format printer would seem an easy objective to attain, but this alone will not guarantee high productivity. A productive printer must also ensure that the output is sellable, print after print, and will offer a printing solution which is easy to use and requires minimum operator attention.

So how can this be achieved?
Choosing the right large-format printing solution not only involves the selection of the printer itself, but also the choice of the associated Raster Image Processor (RIP), as this plays a key role in determining the potential speed and quality of the printed output.

Let's take a minute to understand how a RIP works and its role in the printing process. RIPs come in the form of hardware (either internal or external) or software. An example of an external hardware RIP is the Hewlett-Packard DesignJet 2800CP and 3800CP Series printers' EFI Fiery® X2-CP RIP. Third party RIPs for HP DesignJet printers are available as both hardware and software. In all cases, the RIP is an interface between the computer and the printer.

A RIP performs a number of functions, but at its most basic, it processes the information contained in an electronic image file so that it can be printed in a particular way on a specific printer. A RIP behaves like an enhanced print driver which offers a greater number of print options and supports a wider selection of file formats than a standard print driver. It is therefore particularly useful in a Print-for-Pay business where operators may need to print files supplied by external customers directly from a wide variety of formats, such as PostScript, TIFF, GIF and JPEG files, that might not print correctly using only a standard print driver.

RIPs provide the operator with a greater degree of control in the color management process. Instead of choosing from a limited number of broad options such as "vivid color", the operator can make minute adjustments to individual color components, and thus achieve the desired artistic effect in the printed output. The use of a RIP offers a range of other benefits to the operator, including the application of a universal set of parameters to all of the files received by the printer, ensuring, for example, that all the images are printed in the same size and orientation regardless of how the user sent them to the printer.

Depending on the RIP, further benefits include spool management, by which the user can organize the print jobs into queues, allowing the priority of jobs to be shifted at short notice and even automatically diverting the print job from one printer to another in the event of a technical problem with a printer. RIPs can also enhance the connectivity of a printer.

In addition, RIPs offer support for special media types such as textiles or adhesive media that would not usually be supported by the printer. This is achieved by including print modes that are specially calibrated for these media on the specific printer, enhancing the printer's overall flexibility.

Varware
Further enhancing the performance of the RIP is Varware, a job control language developed by HP for its HP DesignJet Series printers. Varware provides RIP vendors with the additional flexibility they need to fine-tune the print modes to meet specific print requirements such as the carriage speed, the number of passes, the print mask width, the ink density and the resolution of the printed output.

An important parameter that can be optimized via Varware is the print mask width. In a nutshell, print masks define the way ink is laid down on the media surface to minimize unwanted ink-media interaction such as cockle or ink color mixing. Also, by combining print masks with multiple carriage passes, defects like banding can be reduced dramatically.

The print masks of the HP DesignJet CP Series printers were originally programmed at 240 x 32 pixels. This 'native' configuration provides a good balance between image quality and speed and is the default used by the

HP DesignJet CP Series Printers

HP DesignJet 2500CP and HP DesignJet 3500CP internal RIP. However, in a production-oriented environment such as the Print-for-Pay business, the resulting printing speed is not sufficient for applications involving printing high volumes.

Productivity-tuned RIPs, such as the new HP DesignJet 2800/3800CP Series printers' EFI Fiery® X2-CP RIP overcome this by enabling, via Varware, the new 240 x 256 pixel wide masks. In this way, the number of carriage passes needed to achieve a specific image quality is significantly reduced, resulting in higher speeds. The benefits of using wide-mask technology are transparent to the user who enjoys reliable printing. Even with the higher speeds, there is no significant loss of image quality.

HP is working closely with RIP vendors to increase awareness of the benefits of Varware and to ensure that their products take full advantage of all the potential offered by the HP DesignJet CP Series printers. The use of Varware is open to all RIP vendors and is already used by many including Amiable Technologies Inc., IMAGE Technologies, Onyx Graphics, Wasatch, and DCS.

Putting the printers to the test

In order to confirm its high-speed, high-quality printing platform, HP turned to the well-respected independent testing house SpencerLab (a division of Spencer & Associates, Melville, NY). The tests involved the HP DesignJet 3000CP printer, tested with three external RIPs, and the HP DesignJet 3800CP printer compared with the HP DesignJet 3500CP printer using its embedded RIP.

SpencerLab used Amiable Technologies Inc.'s Photoprint, IMAGE Technologies' WISP PS and Onyx Graphics' PosterShop RIPs for the tests. All of these are productivity-tuned RIPs that use Varware. To ensure consistency in the testing process, the hardware included a PC with Microsoft Windows '95 and an ECP parallel connection, and the software in each case was Adobe® PhotoShop and Illustrator.

The test suite consisted of three different files meant to represent different applications and usages:

pasta.tif: Scanned Photo Image.
24" x 30", 21MB

cartelc.ai: Text and Graphic Composite Image original Adobe Illustrator file.
Fit arch E 23.5" x 33", 39.5MB

bandas.tif: 4 Color Columns Image
Proportionally scaled to the maximum width of the printers

To measure the printing time ("mechanical"), the tests were carried out as two separate steps, namely the generation of the print files and then their printing. This ensured that rasterization was completed before the printing process

All of the images were printed onto HP High Gloss Photo media in all four printing environments as described in the table below. Also, SpencerLab assessed the print quality across all of the samples within each mode to ensure that they were operating in comparable ranges.

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HP DesignJet CP Series Printers

	Sellable Quality Print Modes	
Printing Environment	**High Quality**	**Medium Quality**
HP DesignJet 3500CP with internal RIP	**"Photo" mode** **Native print mode** Bidirectional 8 passes, 600 dpi	**"Productivity" mode** **Native print mode** Bidirectional 6 passes, 300 dpi
HP DesignJet 3000CP with WISP PS RIP	**Special printing,** **Varware print mode** Bidirectional 6 passes, 600 dpi	**Special printing,** **Varware print mode** Bidirectional 4 passes, 600 dpi
HP DesignJet 3000CP with PosterShop	**Special printing,** **Varware print mode** Bidirectional 6 passes, 600 dpi	**Special printing,** **Varware print mode** Bidirectional 4 passes, 600 dpi
HP DesignJet 3000CP with PhotoPRINT RIP	**Special printing,** **Varware print mode** Bidirectional 6 passes, 600 dpi	**Special printing,** **Varware print mode** Bidirectional 4 passes, 600 dpi
HP DesignJet 3800CP printer	**"Photo" high speed mode** **Varware print mode** Bidirectional 6 passes, 600 dpi	**"Productivity" high speed mode** **Varware print mode** Bidirectional 4 passes, 600 dpi

Test results Speak for Themselves
The test results speak for themselves, confirming that the use of an HP DesignJet 3000CP/3500CP printer with an external, productivity-tuned Varware RIP, significantly increases the printing speed, while at the same time maintaining the high image quality which customers seek.

High Quality Print Modes

File	Using HP DesignJet 3500CP internal RIP (see note)	Using productivity tuned RIPs (range) Max	Min	Maximum % Increase vs. internal RIP
Photo Sample (Pasta.tif)	15 sq.ft./hr.	25 sq.ft./hr.	20 sq.ft./hr.	66%
Sign/Graphics (Cartelc.ai)	15 sq.ft./hr.	22 sq.ft./hr.	20 sq.ft./hr.	46%
Speed Test Sample (Bandas.tif)	19 sq.ft./hr.	32 sq.ft./hr.	27 sq.ft./hr.	68%

HP DesignJet CP Series Printers

Medium Quality Print Modes

File	Using HP DesignJet 3500CP internal RIP (see note)	Using productivity tuned RIPs (range) Max	Min	Maximum % Increase vs. internal RIP
Photo Sample (Pasta.tif)	24 sq.ft./hr.	36 sq.ft./hr.	32 sq.ft./hr.	50%
Sign/Graphics (Cartelc.ai)	22 sq.ft./hr.	34 sq.ft./hr.	29 sq.ft./hr.	54%
Speed Test Sample (Bandas.tif)	29 sq.ft./hr.	47 sq.ft./hr.	43 sq.ft./hr.	62%

Note:

The HP DesignJet 3500CP can also be driven by the productivity-tuned RIP listed above. In that case the operator can either send the file directly to the printer to be ripped internally or to be processed by an external RIP.

When using an external productivity-tuned RIP, the HP DesignJet 3500CP behaves like a DesignJet 3000CP achieving the same print speed.

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