

### Canon imagePROGRAF iPF605 vs HP Designjet T520 24"

	Canon imagePROGRAF iPF605	HP Designjet T520 24"
Advantage ✓		
Colour Print Quality	=	=
Black Print Quality	=	=
Colour Print Productivity	✓	
Black Print Productivity	✓	
Direct PDF Submission Functionality		✓
Banner Printing	✓	
Poster Printing	✓	
Ink Consumption	✓	
Device Feature Set	✓	
Print Driver Feature Set	✓	



Canon imagePROGRAF iPF605



HP Designjet T520 24"

## TEST OBJECTIVE

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Buyers Laboratory LLC (BLI) was commissioned by Canon Europe to conduct confidential document imaging device performance testing on the Canon imagePROGRAF iPF605 and the 24" configuration of the HP Designjet T520, and produce a report comparing the relative strengths and weaknesses of the two products in terms of image quality, productivity, ink consumption, direct PDF submission, device feature set, driver functionality, and banner and poster printing. All testing was performed in BLI's test facility in Wokingham, UK.

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## Executive Summary

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The Canon imagePROGRAF iPF605 gave a very good overall performance in BLI's testing, delivering much higher productivity in both colour and black modes than the HP Designjet T520 24" model, as well as superior media handling and a richer driver feature set. The Canon model also had the advantage in ink consumption, using less ink for two of the three document types used in the test. Another benefit of the Canon model that boosts user productivity and reduces waste is how it handles ink and paper outages. When the HP model runs out of ink or paper, it stops and cancels the entire job in progress, even if it's in the middle of a 50-page print run, forcing users to set up the job again from scratch once ink or paper is replenished. The Canon model, in contrast, continues to print when ink needs replacing, while alerting the user to replace the cartridge. When it's out of paper, the Canon unit pauses, alerts the operator, and after a new roll is installed, prompts the operator to continue the job, which begins by printing the interrupted page in full followed by all successive pages.

The two models offer comparable image quality in both colour and black modes, with each having advantages. As would be expected of models aimed at the CAD market, both models delivered excellent results when printing AEC graphics. When printing GIS graphics, the HP model delivered greater depth of field and sharper detailing on plain paper, while the Canon model delivered greater depth of field on matte coated paper, giving a more realistic three-dimensional rendering of topographical features. The Canon model delivers a larger colour gamut than the HP model when printing on all types of paper. Neither model produced natural-looking flesh tones, which were reddish in output produced by the Canon unit and yellowish with the HP unit. The HP model's output density was higher for all colours except magenta and it had the advantage for optical density in black, except in High/Best mode where the Canon unit's output had higher density. Both models delivered superb fine lines, but the Canon model suffered from some ink overspray in text and line art in default settings, but not when CAD (Line Drawing) settings were used. The HP unit delivered superior colour saturation when printing posters in Best mode. The Canon model, however, enjoys one important image quality advantage—the option of unidirectional printing in the driver, even in draft mode, helping it to avoid the banding that's evident across the full width of the image when using the HP device's bidirectional printhead in every mode except Best.

Other advantages of the HP Designjet T520 include lower energy consumption—less than 35 watts while printing and 4.5 watts while in standby compared with 100 watts while printing and 5 watts in standby with the Canon model—and slightly lower noise emissions. In addition, it is a more compact, lightweight device than the Canon model. However, it failed to print BLI's banner during testing, likely due to insufficient memory.

While both models support direct PDF submission without the need to open an application and both allow files to be retrieved from cloud storage for printing, HP's ePrint & Share offers better functionality, including support for printing from Apple or Android smartphones or tablets, full access to the Adobe PDF font library and direct submission of DWF files—all of which the Canon Direct Print & Share utility lacks. However, HP's ePrint & Share requires users to register as users of the ePrint & Share Library and the HP ePrint & Share Printing tool by creating a separate account for each on HP's ePrint & Share Web Center (server), each with their own passwords, which BLI analysts found to be a more tedious and time-consuming process than with iPF Direct Print & Share. Canon users who are registered with Google Drive will have instant access to its hierarchical folder system, in contrast to the flat file structure of HP's ePrint & Share.

Overall the Canon imagePROGRAF iPF605 delivered a superior performance in the majority of categories tested, with much greater productivity (especially in High/Best quality modes), superior banner and poster productivity, lower ink consumption and a more feature-rich driver than the HP Designjet T520. In terms of image quality the two models are very evenly matched.

## Colour Image Quality

	Canon imagePROGRAF iPF605	HP Designjet T520 24"
<b>Advantage ✓</b>		
<b>Text</b>	=	=
<b>Fine Lines</b>	=	=
<b>Halftone Range</b>	=	=
<b>Halftone Fill</b>	=	=
<b>Solid Density</b>		✓
<b>AEC Graphics</b>	=	=
<b>GIS Graphics</b>	=	=
<b>Business Graphics</b>	=	=
<b>Photographic Images</b>	=	=
<b>Colour Gamut (plain paper, default settings)</b>	✓	
<b>Colour Gamut (photo paper, High/Best quality settings)</b>	✓	

+, – and ○ represent positive, negative and neutral attributes, respectively.

### Canon iPF605 v HP Designjet T520

- + One factor influencing overall image quality is the Canon model's option of using unidirectional printing, even in Draft mode. The HP model offers only bidirectional printing, which means that the printhead travels in both directions over the image, creating a noticeable pattern of banding across the full width of the image in all modes except Best quality. The Canon model, on the other hand, is free from any banding, even in Draft mode, when unidirectional printing is selected.
- The HP Designjet T520 delivered higher optical densities on plain paper across all CMYK colours and all quality modes with the exception of magenta in Draft and Normal modes, where the Canon iPF605 had higher densities.
- + When printing on plain paper in Draft settings, the HP Designjet T520 24" delivered a smaller colour gamut, with a CIE volume of 184,939 compared with 232,672 for the Canon iPF605, which is 20.5% higher than that of the HP unit.
- + When printing on plain paper in default settings, the HP Designjet T520 24" again delivered a smaller colour gamut, with a CIE volume of 220,244 compared with 251,494 for the Canon iPF605, which is 14.2% higher than that of the HP unit.
- + When printing on plain paper in High/Best quality settings, the HP Designjet T520 24" also delivered a smaller colour gamut, with a CIE volume of 243,589 compared with 251,426 for the Canon iPF605, which is 3.2% higher than that of the HP unit.

- + And when printing on photo quality paper using Canon's High quality setting and the HP Designjet T520's Best quality setting, the Canon model delivered a colour gamut 5.2% larger than that of the HP unit, with a CIE volume of 468,976 compared with 445,672 for the HP device.
- + When printing on matte coated paper using Canon's High quality setting and the HP Designjet T520's Best quality setting, the Canon model delivered a colour gamut 25.5% larger than that of the HP unit, with a CIE volume of 431,518 compared with 343,970 for the HP device.
- When evaluating text in colour mode there were few significant differences between the two models. In Fast/Draft, Standard/Normal modes and in High/Best mode, the Canon unit's fonts were slightly crisper, with the HP unit showing more breakup in characters below the 4-pt. size.
- The Canon model exhibited some ink overspray in both text and line art in default mode, creating some loss of sharpness, but only when viewed under magnification.
- + However, the Canon unit produced superior results for fine lines and text, with no overspray, when the CAD (Colour Line Drawing) settings were used.
- Fine lines remained distinct down to the 0.1-pt. level in all modes on both devices, with the exception of white on black fine lines which were not handled well in all modes by the HP unit, or by the Canon model except, curiously, in Draft mode.
- As would be expected for devices aimed at the CAD market, both models delivered excellent Architectural, Engineering and Construction (AEC) graphics in both Normal/Standard and High/Best modes, with superlative detailing and distinct fine lines.
- When evaluating Geographic Information Systems (GIS) graphics in High/Best mode on plain paper, the HP unit delivered a finer level of detail and greater depth of field than the Canon model.
- + However, when evaluating GIS graphics in High/Best mode on matte coated paper, the Canon unit delivered a finer level of detail and greater depth of field than the HP model, with a richer three-dimensional rendering of topographical features.
- Colour business graphics produced by both models exhibited sharp details and smooth gradations of colour.
- When comparing photographic images, once again there was little difference between the two models, with the HP model delivering better detailing in dark contrast areas and the Canon unit delivering better detailing in light contrast areas.
- Skin tones produced by both models were not very natural-looking in all modes, with those produced by the Canon device being slightly reddish and those produced by the HP device being slightly yellowish.
- BLI's overall assessment of colour image quality is that the two models were very evenly matched, with the HP model offering higher optical density for all colours except magenta, a finer level of detail in GIS graphics on plain paper, and none of the ink overspray in text and line art which the Canon device showed under magnification. However, the Canon device delivered a larger colour gamut on all types of paper, and superior GIS graphics on matte coated paper. Both models delivered excellent results in AEC drawings, but neither model delivered natural looking skin tones. Although the Canon model suffered from some ink overspray, it does offer the option of using unidirectional printing to avoid the banding that was clearly present across all HP output except in Best mode.

## Black Image Quality

	Canon imagePROGRAF iPF605	HP Designjet T520 24"
<b>Advantage ✓</b>		
<b>Text</b>	=	=
<b>Fine Lines</b>	=	=
<b>Halftone Range</b>	=	=
<b>Halftone Fill</b>	✓	
<b>Solid density</b>		✓
<b>AEC Graphics</b>	=	=
<b>Business Graphics</b>	=	=
<b>Photographic Images</b>	✓	

### Canon iPF605 v HP Designjet T520

- The HP model delivered higher optical densities for black in Draft and Normal modes.
- + However, the Canon iPF605 had a much higher black density in Best/High quality mode.
- When evaluating text in black mode there were few significant differences between the two models. In Fast/Draft, Standard/Normal modes and in High/Best mode, the Canon unit's fonts were slightly crisper, with the HP unit showing more breakup in characters below the 4-pt. size.
- The Canon model exhibited some ink overspray in both text and line art in default mode, creating some loss of sharpness, but only when viewed under magnification. However, the Canon unit produced superior results for fine lines and text, with no overspray, when the CAD (Monochrome Line Drawing) settings were used. Note that these settings are not available for HP users.
- Fine lines remained distinct down to the 0.1-pt. level in all modes on both devices, with the exception of white on black fine lines which were not handled well in all modes by the HP unit, nor by the Canon model except, curiously, in Draft mode.
- As would be expected for devices aimed at the CAD market, both models delivered excellent Architectural, Engineering and Construction (AEC) graphics in both Normal/Standard and High/Best modes, with excellent detailing and distinct fine lines.
- Both models delivered a very good halftone range—from the 10% to 100% dot-fill levels in all modes.
- + The Canon device was rated very good in all modes for halftone fill, but the HP unit was rated only good as fills were less smooth even in High/Best quality mode.
- When evaluating AEC graphics in Normal/Standard and High/Best modes in black, both models delivered excellent results, with accurate detail and distinct fine lines.
- Business graphics in monochrome in Best/High quality mode on plain paper were delivered very accurately with both models, with smooth halftone gradations and crisp text.

- + The Canon model produced photographic images in Best/High quality mode on plain paper with smoother gradations than did the HP model. Metallic/chrome surfaces were produced with superb realism and smoothness by the Canon iPF605.
- BLI analysts found little difference between the two models for black image quality. Both units (as would be expected) delivered excellent results in AEC graphics, with detailed and distinct fine lines. Although the Canon model delivered superior halftone fills, and smoother gradations in photographic images, the HP unit delivered higher optical density in all modes except High/Best mode, and text that had none of the ink overspray visible under magnification with the Canon model in text and line art.

## Print Productivity

	Canon imagePROGRAF iPF605	HP Designjet T520 24"
<b>Advantage ✓</b>		
<b>First Page Out</b>	✓	
<b>Throughput Speed (fastest mode)</b>	✓	
<b>Throughput Speed (default mode)</b>	✓	
<b>Throughput Speed (highest-quality mode)</b>	✓	
<b>Job Stream (multiple jobs submitted to device in fast succession simulating busy network environment)</b>	✓	

### Canon iPF605 v HP Designjet T520

- + When the HP model runs out of ink or paper, it stops and cancels the entire job in progress, even in the middle of a multi-page print run, forcing users to resubmit the job once ink or paper is replenished. This has a negative impact on productivity, since the operator must determine the last page printed and then resubmit the job from that point. The Canon model, in contrast, will continue to print (drawing ink from its sump tank) when ink needs replacing, and the control panel conveniently alerts the user to replace ink. When the Canon unit runs out of paper, it pauses and alerts the operator. After a new roll is installed, the operator is prompted to continue the job, after which the job will continue printing from the beginning of the interrupted page.
- + Since printing is not interrupted when a Canon cartridge is depleted, it is expected that less ink and paper will be wasted by the Canon model than the HP.
- + The Canon's output catch tray can stack printed sheets more neatly (and in the correct sequence) than HP's catch basket, which tends to mix up pages which have fallen askew. This makes collating output much easier with the Canon model and helps to reduce operator intervention and downtime.
- + The Canon iPF605 delivered a faster first-page-out time of 106.24 seconds after a weekend of non-use, com-

pared with 117.40 seconds for the HP device. Warm-up time before printing commenced was 27.82 seconds for the Canon model, slightly faster than the 29.94 seconds for the HP unit.

- + The Canon iPF605 delivered a faster first-page-out time of just 69.41 seconds from its ready state, compared with 98.91 seconds for the HP device. Warm-up time before printing commenced was just 11.80 seconds for the Canon model, compared with 14.10 seconds for the HP unit.
- + When printing BLI's job stream, designed to simulate a typical mixed workflow for a large-format unit, the Canon iPF605 was 54.1% faster than the HP model in Draft/Fast mode, 25.3% faster in Standard/Normal mode, and 223.6% faster in High quality/Best mode.
- + When printing BLI's 12-page DWF test file in colour, the Canon unit was 16.8% faster in Draft/Fast mode, 32.7% faster in Standard/Normal mode, and 248.0% faster in High quality/Best mode when compared with the HP unit.
- + When printing BLI's 12-page DWF test file in monochrome, although the Canon unit was 27.5% slower than the HP model in Standard/Normal mode, it was 23.9% faster in Draft/Fast mode, and 245.9% faster in High quality/Best mode.

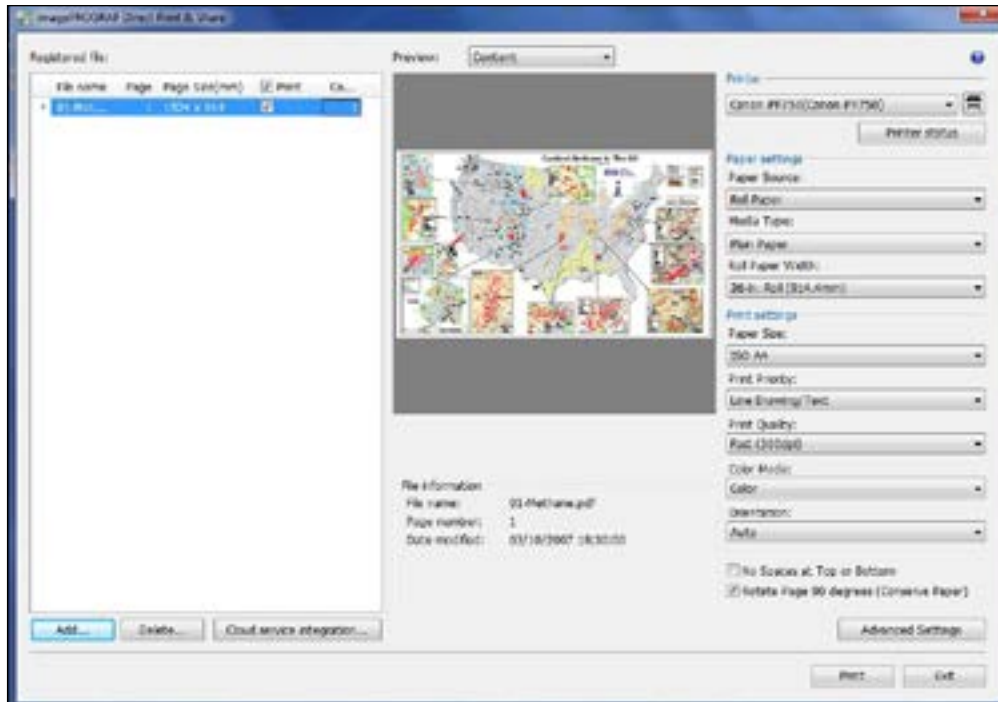
## Direct PDF Print Submission Functionality

	Canon imagePROGRAF iPF605	HP Designjet T520 24"
Advantage ✓		
Ease of Use	=	=
Functionality		✓

### Canon iPF605 v HP Designjet T520

- + A free download from Canon's website, the iPF Direct Print & Share utility enables PDFs to be printed without opening Adobe Acrobat. iPF Direct Print & Share also allows users to retrieve files from cloud storage for printing.





**Canon's iPF Direct Print & Share utility**

- HP's ePrint & Share Web services software provides the same direct PDF submission and cloud storage retrieval functionality for the HP device as Canon's Direct Print & Share utility but also supports printing from Apple or Android smartphones or tablets, and automatically saves copies of work to the cloud. It also provides access to the full Adobe PDF font library and supports direct submission of DWF files, features that the Canon utility lacks.



- + HP's ePrint & Share requires users to register as users of the ePrint & Share Library and the HP ePrint & Share Printing tool by creating a separate account for each on HP's ePrint & Share Web Center (server), each with their own passwords, which BLI analysts found to be a more tedious and time-consuming process than with iPF Direct Print & Share. Canon users who are registered with Google Drive will have instant access to its hierarchical folder system, in contrast to the flat file structure of HP's ePrint & Share.

## Banner Printing

	Canon imagePROGRAF iPF605	HP Designjet T520 24"
Advantage ✓		
Ease of Use	✓	
Productivity	✓	

### Canon iPF605 v HP Designjet T520

- + The Canon iPF605 successfully printed BLI's 24" x 70" banner (originally a 4,955-KB PDF file) in Draft mode, taking just 28.21 seconds to generate a preview, and a further 2 minutes, 19.32 seconds from preview to final paper cut.
- + The HP T520 was unable to print any portion of the banner, with a message appearing on the display saying 'Out of memory... the printer cannot complete this job.'

## Poster Printing

	Canon imagePROGRAF iPF605	HP Designjet T520 24"
Advantage ✓		
Image Quality (Draft and Normal modes)	✓	
Image Quality (High/Best modes)		✓
Productivity	✓	

### Canon iPF605 v HP Designjet T520

- When printing a poster in Draft/Fast mode at 300 dpi, the Canon model took 42.55 seconds to complete the job and the HP unit took 51.95 seconds, although banding was evident with both models across the full width of the poster. When the Canon model was switched to unidirectional printing, which eliminated the banding, it took 66.59 seconds to print.
- + When printing posters in Standard/Normal mode at 600 dpi, the Canon model took 75.61 seconds and the HP unit took 88.22 seconds, but no banding was evident with either model in this mode.
- + Printing posters in High quality (600 dpi) mode on the Canon model took 1 minute, 55.66 seconds, while the HP model in Best quality (1200 dpi) mode took 6 minutes, 21.87 seconds—more than three times longer than with the Canon model.

- However, at these High/Best settings the HP unit delivered better image quality when printing posters with more vibrant, saturated colours than did the Canon iPF605.

## Ink Consumption

RESULTS		
Results averaged across three tests of 50-page A1 printing in Fast/Draft and Standard / Normal Modes.	Canon imagePROGRAF iPF605	HP Designjet T520 24"
<b>COTTAGE ARCHITECTURAL PLAN (Fast/Draft Mode)</b>		
Overall weight of ink used (grams)	52.80 g	53.20 g
Percentage of total ink used averaged across all colours	6.33%	30.26%
<b>COTTAGE ARCHITECTURAL PLAN (Standard / Normal Mode)</b>		
Overall weight of ink used (grams)	69.10 g	64.60 g
Percentage of total ink used averaged across all colours	8.29%	36.75%
<b>RETAIL POSTER (Standard / Normal Mode)</b>		
Overall weight of ink used	211.0g	225.0 g
Percentage of total ink used averaged across all colours	25.3%	128.0%
<b>GIS MAP (Standard / Normal Mode)</b>		
Overall weight of ink used	143.8 g	157.7 g
Percentage of total ink used averaged across all colours	17.3%	89.7%

### Canon iPF605 v HP Designjet T520

- + When producing 50 prints of a Cottage Architectural Plan in Draft/Fast Mode, the Canon unit used 0.7% less ink on average than did the HP T520. The Canon model used only 6.3% of the ink available, whereas the HP model used 30.3% of the available ink.
- When producing 50 prints of a Cottage Architectural Plan in Standard / Normal Mode, the Canon unit used 6.9% more ink than did the HP T520 on average. However, the Canon model only used 8.3% of the ink available, whereas the HP model used 36.7% of the available ink.
- + When printing a Retail Poster in Standard / Normal Mode, the Canon unit used 6.2% less ink on average than did the HP T520.
- + When printing a GIS Map, the Canon iPF605 used 8.8% less ink on average compared with the HP device.
- + As noted earlier, the fact that the Canon cartridges can be run to exhaustion without interrupting the print process means that less ink and paper are likely to be wasted by the Canon model than by the HP T520.

## Device Feature Set

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### Canon iPF605 v HP Designjet T520

- + The capacity of the Canon cartridges (130 ml for black, cyan, magenta and yellow) is higher than that of the HP model (29 ml for cyan, magenta and yellow; 38 and 80 ml for the black), and as a consequence they will likely need replacing much less frequently than with the HP device.
- + If the Canon device detects that printhead nozzles are in danger of clogging, it will automatically start a cleaning routine. This task would have to be done manually with the HP unit, although BLI analysts did not encounter any nozzle clogging issues during testing.
- + The Canon unit supports a larger diameter of roll paper (150 mm as opposed to 100 mm with the HP device) and a higher maximum media thickness (300 gsm compared with HP's 280 gsm).
- The HP unit supports a higher maximum cut-sheet media length of 1.897 m compared with 1.6 m for the Canon unit.
- + Canon's output catch tray can stack printed sheets more neatly (and in the correct sequence) than the HP catch basket, making collating output much easier.
- The HP device offers a larger standard and maximum RAM of 1 GB, compared with 256 MB for the Canon iPF605.
- The HP T520 is a more compact, lightweight device than the Canon model, weighing in at just 34 kg versus 60 kg for the Canon unit.
- Unlike the Canon device, the HP model is WiFi-enabled.
- The HP model includes a colour touchscreen while the display on the Canon model is a non-touchscreen LCD monochrome display.
- The HP T520's power consumption is much lower than the Canon model, both in standby mode and while printing.
- Noise emissions are fractionally higher with the Canon device (49 dB versus 48 dB with the HP model).

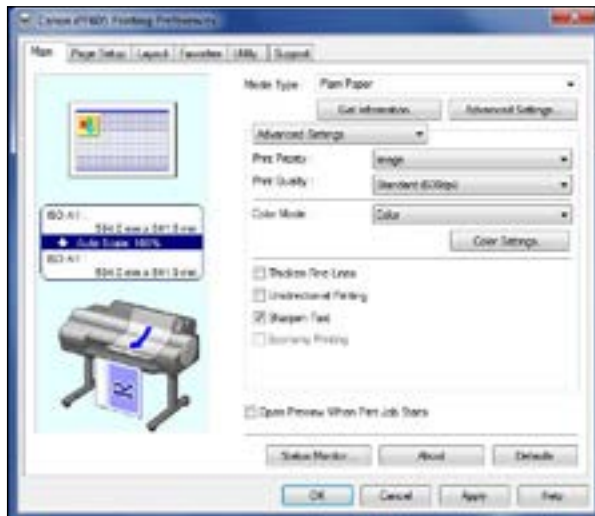
## Driver Feature Set

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### Canon iPF605 v HP Designjet T520 24"

- The Canon iPF605 has five speed settings (Draft 300, Standard 600, Draft 600, High 600 and 1200), as opposed to three with the HP device (Fast, Normal and Best). Note: not all speed settings are available with all media types.

- + The Canon GARO driver provides an overview of the settings for predefined profiles, unlike HP's HP-GL/2 driver.
- + The HP driver offers a range of just five predefined profiles, whereas the Canon unit has 13 predefined profiles.
- + The Canon driver supports multi-up (2 to 16) printing, which the HP driver doesn't support.
- + The Canon GARO driver has a poster mode (2 by 2) that is not available from the HP driver.
- + Unlike the HP driver, the Canon driver offers page stamping (Date, Time, Name and Page Number).
- + The Canon GARO driver offers a wider range of built-in adjustments for CMYK balance, brightness, contrast and saturation than the HP-GL/2 driver. ICC profile settings are also available in the GARO driver's matching tab under Advanced Settings. Operators can select four matching modes (driver, ICC, driver ICM and host ICM matching) and choose one of four rendering methods (auto, perceptual, colorimetric or saturation). Note that a wide range of colour management profiles are available when the HP driver and colour management tools (from the Printing Preferences menu) are downloaded from HP's website (as of March 2013), plus the ability to preview images before printing—features which were not included in the Startup driver disk supplied to BLI with the device.
- + The Canon driver offers unidirectional printing, even in draft mode. This means that the printhead travels in only one direction to create the desired image, helping it to avoid the banding that's evident across the full width of the image when using the HP device's bidirectional printhead in every mode except Best.
- + The Canon driver includes the Colour imageRUNNER Enlargement Copy Mode utility, which enables users to integrate a Canon small-format MFP device with the iPF605. Documents scanned by the Canon MFP are automatically routed to a hot folder that is monitored by the driver of the iPF605. The image is then resized and printed, offering a fast, easy-to-use poster creation tool for office users.
- + The Canon driver also includes a Free Layout nesting tool that enables files—even files created with different applications—to be scaled, resized, or grouped together as a single job from the printer driver. Images can be dragged and dropped to their desired locations and printed together on a single page to save on paper.
- + The Canon model also offers a plug-in for printing from Microsoft Office applications that include useful tools for automatic media resizing, nesting and borderless printing.



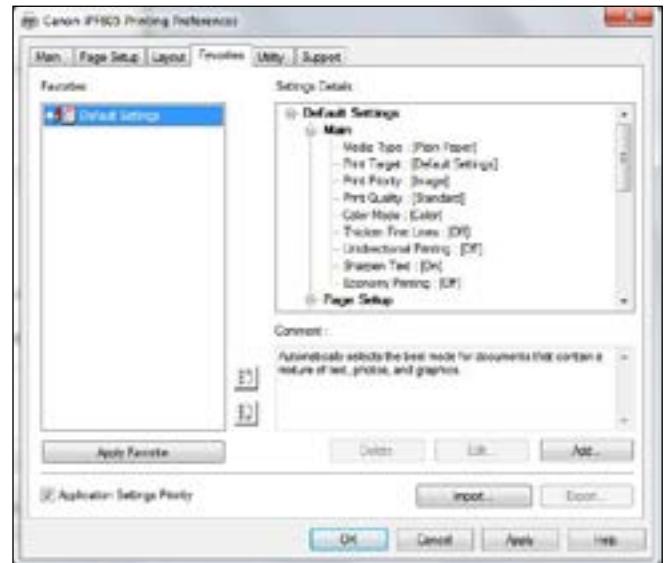
Canon Print Driver Main Tab



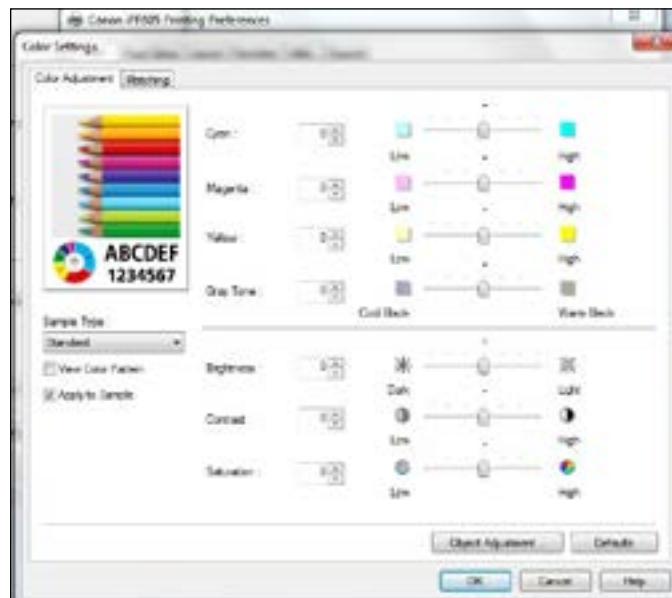
Canon Print Driver Page Setup Tab



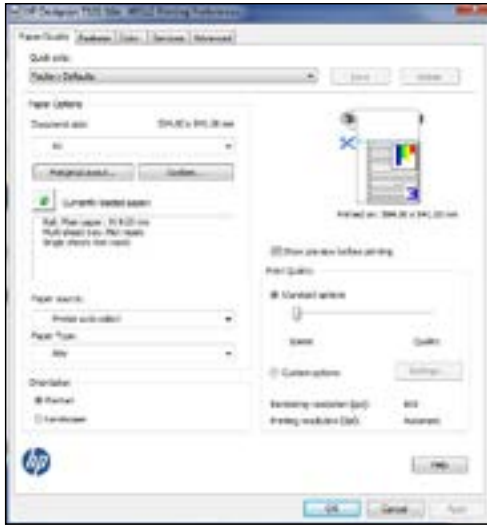
Canon Print Driver Layout Tab



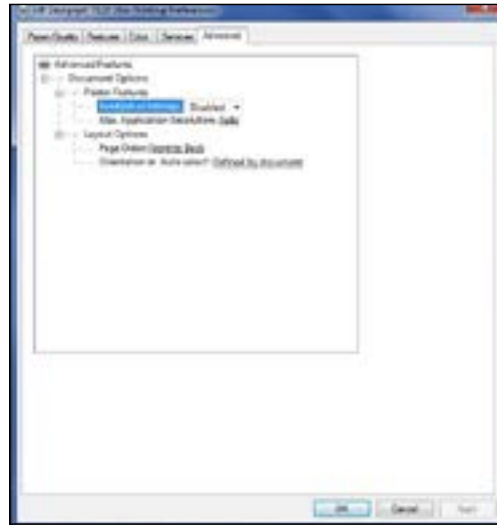
Canon Print Driver Favourites Tab



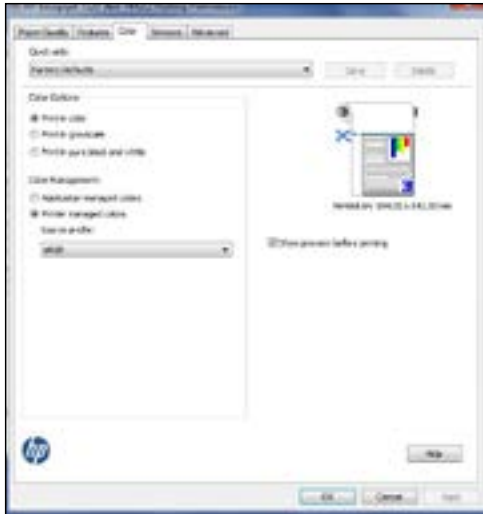
Canon Print Driver Colour Adjustment Tab



HP Print Driver Paper Quality Tab



HP Print Driver Advanced Settings Tab



HP Print Driver Colour Settings Tab



HP Print Driver Features Tab

## SUPPORTING TEST DATA

### Job Stream Productivity

#### Mixed File Types, Same Size

	Canon iPF605 (time in seconds)		HP DJ T520 24" (time in seconds)
<b>Draft</b>	857.74	<b>Fast</b>	1,322.03
<b>Standard</b>	1,373.97	<b>Normal</b>	1,772.19
<b>High</b>	2,515.88	<b>Best</b>	8,140.90

BLI's job stream consists of 10 files, including PDF, TIFF and DWF files totalling 19 pages, all at Arch D-size. This test replicates the type of traffic a typical wide-format device might experience in a real-world, multi-user environment. All of the files are submitted to the controller in a specific order and sent to the printer as a group, at which time the stopwatch begins; timing ends when the last page of the last file exits the device. Both devices were loaded with 914-mm rolls, with each file set to auto-rotate to save media.

#### Colour Productivity

Canon imagePROGRAF iPF605 (time in seconds)			HP Designjet T520 24" (time in seconds)		
Draft	Standard	High	Fast	Normal	Best
564.78	853.07	1,547.94	659.53	1,132.18	5,386.81

The 12-page DWF test file was printed using the device driver set to the plain paper/colour setting. Both devices were loaded with 610-mm rolls. The actual time indicated is the time it took to RIP, image and deliver all pages of the test document to the collection bin.

#### Monochrome Productivity

Canon imagePROGRAF iPF605 (time in seconds)			HP Designjet T520 24" (time in seconds)		
Draft	Standard	High	Fast	Normal	Best
532.22	859.26	1,553.01	659.79	674.02	5,371.54

The 12-page DWF test file was printed with the Canon driver set to the plain paper/monochrome setting and the HP driver set to plain paper, greyscale, black ink only. Both devices were loaded with 610-mm rolls. The actual time indicated is the time it took to RIP, image and deliver all pages of the test document to the collection bin.



### First-Page-Out Productivity After a Weekend of Non-Use

	Canon imagePROGRAF iPF605 (time in seconds)	HP Designjet T520 24" (time in seconds)
Time Before Printing Commences	27.82	29.94
First Print Out	106.24	117.40

### First-Page-Out Productivity From Ready State

	Canon iPF605 (time in seconds)	HP DJ T520 24" (time in seconds)
Time Before Printing Commences	11.80	14.10
First Print Out	69.41	98.91

First-page-out times are achieved by sending an Arch D-size PDF file to print, timed from release to page out with the Canon driver set to the plain paper/monochrome setting and the HP driver set to plain paper, greyscale, black ink only. Both devices were loaded with 914-mm rolls, with each file set to auto-rotate to save media.

## Colour Print Quality

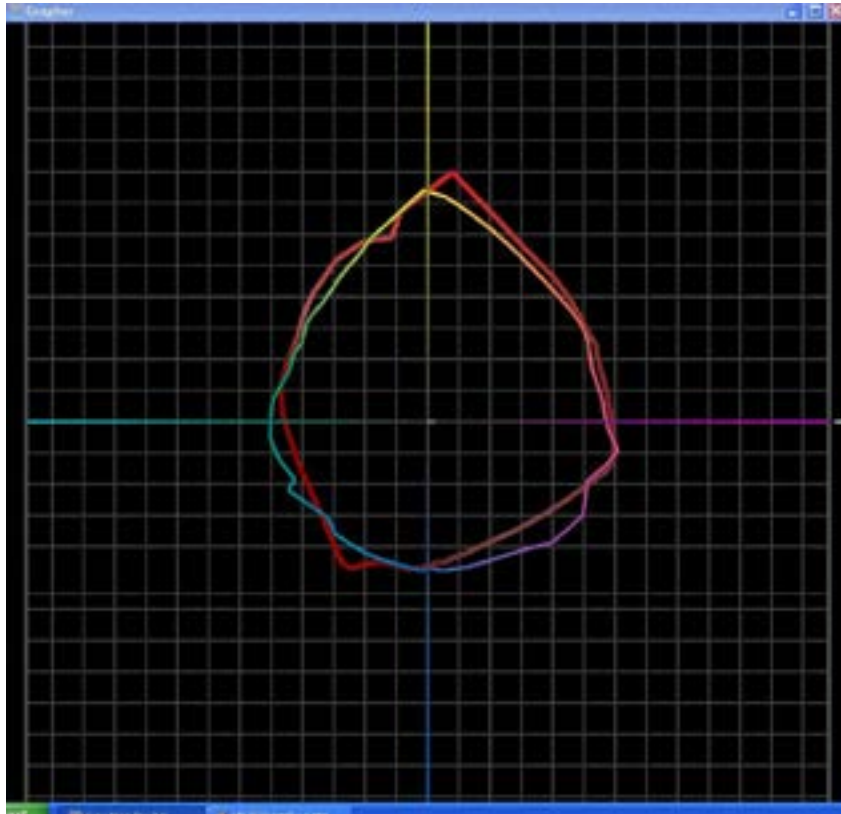
### Colour Optical Density Evaluation

Canon imagePROGRAF iPF605						
Plain Paper						
	Draft		Standard		High	
	50%	100%	50%	100%	50%	100%
Cyan	0.59	0.71	0.61	0.79	0.60	0.75
Magenta	0.58	0.87	0.63	0.96	0.61	0.97
Yellow	0.64	0.73	0.63	0.83	0.62	0.84
Black	0.68	1.34	0.70	1.47	0.66	1.46

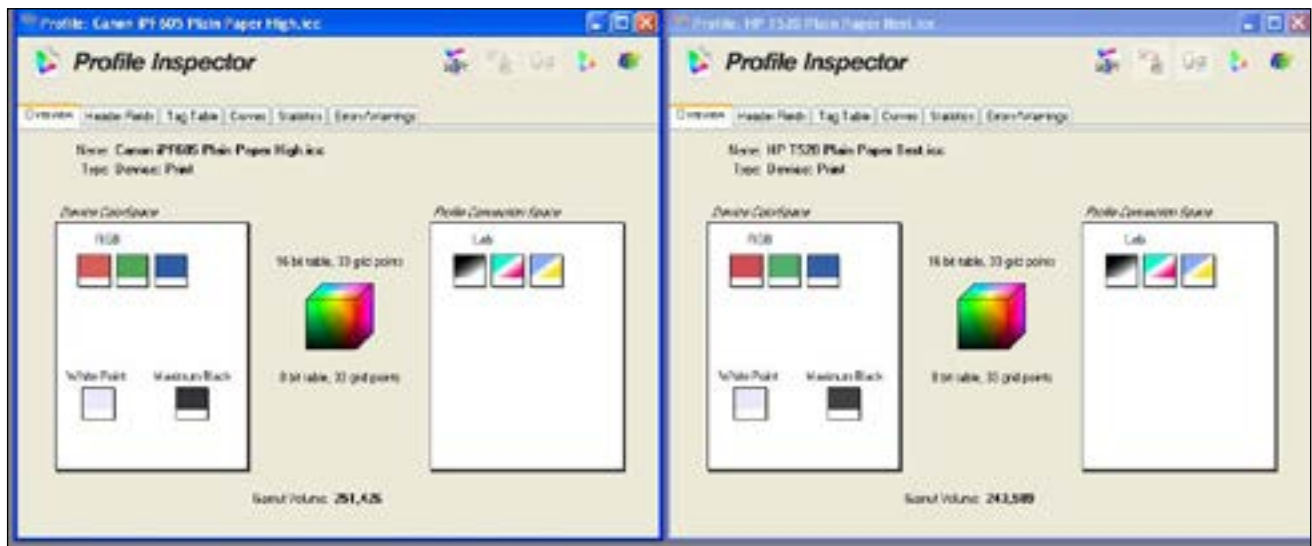
HP Designjet T1520 24"						
Plain Paper						
	Fast		Normal		Best	
	50%	100%	50%	100%	50%	100%
Cyan	0.41	0.75	0.45	0.85	0.52	0.97
Magenta	0.54	0.82	0.59	0.84	0.59	0.98
Yellow	0.57	0.76	0.62	0.85	0.61	0.96
Black	0.56	1.46	0.61	1.50	0.60	1.37

Note: Colour density readings were assessed by printing an IT8 test file on plain paper in default colour settings at all quality settings available and measuring the density of 100% dot fill and 50% dot fill using an XRite 508 densitometer.

Colour Gamut Comparison

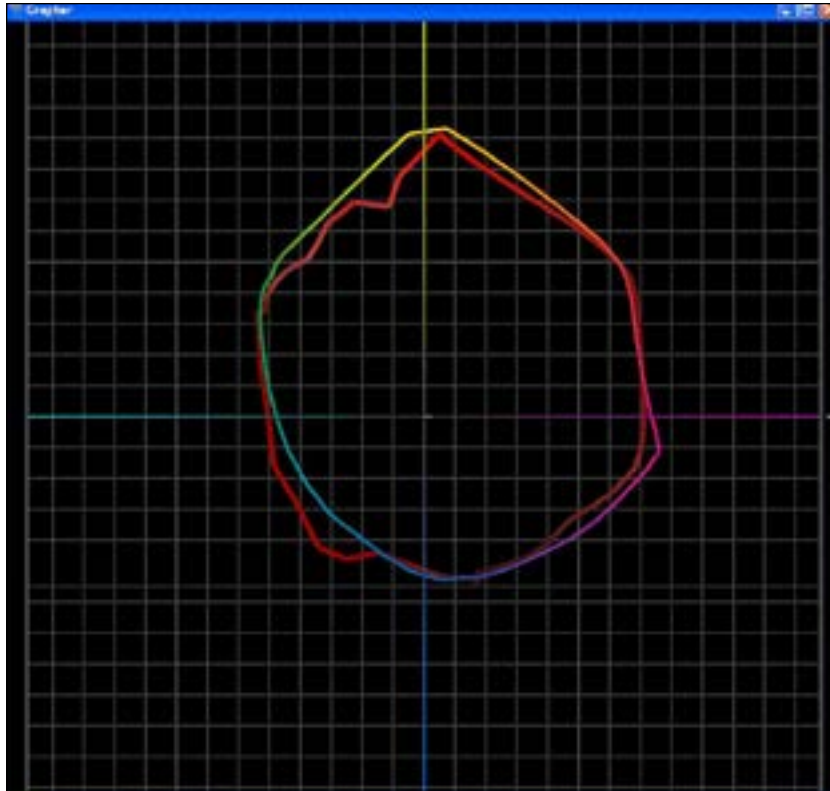


HP Designjet T520 24" colour gamut on plain paper in default settings (red) versus Canon imagePROGRAF iPF605 colour gamut (shown chromatically) on plain paper in default settings.

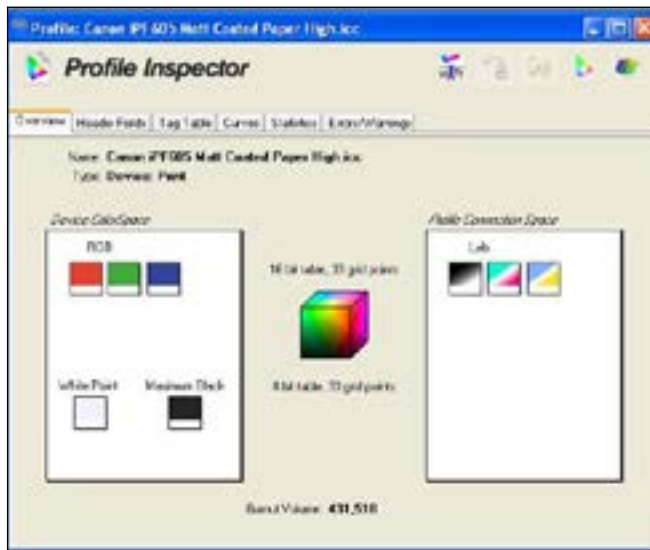


Canon iPF 605 on plain paper

HP Designjet T520 24" on plain paper



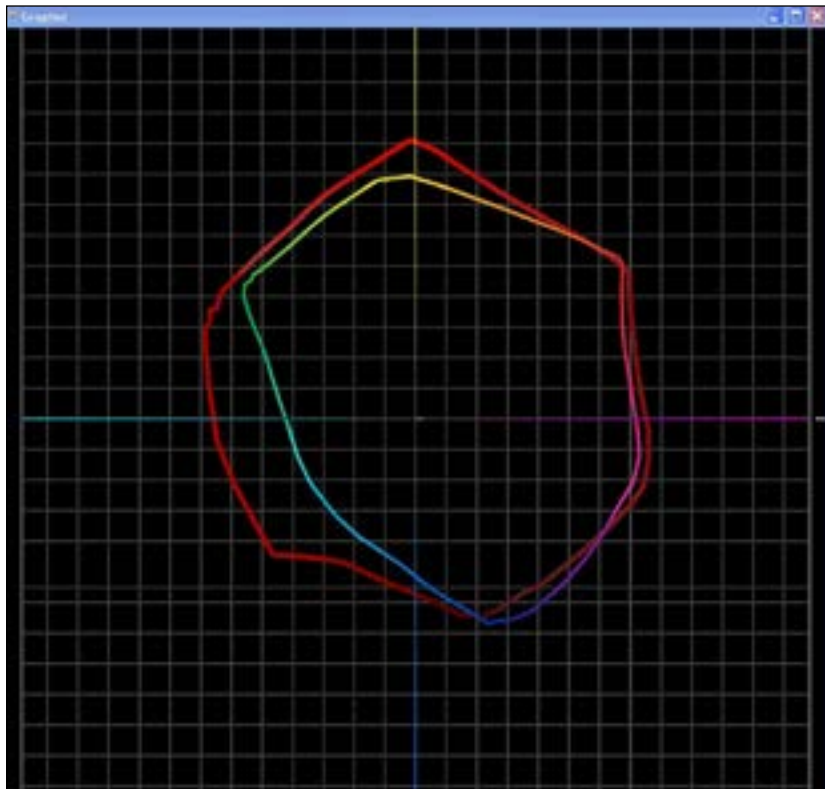
HP Designjet T520 24" colour gamut on matte coated paper in Best quality settings (red) versus Canon imagePROGRAF iPF605 colour gamut (shown chromatically) on matte coated paper in High quality settings.



Canon iPF605 on matte coated paper



HP Designjet T520 24" on matte coated paper



HP Designjet T520 24" colour gamut on photo quality paper in Best quality settings (red) versus Canon imagePROGRAF iPF605 colour gamut (shown chromatically) on photo quality paper in High quality settings.



Canon iPF 605 on photo quality paper



HP Designjet T520 24" on photo quality paper

## Black Print Quality

	Canon imagePROGRAF iPF605			HP Designjet T520 24"		
	Draft	Standard	High	Fast	Normal	Best
Density Block						
1	1.34	1.48	1.47	1.35	1.52	1.48
2	1.37	1.47	1.45	1.36	1.51	1.48
3	1.35	1.48	1.44	1.36	1.50	1.48
4	1.33	1.47	1.44	1.35	1.52	1.49

Note: Solid black density measurements are based on four readings taken from a BLI proprietary PDF test target file corresponding to four different 100% solid black locations on the output. The output was assessed at all quality settings available, with the Canon driver set to plain paper/monochrome setting, HP driver set to plain paper, greyscale, black ink only. Density was measured using an XRite 508 densitometer.

## Device Feature Set

	Canon imagePROGRAF iPF605	Advantage		HP Designjet T520 24"
Max. print quality	2400 x 1200 dpi			2400 x 1200 dpi
Number of inks	6	✓		5
Ink-drop size	4 picoliter	✓		CMY- 5.5 picoliter K – 12 picoliter
Ink cartridge capacity	90 ml (Starter), 130 ml	✓		CMY – 29ml K – 38ml/80ml
Number of nozzles	MBK: 5,120 nozzles, Other colours: 2,560 nozzles each			Information not available
Number of printheads	1			1
Line accuracy	+/-0.1% or less			+/-0.1%
Minimum line width	0.02 mm			0.02 mm
Minimum print margins	3 mm	✓		5 mm
Maximum outside diameter of roll paper	150 mm	✓		100 mm
Maximum printable paper roll length	18 m		✓	19 m
Maximum media thickness	300 gsm	✓		280 gsm
Maximum media width	24 inches			24 inches
Media loading	Front			Front
Optional media handling	Roll holder set	✓		None
Standard RAM	256 MB		✓	1 GB
Maximum RAM	256 MB		✓	1 GB
Hard drive	None			None
Interface	USB 2.0, 10/100Base-TX		✓	USB 2.0, 100Base-T, WiFi
PDL	GARO, HP-GL/2, HP RTL			HP-GL/2, HP RTL, HP PCL 3, GUI, JPEG, CALS G4
Net weight (unpacked)	60 Kg		✓	34 Kg
Power consumption when in standby	4.5 W	✓		5 W
Power consumption when active	100 W		✓	<35 W
Acoustic pressure	Operation: 49 dB (A) or less; Standby: 36 dB (A) or less		✓	Operation: 48 dB (A); Standby: 16 dB (A)
Acoustic power	Operation: 6.6 Bels or less		✓	6.5 B (A) active

## Driver Feature Set

	Canon imagePROGRAF iPF605	Advantage		HP Designjet T520 24"
Speed settings	5 (Draft 300, Standard 600, Draft 600, High 600 and 1200)	✓		3 (Fast, Normal, Best)
Economy mode	Yes			Yes
Predefined profiles	13	✓		5 (Default, CAD, GIS, Photo, B/W Photo)
Overview of profile settings provided	Yes	✓		No
Media profiles	27 + 5	✓		23
IQ optimized for options	Yes			Yes
Watermark	Yes	✓		No
Sharpen text	Yes			Yes (Max detail setting)
Thicken fine lines	Yes			Yes (Max detail setting)
Mirror image	Yes	✓		No
Multi-up printing	Yes, 2 to 16	✓		No
Poster print mode	Yes (2 by 2)	✓		No
Page stamping	Yes (Date, Time, Name, Page Number)	✓		No
Image rotation	Yes – auto 180 degrees			Yes – auto 90 degrees
Option to preview before print	Yes			Yes*
Link to device Web server from driver	No (there is a link to Status Monitor)			No
CMYK balance adjustment	Yes	✓		No
Brightness adjustment	Yes	✓		No
Contrast adjustment	Yes	✓		No
Saturation adjustment	Yes	✓		No
Advanced colour management options	Yes			Yes
Disable automatic cutter	Yes			Yes
Unidirectional printing	Yes	✓		No

\*When driver is downloaded from HP's website.

## Ink Consumption

**Table 1: Amount of Ink in Each Canon iPF605 Cartridge (grams)**

	Cyan	Magenta	Yellow	Black	Matte Black (1)*	Matte Black (2)*
Weight of cartridge prior to installation	177.3	178.7	172.0	175.2	175.2	176.0
Weight of cartridge at end of life	36.8	36.8	36.8	36.8	36.8	36.8
Net weight of ink	140.5	141.9	135.2	138.4	138.4	139.2
<b>Total ink weight across six cartridges</b>						<b>833.6</b>

\*Two MBK cartridges were installed in the machine; combined weights were used.

**Table 2: Amount of Ink in Each HP Designjet T520 24" Cartridge (grams)**

	Cyan	Magenta	Yellow	Black
Weight of cartridge prior to installation	58.4	58.4	58.7	134.1
Weight of cartridge at end of life	28.2	28.2	28.2	49.2
Net weight of ink	30.2	30.2	30.5	84.9
<b>Total ink weight across four cartridges</b>				<b>175.8</b>

**Table 3: Ink Used in Three 50-Page Runs of Cottage Architectural Drawing Test Document on the Canon iPF605 (grams) in Draft/Fast Mode.**

	Cyan	Magenta	Yellow	Black	Matte Black*
Test Run 1 Net weight of ink used	2.6	2.7	0.5	1.6	10.0
Test Run 2 Net weight of ink used	2.9	2.9	0.9	0.2	10.9
Test Run 3 Net weight of ink used	3.1	2.9	0.6	0.2	10.8
Average amount of ink used across three runs	2.9	2.8	0.7	0.7	10.6
<b>Total ink weight across six cartridges for 50-page run (based on averages)</b>					<b>17.6</b>

\* Two Matte Black Cartridges were installed in iPF605; combined usage and weights were reported.



**Table 4: Ink Used in Three 50-Page Runs of Cottage Architectural Drawing Test Document on the HP Designjet T520 24" (grams) in Draft/Fast Mode**

	Cyan	Magenta	Yellow	Black
<b>Test Run 1 Net weight of ink used</b>	4.1	2.4	1.1	11.0
<b>Test Run 2 Net weight of ink used</b>	3.9	2.3	0.8	10.3
<b>Test Run 3 Net weight of ink used</b>	3.5	2.2	0.9	10.7
<b>Average amount of ink used across three runs</b>	3.8	2.3	0.9	10.7
<b>Total Ink Weight across four cartridges for 50-page run (based on averages)</b>				17.7

**Table 5: Ink Used in Three 50-Page Runs of Cottage Architectural Drawing Test Document on the Canon iPF605 (grams) in Standard / Normal Mode.**

	Cyan	Magenta	Yellow	Black	Matte Black*
<b>Test Run 1 Net weight of ink used</b>	4.3	3.1	0.9	0.2	14.4
<b>Test Run 2 Net weight of ink used</b>	3.8	2.9	0.7	1.1	14.3
<b>Test Run 3 Net weight of ink used</b>	4.1	3.2	0.7	0.9	14.5
<b>Average amount of ink used across three runs</b>	4.1	3.1	0.8	0.7	14.4
<b>Total ink weight across six cartridges for 50-page run (based on averages)</b>					23.0

\* Two Matte Black Cartridges were installed in iPF605; combined usage and weights were reported.

**Table 6: Ink Used in Three 50-Page Runs of Cottage Architectural Drawing Test Document on the HP Designjet T520 24" (grams) in Standard/Normal Mode**

	Cyan	Magenta	Yellow	Black
<b>Test Run 1 Net weight of ink used</b>	6.5	3.1	1.2	12.3
<b>Test Run 2 Net weight of ink used</b>	5.9	2.5	0.7	11.6
<b>Test Run 3 Net weight of ink used</b>	6.1	2.5	0.7	11.5
<b>Average amount of ink used across three runs</b>	6.2	2.7	0.9	11.8
<b>Total ink weight across four cartridges for 50-page run (based on averages)</b>				21.6

**Table 7: Ink Used in Three 50-Page Runs of Retail Poster Test Document on the Canon iPF605 (grams)**

	Cyan	Magenta	Yellow	Black	Matte Black*
<b>Test Run 1 Net weight of ink used</b>	14.0	28.1	16.4	1.7	7.8
<b>Test Run 2 Net weight of ink used</b>	14.7	30.5	17.3	1.0	6.8
<b>Test Run 3 Net weight of ink used</b>	14.5	31.0	17.8	2.2	7.2
<b>Average amount of ink used across three runs</b>	14.4	29.9	17.2	1.6	7.3
<b>Total ink weight across 6 cartridges for 50-page run (based on averages)</b>					70.4

\* Two Matte Black Cartridges were installed in the iPF605; combined usage and weights reported.

**Table 8: Ink Used in Three 50-Page Runs of Retail Poster Test Document on the HP Designjet T520 24" (grams)**

	Cyan	Magenta	Yellow	Black
<b>Test Run 1 Net weight of ink used</b>	14.8	29.9	24.2	7.5
<b>Test Run 2 Net weight of ink used</b>	14.9	29.0	24.3	7.7
<b>Test Run 3 Net weight of ink used</b>	14.1	28.9	23.4	6.3
<b>Average amount of ink used across three runs</b>	14.6	29.3	24.0	7.2
<b>Total ink weight across 4 cartridges for 50-page run (based on averages)</b>				75.0

**Table 9: Ink Used in Three 50-Page Runs of GIS Map Test Document on the Canon iPF605 (grams)**

	Cyan	Magenta	Yellow	Black	Matte Black*
<b>Test Run 1 Net weight of ink used</b>	20.2	10.4	9.4	1.8	7.4
<b>Test Run 2 Net weight of ink used</b>	20.1	9.9	9.5	1.1	5.8
<b>Test Run 3 Net weight of ink used</b>	20.8	10.7	9.5	1.1	6.1
<b>Average amount of ink used across three runs</b>	20.4	10.3	9.5	1.3	6.4
<b>Total ink weight across 6 cartridges for 50-page run (based on averages)</b>					47.9

\* Two Matte Black Cartridges in iPF605; combined usage and weights reported.

**Table 10: Ink Used in Three 50-page Runs of GIS Map Test Document on the HP Designjet T520 24" (grams)**

	Cyan	Magenta	Yellow	Black
<b>Test Run 1 Net weight of ink used</b>	20.6	10.7	15.2	4.6
<b>Test Run 2 Net weight of ink used</b>	20.7	11.0	15.3	5.9
<b>Test Run 3 Net weight of ink used</b>	20.9	12.8	16.0	4.0
<b>Average amount of ink used across three runs</b>	20.7	11.5	15.5	4.8
<b>Total ink weight across 4 cartridges for 50-page run (based on averages)</b>				52.5

## Ink Consumption Test Methodology Overview:

Buyers Lab’s ink consumption analysis was conducted using three document types (architectural plan, retail poster and GIS map). Each document was formatted as a PDF (except the Cottage Architectural Plan which was formatted as a DWF file) and sized at ISO A1.

The Canon imagePROGRAF iPF605 was installed in BLI’s lab with the latest level of firmware (as of March 2013) and connected to a Windows 7 workstation using a 1000BaseT TCP/IP connection. The device was left in default configuration throughout testing. The Canon GARO driver was used for all testing and was left in default colour setting configuration with media selection set to plain paper and the image set to print at actual size. For the Cottage Architectural Drawing, Print Priority settings were set to Line Drawing/Text with Quality set to Standard (600 dpi). For the Retail Poster and the GIS map, Print Priority settings were set to Image with Quality set to Standard (600 dpi).

The HP Designjet T520 24" was installed in BLI’s lab with the latest level of firmware (as of March 2013) and connected to a Windows 7 workstation using a 1000BaseT TCP/IP connection. The device was left in default configuration throughout testing. The Windows HP-GL2 driver was used for all testing and was left in default colour setting, with media selection set to plain paper and the image set to print at actual size. Quality was set to Normal (600 dpi) mode for all document types.

Before installing the ink cartridges, BLI technicians weighed and recorded the weight of each with all packaging removed. At the end of each 50-print test run, the cartridges were weighed again and the resulting weight of ink used for the test run calculated for each colour. To ensure that the sub-tank on the Canon model did not affect results, a procedure was followed to ensure that the sub-tank level was at its maximum before the print run commenced and again after the print run was completed, thereby ensuring that ink replenishment of the sub-tanks was taken into account for each print run.

Canon imagePROGRAF iPF605: one cartridge was then run to exhaustion and the weight of the empty cartridge was recorded.

HP Designjet T520 24": one cartridge was then run to exhaustion and the weight of the empty cartridge was recorded.

The percentage of ink used per cartridge was calculated by dividing the net weight of ink used in the print run by the overall weight of ink in each cartridge and multiplying by 100.

The percentage of total ink used per printer was calculated by adding the percentages used of each of the cartridges and dividing by the number of cartridges.

### Test Environment

Testing was conducted in BLI's European test lab, in an atmospherically controlled environment monitored by a 24/7 Dickson Temperature/RH chart recorder, ensuring that typical office conditions were maintained. All paper used in testing was allowed to acclimatize inside the facility for a minimum of 12 hours before being used.

### Test Equipment

BLI's dedicated test network in Europe, consisting of Windows 2007 servers, Windows 7 workstations, 10/100/1000BaseTX network switches and CAT5e/6 cabling.

### Test Procedures

The test methods and procedures employed by BLI in its lab testing include BLI's proprietary procedures and industry-standard test procedures. In addition to a number of proprietary test documents, BLI uses industry standard files including an IT8 test file and an ASTM monochrome test document for evaluating black image quality. In addition to a visual observation, colour print quality and gamut size is evaluated using a profile software tool from Colour Confidence that was read using an EFI ES-1000 colour spectrophotometer and analysed using Chromix ColorThink Pro 3.0 software. Density of black and colour output was measured using an X-Rite 508 densitometer.

## About Buyers Laboratory LLC

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Buyers Laboratory LLC (BLI) is the world's leading independent provider of analytical information and services to the digital imaging and document management industry. For more than 50 years, buyers have relied on BLI to help them differentiate products' strengths and weaknesses and make the best purchasing decisions, while industry sales, marketing and product professionals have turned to BLI for insightful competitive intelligence and valued guidance on product development, competitive positioning and sales channel and marketing support. Using BLI's Web-based bliQ and Solutions Center services, 40,000 professionals worldwide create extensive side-by-side comparisons of hardware and software solutions for more than 15,000 products globally, including comprehensive specifications and the performance results and ratings from BLI's unparalleled Lab, Solutions and Environmental Test Reports, the result of months of hands-on evaluation in its US and UK labs. The services, also available via mobile devices, include a comprehensive library of BLI's test reports, an image gallery, hard to find manufacturers' literature and valuable tools for configuring products, calculating total cost of ownership (TCO) and annual power usage. BLI also offers consulting and private, for-hire testing services that help manufacturers develop and market better products and consumables.

For more information on Buyers Laboratory, please call David Sweetnam on +44(0) 118 977 2000, visit [www.buyerslab.com](http://www.buyerslab.com), or e-mail [david.sweetnam@buyerslab.com](mailto:david.sweetnam@buyerslab.com).