BLI Comparative Performance Evaluation

APRIL 2014

Canon imagePROGRAF iPF780 vs. HP Designjet T920 ePrinter

Canon imagePROGRAF iPF780 and HP Designjet T920 ePrinter under test in BLI's European test lab

	Canon imagePROGRAF iPF780	HP Designjet T920 ePrinter
Advantage ✔		
Colour Image Quality	✔	
Black Image Quality	✔	
Colour Print Productivity	✔	
Black Print Productivity	✔	
Direct PDF Submission Functionality	=	=
Ink Consumption	✔	
Device Feature Set	=	=
Print Driver Feature Set	✔	

TEST OBJECTIVE

Buyers Laboratory LLC (BLI) was commissioned by Canon Europe to conduct confidential document imaging device performance testing on the Canon imagePROGRAF iPF780 and the HP Designjet T920 ePrinter, 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 and driver functionality. All testing was performed in BLI's test facility in Wokingham, UK.

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Executive Summary

The Canon imagePROGRAF iPF780 outperformed the HP Designjet T920 ePrinter in almost every aspect of BLI's evaluation, demonstrating higher productivity, superior image quality and lower ink consumption. BLI analysts observed that the speed advantage of the Canon model over the HP unit became more pronounced as the quality level was increased. Although productivity was comparable in Fast mode, the Canon model was much faster than the HP unit in Standard/Normal mode and more than twice as fast in High/Best quality mode.

The Canon device is capable of handling ink and paper outages without having an impact on user productivity or causing unnecessary waste. When the Canon model runs out of ink, it continues to operate while alerting the user to replace the cartridge, and, thanks to its hot swap ink tanks, inks can be replaced on the fly. When they run out of paper, both the Canon and HP units pause and alert the operator. After a new roll is installed, the operator is prompted to confirm the paper type and they continue to print the interrupted page in full followed by all successive pages, hence only half a page is wasted. When the HP T920 runs out of ink, however, printing must stop for the cartridge to be replaced, leading to operator downtime. Once the cartridge has been replaced, printing resumes seamlessly from the point at which it stopped with no discernible break or loss of image quality, helping to save on ink and paper.

As expected of models aimed at the Architectural, Engineering and Construction (AEC), Computer-Aided Design (CAD) and Geographic Information Systems (GIS) markets, the image quality produced by both models would easily satisfy customer needs. Both models delivered high quality AEC and GIS graphics and photographic output quality was also on a par, with good saturation and excellent definition in dark and light contrast areas. However, the Canon iPF780 surpassed its HP competitor with a much larger colour gamut in all modes tested when printing on both plain and photo-quality paper, with an impressive CIE volume of 643,228 on photo quality media compared with just 452,655 with the HP unit.

The Canon model also delivered excellent serif and sans serif fonts down to 3-pt. size except in Fast Economy mode where fonts were only legible down to 5-pt. size, as would be expected. With the HP T920 fonts were legible down to the 3-pt. level in Best mode, 4-pt. level in Normal mode, 6-pt. level in Fast mode model but only at the 8-pt. level in Fast Economy mode, with distinct breakup in some characters. Business graphics, fine lines and circles were also reproduced more distinctly with the Canon model, with the HP unit suffering from some ink bleed when viewed under magnification. Both models produced natural-looking flesh tones. Another advantage of the Canon model is the unidirectional printing selection in the driver, which eliminates banding on the Canon iPF780's output, even in Fast mode. However, no banding was evident on the HP device's output in any mode.

Not without advantages, the HP T920 ePrinter provides a competitive device feature set that includes higher standard and maximum memory capacities. In addition, BLI analysts were impressed with the design and build quality of the HP T920's rear-mounted stacker assembly which can hold up to 50 printed sheets in perfect alignment.

Results were mixed in some areas. For example, the HP model has lower energy consumption when printing—120 watts compared with 140 watts for the Canon model—however, the Canon unit's energy consumption in standby mode (where it may spend more of its time) is much lower than the HP's (0.5 W compared with 4 W for the HP unit).

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 in some respects, 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 sign up for the ePrint & Share Library and the HP ePrint & Share Printing tool by creating a separate account with a unique password for each on HP's ePrint & Share Web Center (server), 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.

In conclusion, the Canon imagePROGRAF iPF780 delivered a superior performance in virtually all categories tested, with superior colour and black image quality, faster productivity (particularly in Standard/Normal and High/Best Quality modes) and lower ink consumption than the HP Designjet T920 ePrinter.

Colour Image Quality

	Canon imagePROGRAF iPF780	HP Designjet T920 ePrinter
Advantage ✔		
Text	✔	
Fine Lines	✔	
Halftone Range	=	=
Halftone Fill	✔	
Solid Density	✔	
AEC Graphics	=	=
GIS Graphics (plain paper)	=	=
Business Graphics	✔	
Photographic Images	=	=
Colour Gamut (plain paper, Fast Economy mode)	✔	
Colour Gamut (plain paper, Fast mode)	✔	
Colour Gamut (plain paper, Standard/Normal settings)	✔	
Colour Gamut (plain paper, High/Best Quality mode)	✔	
Colour Gamut (photo paper, High/Best Quality settings)	✔	

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

○ One factor that can influence overall image quality is unidirectional printing, which means that the printhead travels in one direction over the image, a feature that is available on the Canon model in all modes. Although the HP model offers only bidirectional printing, in which the printhead travels in both directions over the image, there was no sign of banding, even when using the Fast setting. While output from the Canon device is also free from any banding—even in Fast mode—when unidirectional printing is selected, there is some trade-off in productivity.

+ The Canon model delivered superior optical densities in all modes for cyan and magenta. The HP Designjet T920 delivered a higher optical density on plain paper for yellow in Standard/Normal quality modes, while the Canon

model had higher density for yellow in Fast Economy and Fast modes, and virtually identical density in High/Best mode. In particular, T920's Fast Economy mode and Fast mode delivers far poorer optical density for all colours (cyan, magenta, yellow and black) compared to Canon.

+ When printing on plain paper in Fast Economy mode, the Canon model delivered an eight times larger colour gamut than did the HP T920 with a CIE volume of 127,478, while the HP model in Fast Economy mode delivered a volume of just 15,328.

+ When printing on plain paper in Fast mode, the Canon model delivered a 84.2% larger colour gamut with CIE volume of 193,062, while the HP model in Fast mode delivered a volume of only 104,799.

+ When printing on plain paper using Standard/Normal settings the Canon model delivered a 32.4% larger colour gamut than the HP device—with a CIE volume of 221,132 compared with 167,046 for the HP device.

+ When printing on plain paper in High/Best Quality settings, the Canon iPF780 delivered a 17.1% larger colour gamut than did the HP T920, with a CIE volume of 224,605 versus a CIE volume of 191,781for the HP model.

+ When printing on photo-quality paper using Canon's High quality setting and the HP T920's Best Quality setting, the Canon model delivered a colour gamut 42.1% larger than that of the HP unit, with a CIE volume of 643,228 compared with 452,655 for the HP T920.

+ Canon delivered consistently excellent text quality in colour across all tested modes except Fast Economy, where serif and sans serif fonts were legible down to the 5-pt. level; in all other modes fonts were legible down to 3-pt. size with no breakup. For the HP model, in Fast mode fonts were only fully legible down to the 6-pt. level; in Normal Quality mode, serif fonts were legible down to the 4-pt. level and down to the 3-pt. level for sans serif fonts. In Best Quality mode, all fonts were legible down to 3-pt. size with no breakup.

+ The HP model exhibited some bleed into the (plain) paper in both text and line art in all modes, causing some "fuzziness" when viewed under magnification, whereas no bleed was detected with the Canon model.

+ Fine lines produced by both devices remained distinct down to the 0.1-pt. level even in Fast mode. Although white-on-black fine lines were only visible at 0.25-pt. level with the Canon model, they were perfectly acceptable, whereas the HP model's white-on-black fine lines were poor in all modes tested. In High/Best Quality mode there were no differences between the two models for fine line accuracy.

+ In Standard/Normal and High/Best Quality modes, the Canon unit produced excellent circles—at 0.1-pt. level circles were smooth and unbroken in all modes except Fast Economy. The HP device delivered poor, indistinct circles in Fast mode, whilst in Normal and Best modes circles at 0.1-pt. level were only rated as good.

○ Colour halftone range was excellent with both models, with distinct transitions between all levels, with the exception of Fast Economy mode where (as expected) output was grainy with both models.

+ Colour halftone fill was slightly grainy on plain paper with the HP model, especially in Fast and Fast Economy modes, whilst the Canon model had smoother transitions and more vibrant colours.

○ When evaluating Architectural, Engineering and Construction (AEC) graphics in Standard/Normal and High/Best Quality modes, both the Canon and the HP units exhibited an excellent level of detail and very distinct fine lines, although there was some evidence of ink bleed with the HP model when viewed under magnification.

○ When evaluating Geographic Information Systems (GIS) graphics in High/Max Quality mode on plain paper, both units delivered very good detail and showed an equally good depth of field—a critical factor in delivering a more realistic three-dimensional rendering of topographical features.

+ Colour business graphics produced by the Canon iPF780 unit exhibited sharper details than did the HP device.

○ When comparing photographic images in Standard/Normal and High/Best Quality modes, again there was very little difference between the two models, with both delivering excellent detailing in dark and light contrast areas and good saturation.

○ Skin tones produced by both models were natural-looking.

+ The Canon iPF780 produced the 1x1 pixel grid in CMY with no quality issues, and coverage was excellent across all colours and in all modes except Fast Economy (as expected). The HP T920 delivered good coverage in Fast mode, very good coverage in Normal mode, and excellent coverage in Best mode across all grids.

+ Overall, the Canon model was the stronger performer in BLI's assessment of colour image quality. While the HP model offered higher optical density for yellow in Normal mode, there was no other aspect where it truly stood out. The Canon model had higher densities for cyan and magenta. As befitting the needs of their target markets, both models produced distinct fine lines in AEC drawings and an excellent level of detail in GIS graphics with very good depth of field even on plain paper. However, the HP model's text and line art suffered from some ink bleed when viewed under magnification, while the Canon's output did not. Moreover, the Canon device delivered superb text, fine lines and circles, and a much larger colour gamut in all modes on both plain and photo quality papers.

Black Image Quality

	Canon imagePROGRAF iPF780	HP Designjet T920 ePrinter
Advantage ✔		
Text	✔	
Fine Lines	✔	
Halftone Range	=	=
Halftone Fill	✔	
Solid density	✔	
AEC Graphics	=	=
Business Graphics	✔	
Photographic Images	✔	

+ In Fast Economy and High/Best quality modes, the Canon model delivered higher optical densities for black, whilst those for Fast and Standard modes were comparable.

+ In all quality modes, fonts produced by the Canon model were legible down to the 3-pt. level, with the exception (as expected) of Fast Economy mode, where they were legible down to 5-pt. size. With the HP T920 fonts were legible down to the 3-pt. level in Best mode, 4-pt. level in Normal mode, 6-pt. level in Fast mode model but only at the 8-pt. level in Fast Economy mode, with distinct breakup in some characters. This consistent performance, along with the higher density, gave the Canon model a distinct edge overall for text.

+ The HP device exhibited some ink bleed or overspray in text and line art in all modes when viewed under magnification.

○ Fine lines in BLI's Line Art test target remained distinct down to the 0.25-pt. level in all modes in the output of both devices, and both could only deliver white-on-black fine lines at 0.25-pt. level in Normal/Standard mode. There was no sign of stair-stepping in diagonal lines with either device.

+ Circles produced by both models were fully formed; the iPF780's circles were smoother than those produced by the HP, which were slightly irregular and fuzzy in appearance.

○ Both models delivered a very good halftone range—from the 10% to 100% dot-fill levels in all modes.

+ Halftone fill results in all modes were very good for the Canon device, while the HP unit was only rated good as some graininess was visible across all output, even without magnification.

+ The Canon unit delivered darker solids with higher optical density in Fast Economy and High/Best modes and exhibited no mottling when compared with the same output from the HP model.

○ When evaluating AEC graphics in Standard/Normal and High/Best Quality modes in black, both models delivered detailed and distinct fine lines.

+ Monochrome business graphics in High/Best Quality mode on plain paper were produced more accurately by the Canon model, with smooth halftone gradations and crisp text, whereas some fine lines and circles were indistinct with the HP unit, even without magnification.

+ BLI's analysts found that the Canon device delivers superior image quality in black, delivering very good halftone fills, darker solids, a higher optical density in Fast Economy and High/Best quality modes, smoother gradations in photographic images and business graphics and text that was legible down to a smaller size (3-pt.), with no breakup. The HP model was unable to match the Canon in delivering smooth circles and displayed some ink bleed or overspray in text and line art in all modes when viewed under magnification. Both models delivered excellent AEC and GIS graphics.

Print Productivity

	Canon imagePROGRAF iPF780	HP Designjet T920 ePrinter
Advantage ✔		
First Page Out From Ready State	=	=
First Page Out From Weekend Non-Use	✔	
Throughput Speed (fastest mode)	✔	
Throughput Speed (default mode)	✔	
Throughput Speed (highest-quality mode)	✔	
Job Stream (multiple jobs submitted to device in fast succession simulating busy network environment)	✔	

○ One factor that had an impact on productivity is that when the HP T920 model runs out of ink, printing must stop for the cartridge to be replaced, leading to operator downtime.

\+ In contrast, the Canon model will continue to print (drawing ink from its sub tank) when ink needs replacing, while its control panel conveniently alerts the user to replace ink as well as providing ink purchasing information. Inks can be replaced while printing is in progress, so again no ink or paper is wasted and there's no operator downtime.

○ When the Canon and HP models run out of paper, they pause and alert the operator. After a new roll is installed, the job prints from the beginning of the interrupted page, so less ink and paper is wasted.

— Printed sheets are stacked neatly and sequentially in the Canon model's output catch tray, which makes collating output an easy process and helps to reduce operator intervention and downtime. BLI analysts were impressed with the HP T920's stacker assembly at the rear of the device which holds up to 50 sheets in perfect alignment. However, printed sheets cannot be released from the stacker assembly while the unit is printing.

\+ The Canon iPF780 delivered a 10.9% faster first-page-out time of 111.03 seconds after a weekend of non-use, compared with 124.63 seconds for the HP device. Start-up time before printing commenced was 46.71 seconds for the Canon model, but 53.78 seconds for the HP unit.

○ The Canon device delivered a 19.9% faster first-page-out time of 67.82 seconds from its ready state, compared with 84.68 seconds for the HP device. Start-up time before printing commenced was 17.07 seconds for the Canon model compared with 13.89 seconds for the HP model.

\+ When printing BLI's job stream, designed to simulate a typical mixed workflow for a large-format unit, the Canon iPF780 was 3.6% faster than the HP model in Fast mode, 26.2% faster in Standard/Normal mode, and 55.6% faster in High/Best Quality mode.

\+ When printing BLI's 12-page DWF test file in colour, the Canon unit was 2.6% slower in Fast mode, but 26.3% faster in Standard/Normal mode, and 58.6% faster in High/Best Quality mode when compared with the HP device.

\+ Similarly, when printing BLI's 12-page DWF test file in monochrome, the Canon unit was 1.3% slower than the HP model in Fast mode, but 28.2% faster in Standard/Normal mode, and 57.5% faster in High/Best Quality mode when compared with the HP model.

○ In BLI's single-page A0-size test with the Cottage Architectural Plan in Fast Economy mode, the Canon iPF780 delivered a first-page-out time (56.42 seconds) that was 5.9% slower than the HP unit (53.28 seconds). The time to print five A0-size pages, however, was 1.2% faster for the Canon iPF780 than for the HP device (245.35 seconds versus 248.25 seconds).

\+ In BLI's single-page A0-size test with the Cottage Architectural Plan in Standard/Normal mode, the Canon iPF780 delivered a first-page-out time (100.59 seconds) that was 32.9% faster than the HP unit (149.85 seconds). The time to print five A0-size pages was 40.3% faster for the Canon iPF780 than for the HP device (454.66 seconds versus 762.20 seconds).

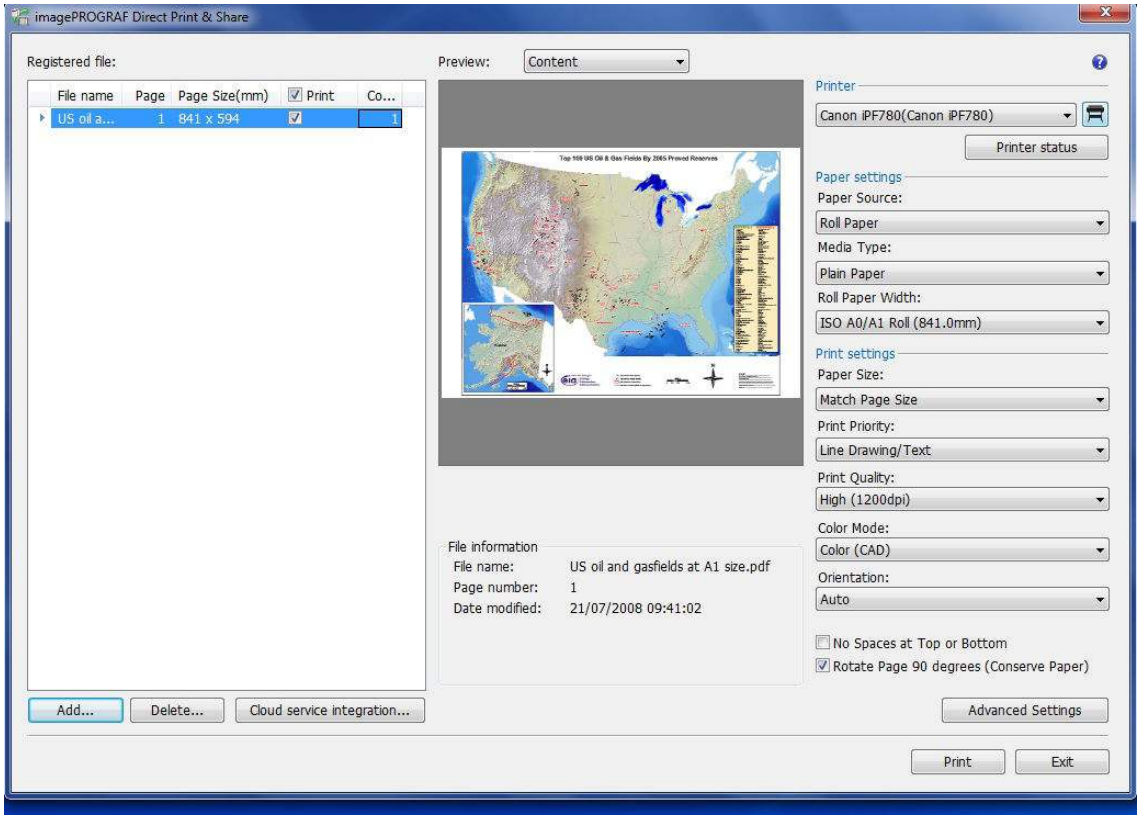
\+ In BLI's single-page A0-size test with the Poster test file in Standard/Normal mode, the Canon iPF780 delivered a first-page-out time (190.10 seconds) that was 57.2% faster than the HP unit (444.48 seconds). The time to print five A0-size pages was 56.8% faster for the Canon iPF780 than for the HP device (969.99 seconds versus 2,245.45 seconds).

\+ In BLI's single-page A0-size test with the Poster test file in High/Best Quality mode, the Canon iPF780 delivered a first-page-out time (461.10 seconds) that was 30.9% faster than the HP unit (667.02 seconds). The time to print five A0-size pages was 32.9% faster for the Canon iPF780 than for the HP device (2,293.85 seconds versus 3,419.20 seconds).

Direct PDF Print Submission Functionality

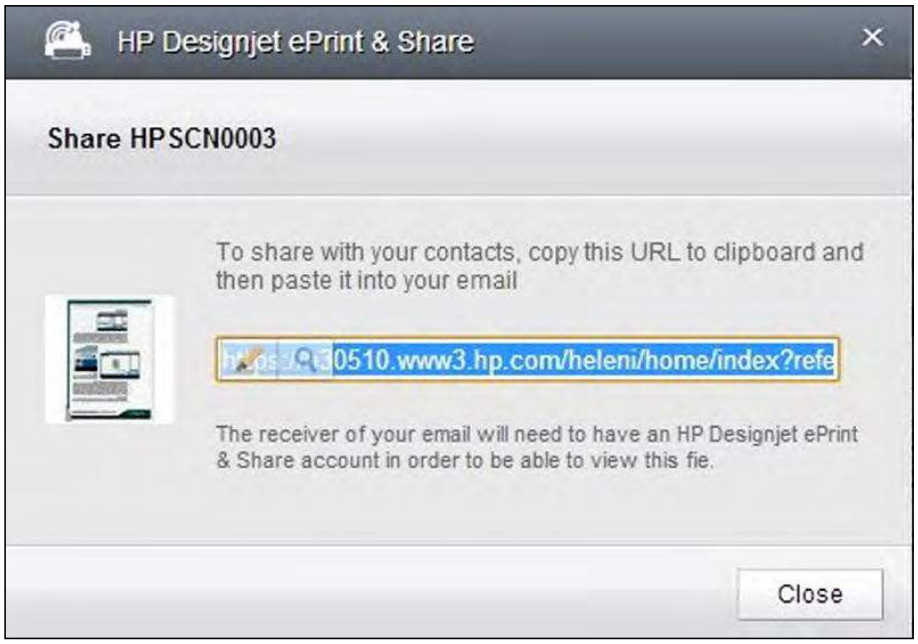
	Canon imagePROGRAF iPF780	HP Designjet T920 ePrinter
Advantage ✔		
Ease of Use	✔	
Functionality	=	=

- A free download from Canon's website, the iPF Direct Print & Share utility enables PDFs to be printed without opening Adobe Acrobat, and it also allows users to retrieve files from cloud storage for printing.
- The latest version (v2.0) of iPF Direct Print & Share (not tested with this model) supports "Shortcut Print" functionality which defines several print settings via a desktop icon. Files are automatically printed with the predefined setting with a simple drag-and-drop operation on the icon. Multiple desktop icons can be created for different print settings.



Canon's iPF Direct Print & Share utility gives operators an image preview.

— HP's ePrint & Share web services software provides the same direct PDF submission and cloud storage retrieval functionality for the HP device 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 Designjet ePrint & Share utility.

+ HP's ePrint & Share requires users to register for 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 its own unique password, 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.

Ink Consumption

RESULTS		
Results averaged across three tests of 50-set A1 printing in various Quality Modes specified below	**Canon imagePROGRAF iPF780**	**HP Designjet T920 ePrinter**
COTTAGE ARCHITECTURAL PLAN (Fast Economy Mode)		
Overall weight of ink used (grams)	17.9	10.3
Percentage of total ink used averaged across all colours	1.1%	1.3%
COTTAGE ARCHITECTURAL PLAN (Standard/Normal Mode)		
Overall weight of ink used (grams)	34.0	42.2
Percentage of total ink used averaged across all colours	2.1%	5.2%
OFFICE POSTER (Standard/Normal Mode)		
Overall weight of ink used (grams)	91.7	116.3
Percentage of total ink used averaged across all colours	5.7%	14.2%
OFFICE POSTER (High/Best Quality Mode)		
Overall weight of ink used (grams)	103.9	136.9
Percentage of total ink used averaged across all colours	6.4%	16.7%
GIS MAP (Standard/Normal Mode)		
Overall weight of ink used (grams)	100.5	118.9
Percentage of total ink used averaged across all colours	6.2%	14.5%
GIS MAP (High/Best Quality Mode)		
Overall weight of ink used (grams)	102.1	126.2
Percentage of total ink used averaged across all colours	6.3%	15.4%

— When producing 50 prints of a Cottage Architectural Plan in Fast Economy Mode, the Canon unit used 73.8% more ink than the HP T920. However, the HP model laid down so little ink in Fast Economy mode that its colour gamut CIE volume was 15,328 (just 12% of the Canon model's gamut of 127,478).

+ When producing 50 prints of a Cottage Architectural Plan in Standard/Normal Mode, the Canon unit used 19.4% less ink than the HP T920.

+ When printing an Office Poster in Standard/Normal Mode, the Canon unit used 21.2% less ink compared with the HP T920.

+ When printing an Office Poster in High/Best Quality Mode, the Canon unit used 24.1% less ink compared with the HP T920.

+ When printing a GIS Map in Standard/Normal Mode, the Canon iPF780 used 15.5% less ink compared with the HP device.

+ When printing a GIS Map in High/Best Quality Mode, the Canon iPF780 used 19.1% less ink compared with the HP device.

+ In all modes tested the Canon model used a lower percentage of available ink than the HP model.

Device Feature Set

+ The capacity of Canon's starter cartridges (90 ml for CMYK and 130 ml for Matte Black) is more generous than those offered by HP (40 ml for CMY, Photo Black and Grey, 69 ml for Matte Black).

+ The capacity of Canon replacement cartridges (130 ml and 300 ml for black, cyan, magenta and yellow) is higher than those of the HP model (130 ml for CMY, Photo Black and Grey, 300 ml for Matte Black only), and as a consequence they will need replacing less frequently than with the HP device.

+ If the Canon device detects that printhead nozzles are becoming clogged, it automatically starts a cleaning routine when there are no more nozzles available to compensate for the clogged ones. This task would have to be done manually with the HP unit, although BLI analysts did not encounter any nozzle clogging issues with either model during testing.

+ Canon's ink cartridges are replaceable during operation, which helps to reduce downtime for Canon users.

+ The Canon unit supports a higher maximum cut-sheet media length of 1.6 m compared with 914 mm for the HP unit.

○ Both models offer both USB 2.0 and Gigabit Ethernet connectivity.

+ The catch tray of the Canon model enables printed sheets to be stacked very neatly (and in the correct sequence), making collating output an easy process.

— BLI analysts were impressed with the design and build quality of the HP T920's rear-mounted stacker assembly which can hold up to 50 printed sheets in perfect alignment.

— The Canon model offers a standard and maximum RAM of 256 MB, while the HP unit has a standard and maximum RAM of 1.5 GB.

+ The Canon iPF780 supports borderless printing, while HP does not.

+ The Canon iPF780 supports up to 0.8mm media thickness for roll paper and 150mm as the outside diameter of the roll, while the HP T920 only supports up to 0.3mm in thickness and 140mm in diameter.

+ The Canon model is a lighter (67.9 kg versus 87 kg), more compact device than the HP unit.

— The HP model includes a colour LCD while the Canon model has a monochrome LCD display.

— The HP T920's power consumption while active is lower—120 watts versus 140 watts—than that of the Canon model.

+ However, in standby mode (where it may spend more of its time) the HP T920's power consumption is higher (4 watts versus Canon's 0.5 watts).

○ Noise emissions are slightly higher for the Canon model (48 dB) compared to the HP device (47 dB).

Driver Feature Set

+ The Canon iPF780 has five speed settings (Fast 300, Standard 600, Fast 600, High 600 and 1200), which are matched by three settings with the HP device (Fast, Normal and Best), although not all speed settings are available with all media types.

○ Both the Canon GARO driver and the HP-GL/2 driver provide a useful overview of the settings for predefined profiles.

+ Seven predefined profiles are available with the Canon driver, while the HP driver offers a smaller range of four settings.

+ The Canon driver supports multi-up (2 to 16) printing, while the HP driver does not support multi-up printing.

+ The Canon GARO driver offers a 2 by 2 poster mode, while the HP model does not offer support for poster printing.

+ The Canon driver offers page stamping (Date, Time, Name and Page Number), which the HP driver does not support.

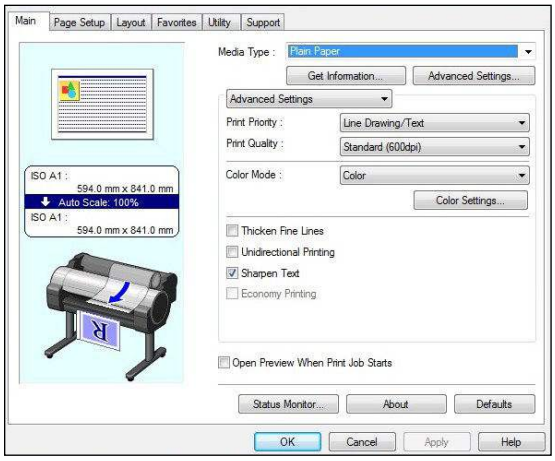
○ Both the HP driver and the Canon GARO driver offer a wide range of built-in adjustments for CMYK balance, brightness, contrast and saturation. ICC profile settings are also available with both drivers—in the case of Canon's GARO driver in its matching tab under Advanced Settings. Canon operators can select four matching modes (driver, ICC, driver ICM and host ICM matching) and choose one of four rendering methods (auto, perceptual, colorimetric or saturation).

O The Canon driver offers unidirectional printing, even in Fast mode, which helps to avoid banding across output because the printhead travels in only one direction to create the desired image. The HP driver does not offer this feature, but did not suffer from banding in BLI's testing.

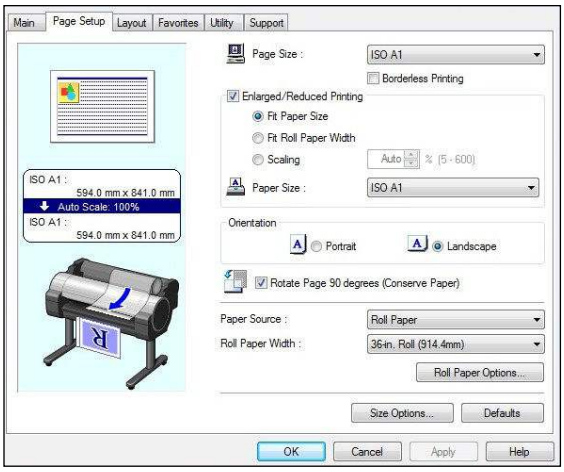
+ The Canon driver includes the Color imageRUNNER Enlargement Copy Mode utility, which enables users to integrate a Canon small-format MFP device with the iPF780. Documents scanned by the Canon MFP are automatically routed to a hot folder that is monitored by the driver of the iPF780. The image is then 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, helping to save on paper.

+ The Canon model also offers a plug-in for printing from Microsoft Office applications, which includes useful tools for automatic media resizing, nesting and borderless printing.



Canon Print Driver Main Tab



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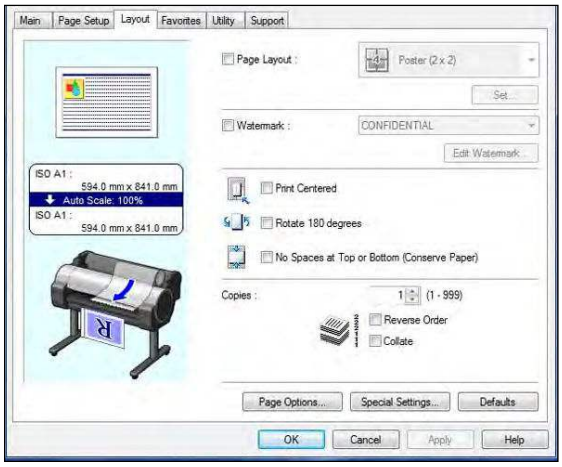
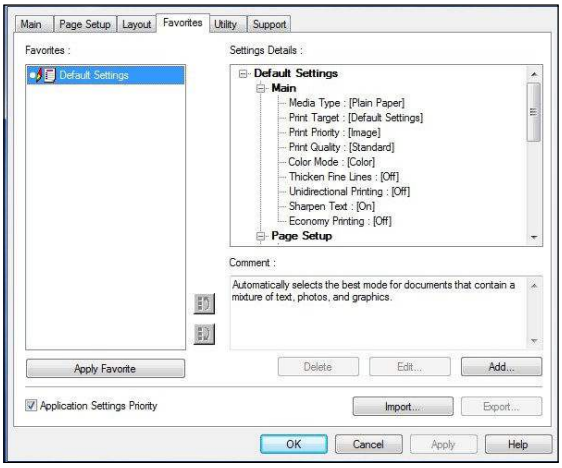
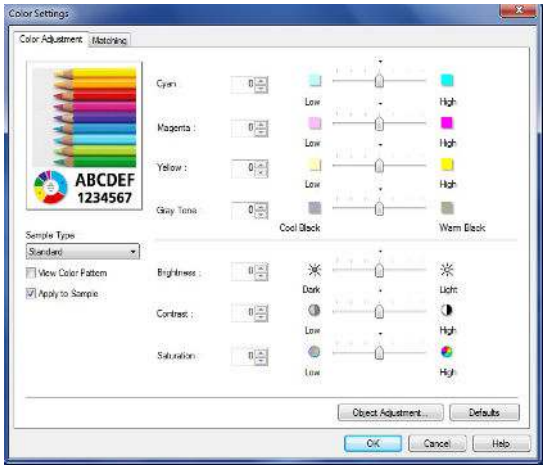


Canon Print Driver Layout Tab



Canon Print Driver Favourites Tab



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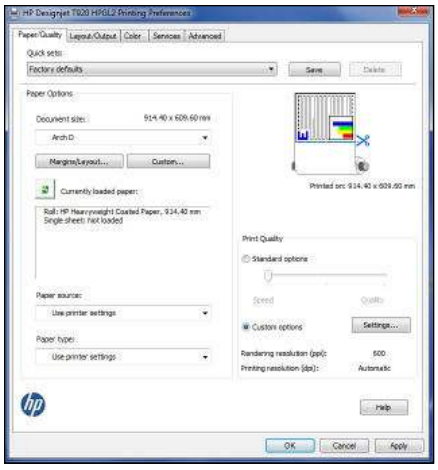
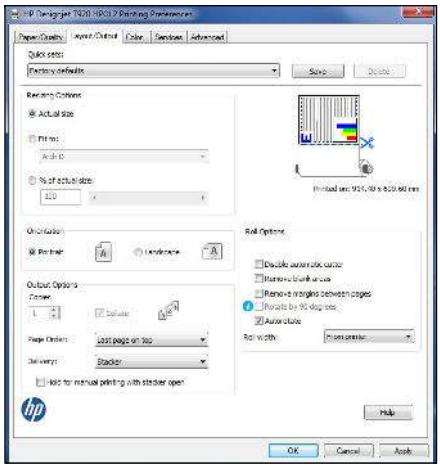
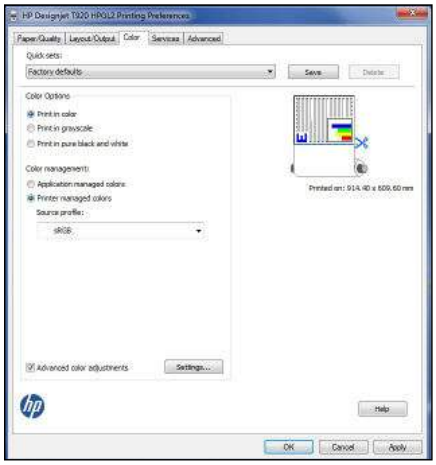


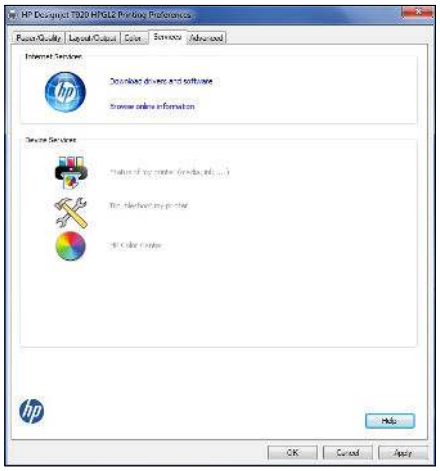
HP Print Driver Paper/Quality Tab



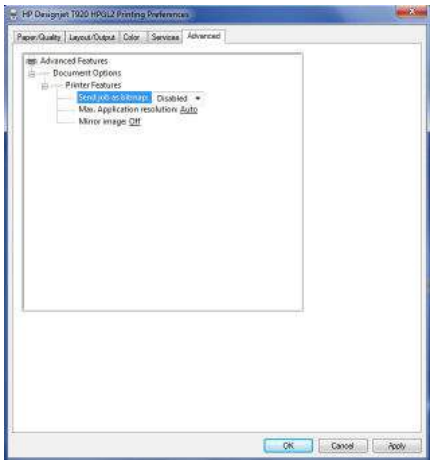
HP Print Driver Layout Tab



HP Print Driver Colour Tab



HP Print Driver Services Tab



HP Print Driver Advanced Tab

HP Print Driver Colour Controls under Printer Preferences

SUPPORTING TEST DATA

Job Stream Productivity

Mixed File Types, Same Size

Canon imagePROGRAF iPF780 (time in seconds)		HP Designjet T920 ePrinter (time in seconds)	
Fast	693.09	Fast	719.34
Standard	1,254.66	Normal	1,701.08
High	1,828.93	Best	4,123.31

BLI's job stream consists of nine 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 iPF780 (time in seconds)			HP Designjet T920 ePrinter (time in seconds)		
Fast	Standard	High	Fast	Normal	Best
408.28	768.39	1,100.79	397.97	1,043.14	2,655.81

The 12-page DWF test file was printed using the device driver set to the plain paper/colour setting. Both devices were loaded with 914-mm rolls with each file set to auto-rotate to save media. 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 iPF780 (time in seconds)			HP Designjet T920 ePrinter (time in seconds)		
Fast	Standard	High	Fast	Normal	Best
410.18	766.92	1,111.91	404.90	1,067.49	2,617.44

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, black mode. Both devices were loaded with 914-mm rolls, with each file set to auto-rotate to save media. 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 iPF780	HP Designjet T920 ePrinter (time in seconds)
Time Before Printing Commences	46.71	53.78
First Page Out	111.03	124.63

First-Page-Out Productivity from Ready State

	Canon imagePROGRAF iPF780 (time in seconds)	HP Designjet T920 ePrinter (time in seconds)
Time Before Printing Commences	17.07	13.89
First Page Out	67.82	84.68

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, black mode. Both devices were loaded with 914-mm rolls, with each file set to auto-rotate to save media.

A0 First-Page-Out and Throughput Productivity

	Canon imagePROGRAF iPF780 (time in seconds)	HP Designjet T920 ePrinter (time in seconds)
First Page Out	56.42	53.28
Five Pages Out	245.35	248.25

The single-page A0-size Cottage Architectural Plan DWG TrueView Drawing test file was printed using the device driver with the plain paper/colour setting in Fast Economy speed mode. The actual time indicated is the time it took to RIP, image and deliver all five pages of the test document to the collection bin.

	Canon imagePROGRAF iPF780 (time in seconds)	HP Designjet T920 ePrinter (time in seconds)
First Page Out	100.59	149.85
Five Pages Out	454.66	762.20

The single-page A0-size Cottage Architectural Plan DWG TrueView Drawing test file was printed using the device driver with the plain paper/colour setting in Standard/Normal mode. The actual time indicated is the time it took to RIP, image and deliver all five pages of the test document to the collection bin.

	Canon imagePROGRAF iPF780 (time in seconds)	HP Designjet T920 ePrinter (time in seconds)
First Page Out	190.10	444.48
Five Pages Out	969.99	2,245.45

The single-page A0-size ISO Poster TIFF test file was printed using the device driver with the heavy coated paper/colour setting in Standard/Normal mode. The actual time indicated is the time it took to RIP, image and deliver all five pages of the test document to the collection bin.

	Canon imagePROGRAF iPF780 (time in seconds)	HP Designjet T920 ePrinter (time in seconds)
First Page Out	461.10	667.02
Five Pages Out	2,293.85	3,419.20

The single-page A0-size ISO Poster TIFF test file was printed using the device driver with the heavy coated paper/colour setting in High/Best mode. The actual time indicated is the time it took to RIP, image and deliver all five pages of the test document to the collection bin.

Colour Print Quality

Colour Optical Density Evaluation

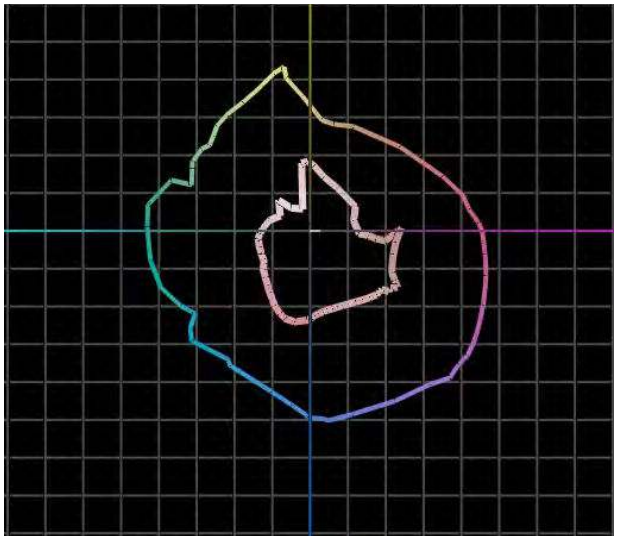
Canon imagePROGRAF iPF780								
Plain Paper								
	Fast Economy		Fast		Standard		High	
	50%	100%	50%	100%	50%	100%	50%	100%
Cyan	0.19	0.55	0.50	1.07	0.54	1.12	0.51	1.14
Magenta	0.17	0.51	0.46	0.99	0.50	1.04	0.48	1.11
Yellow	0.12	0.37	0.39	0.78	0.43	0.84	0.41	0.86
Black	0.27	1.02	0.65	1.39	0.74	1.43	0.70	1.44

HP Designjet T920 ePrinter								
Plain Paper								
	Fast Economy		Fast		Normal		Best	
	50%	100%	50%	100%	50%	100%	50%	100%
Cyan	0.17	0.25	0.31	0.47	0.43	0.72	0.45	0.71
Magenta	0.20	0.38	0.37	0.74	0.50	0.94	0.53	1.00
Yellow	0.10	0.21	0.32	0.63	0.51	0.87	0.52	0.87
Black	0.23	0.89	0.46	1.33	0.57	1.52	0.58	1.43

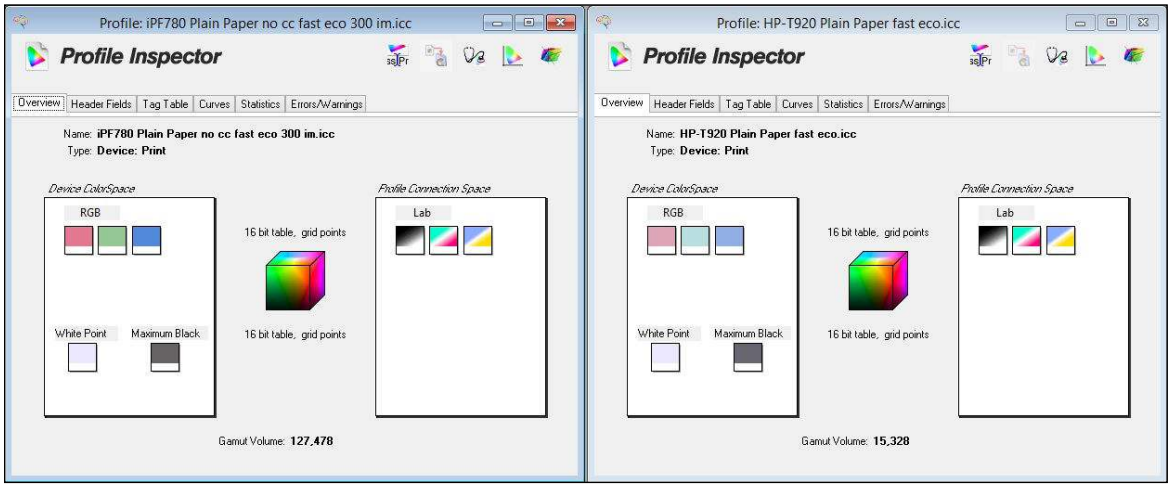
Note: Colour density readings were assessed by printing a BLI IQ test target file on plain paper in default colour settings at all quality settings available and measuring the density of 100% dot fill and 50% dot fill using an XRite 508 densitometer.

Colour Gamut Comparison

Media Type/Settings	Canon imagePROGRAF iPF780	HP Designjet T920 ePrinter
Plain Paper Fast Economy	127,478	15,328
Plain Paper Fast	193,062	104,799
Plain Paper Standard/Normal	221,132	167,046
Plain Paper High/Best	224,605	191,781
Glossy Photo High/Best	643,228	452,655

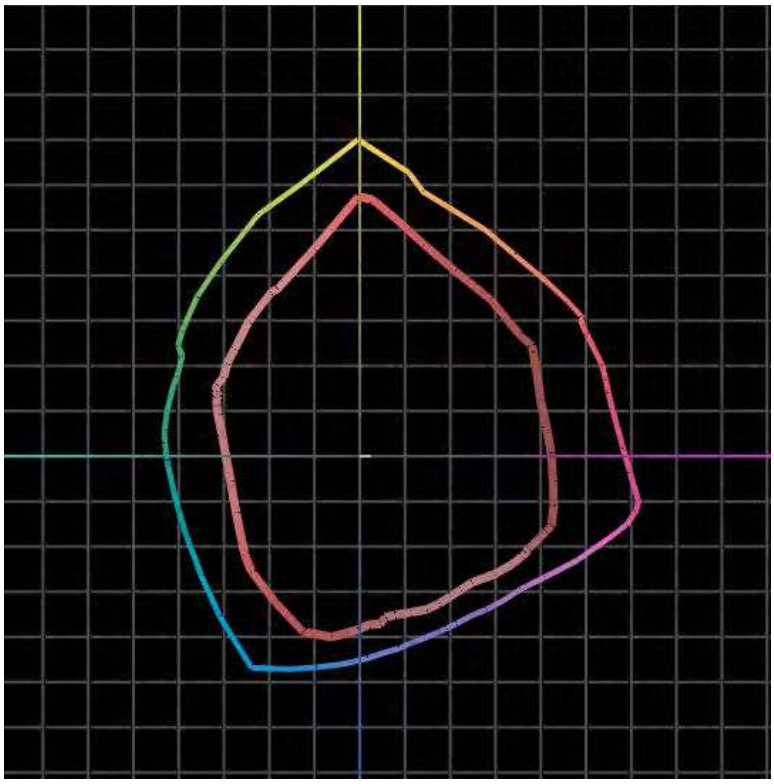


HP Designjet T920 colour gamut on plain paper in Fast Economy settings (red) versus Canon imagePROGRAF iPF780 colour gamut (shown chromatically) on plain paper in Fast Economy settings.

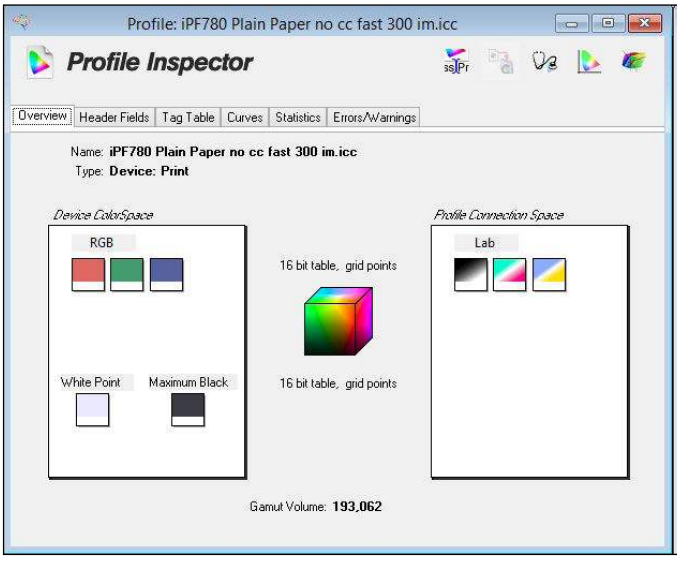


Canon imagePROGRAF iPF780 on plain paper (Fast Economy)

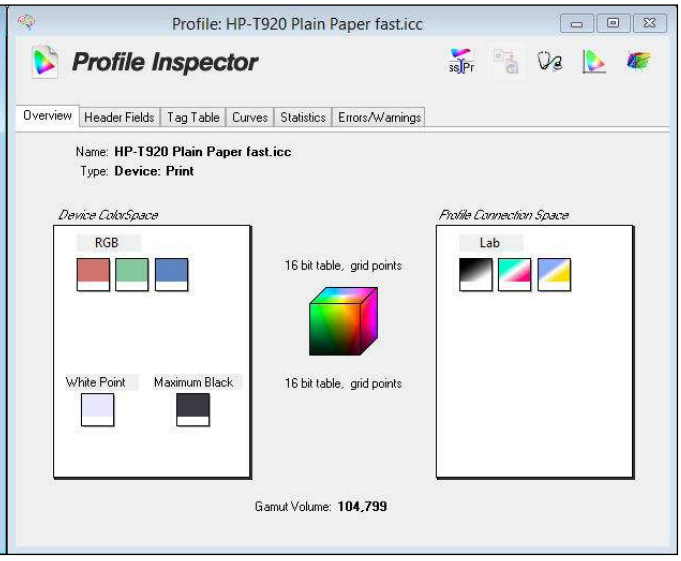
HP Designjet T920 on plain paper (Fast Economy)



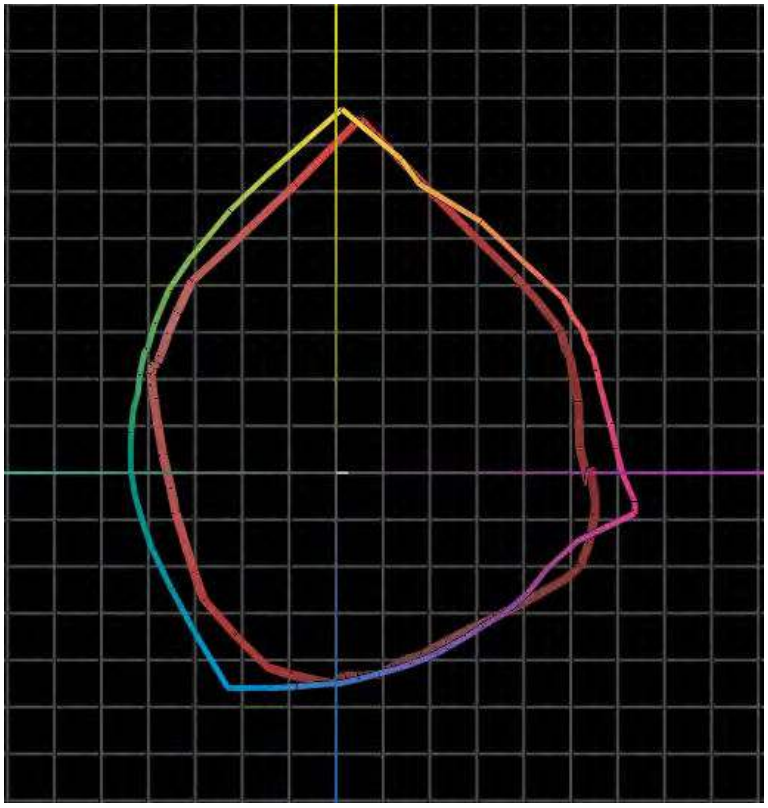
HP Designjet T920 colour gamut on plain paper in Fast settings (red) versus Canon imagePROGRAF iPF780 colour gamut (shown chromatically) on plain paper in Fast settings.



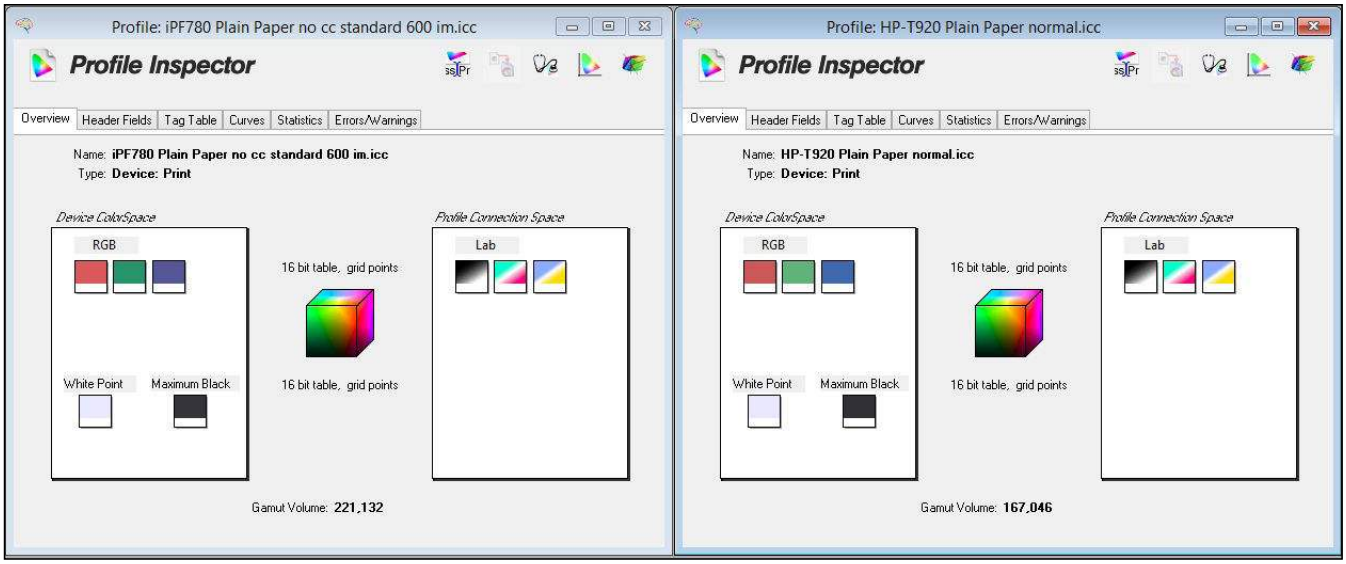
Canon imagePROGRAF iPF780 on plain paper (Fast setting)



HP Designjet T920 on plain paper (Fast setting)

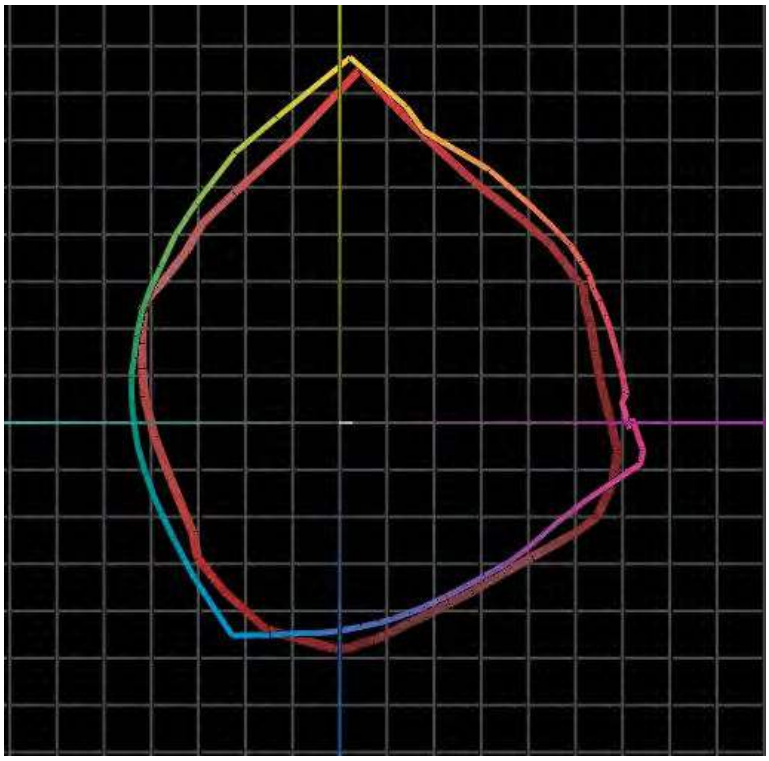


HP Designjet T920 colour gamut on plain paper in Normal Quality settings (red) versus Canon imagePROGRAF iPF780 colour gamut (shown chromatically) on plain paper in Standard Quality settings.

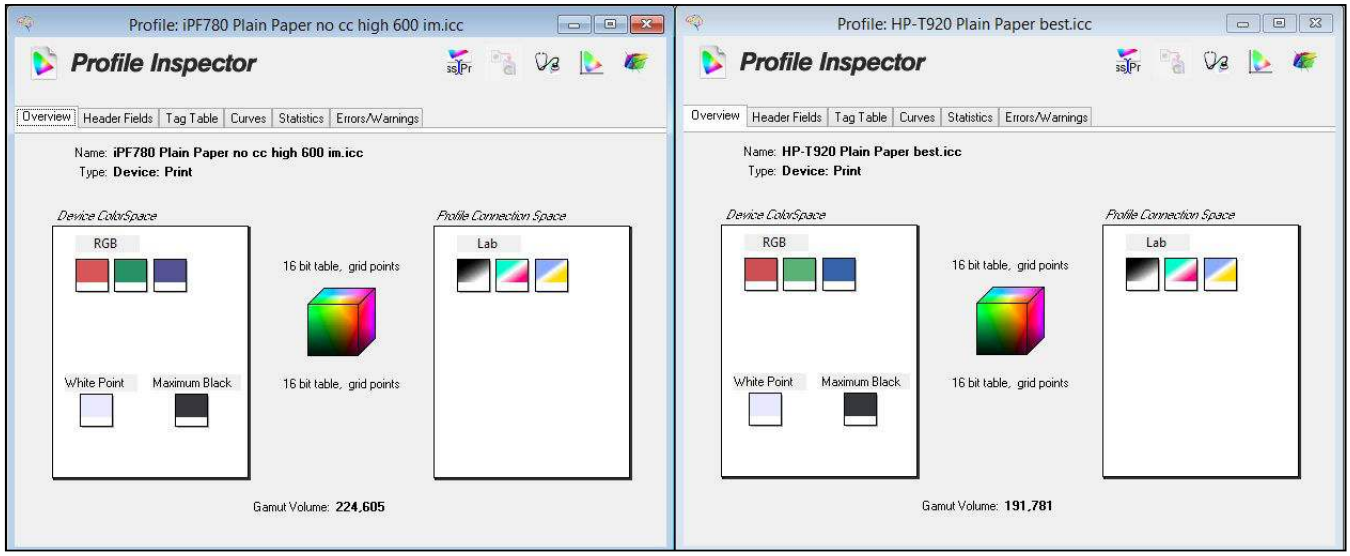


Canon imagePROGRAF iPF780 on plain paper (Standard Quality)

HP Designjet T920 on plain paper (Normal Quality)

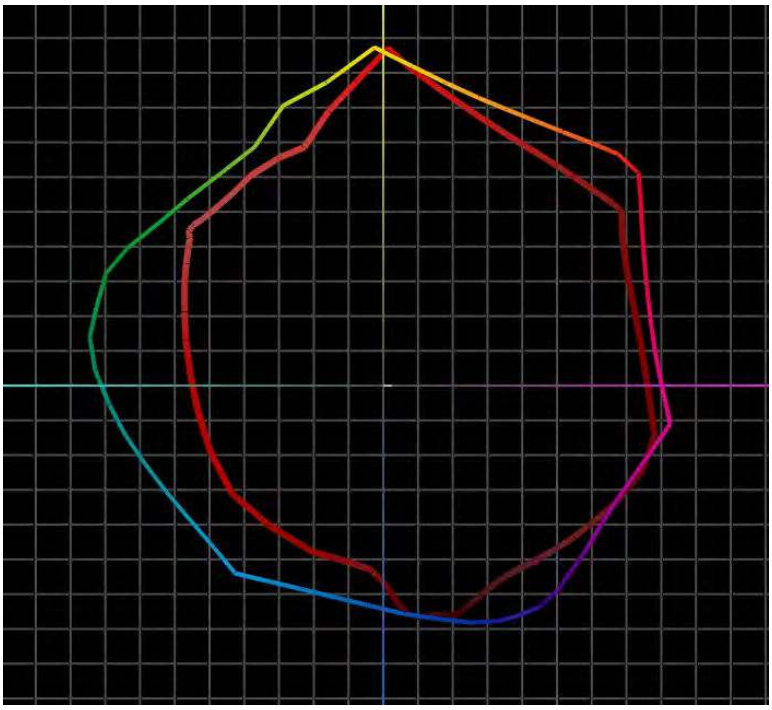


HP Designjet T920 colour gamut on plain paper in Best Quality settings (red) versus Canon imagePROGRAF iPF780 colour gamut (shown chromatically) on plain paper in High Quality settings.

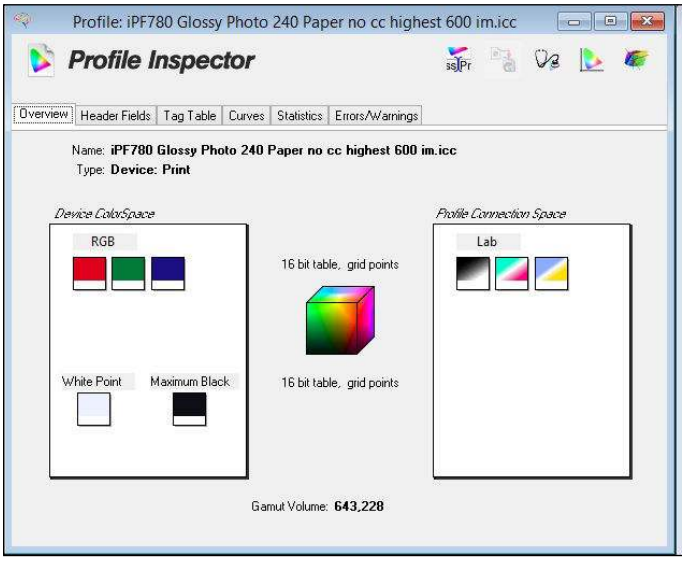


Canon imagePROGRAF iPF780 on plain paper (High Quality)

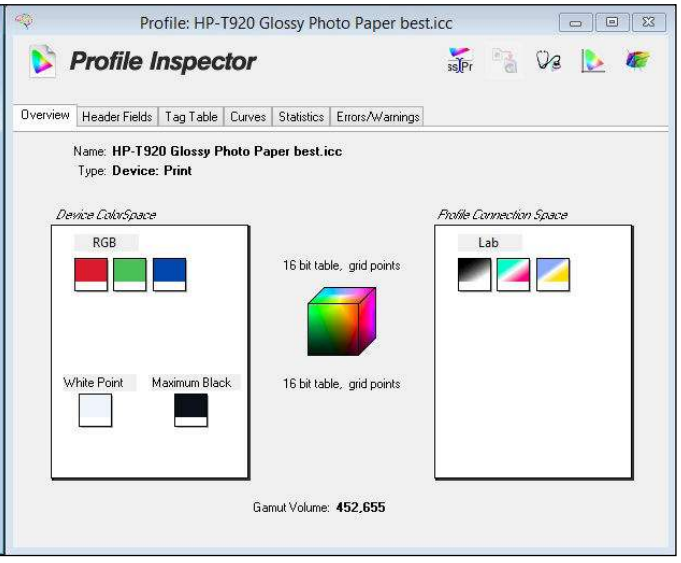
HP Designjet T920 on plain paper (Best Quality)



HP Designjet T920 colour gamut on photo quality paper in Best Quality settings (red) versus Canon imagePROGRAF iPF780 colour gamut (shown chromatically) on photo quality paper in High Quality settings.



Canon imagePROGRAF iPF780 on photo quality paper (Best Quality)



HP Designjet T920 on photo quality paper (Best Quality)

Black Print Quality

	Canon imagePROGRAF iPF780				HP Designjet T920 ePrinter			
	Fast Economy	Fast	Standard	High	Fast Economy	Fast	Normal	Best
Density Block								
1	1.03	1.38	1.43	1.46	0.93	1.36	1.44	1.42
2	1.03	1.39	1.44	1.44	0.89	1.35	1.42	1.44
3	1.04	1.36	1.42	1.45	0.92	1.37	1.46	1.44
4	1.03	1.35	1.42	1.44	0.91	1.37	1.42	1.40

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 and the HP driver set to plain paper, black mode. Density was measured using an XRite 508 densitometer.

Device Feature Set

	Canon imagePROGRAF iPF780	Advantage		HP Designjet T920 ePrinter
Max. print quality	2400 x 1200 dpi			2400 x 1200 dpi (enhanced)
Number of inks	5		✔	6
Ink tanks replaceable during operation	Yes	✔		No
Ink-drop size	4 picoliter	✔		6 picoliter (CMY, G, PBk), 9 picoliter (MBk)
Ink cartridge capacity	90 ml (Starter), 130 ml, 300 ml for CMYK	✔		40 ml (Starter), 130 ml CMY, Grey and Photo Black; 69 ml (Starter) and 300 ml (Matte Black only)
Number of nozzles	MBK: 5,120 nozzles; other colours: 2,560 nozzles each	✔		1,376 each
Number of printheads	1			1
Line accuracy	+/-0.1%			+/-0.1%
Minimum line width	0.02 mm			0.02 mm
Minimum print margins	3 mm			3 mm
Borderless (0 mm) printing	Yes	✔		No
Maximum outside diameter of roll paper	150 mm	✔		140 mm
Maximum printable paper roll length	18 m (varies according to the OS and application)			Limited by application, OS and driver/RIP used
Maximum cut-sheet media length	1.6 m	✔		914 mm
Maximum media thickness for roll paper	0.8mm	✔		0.3mm
Maximum media width	36 inches			36 inches
Media loading	Front			Front
Optional media handling	Roll holder set			Roll media adapter
Standard RAM	256 MB		✔	1.5 GB
Maximum RAM	256 MB		✔	1.5 GB
Hard drive	None			None
Interface	10/100/1000Base-T/TX Ethernet, USB 2.0			1000Base-T Ethernet, USB 2.0 (Host)
PDL	GARO, HP-GL/2, HP RTL		✔	HP-GL/2, HP-RTL, TIFF, JPEG, CALS G4, HP PCL 3 GUI, URF
Net weight (unpacked)	67.9 kg	✔		87 kg
Power consumption when in standby	0.5 W	✔		<4 W
Power consumption when active	140 W		✔	120 W
Acoustic pressure	Operation: 48 dB (A) or less; Standby: 35 dB (A) or less			Operation: 47 dB (A); Standby: 39 dB (A)
Acoustic power	Operation: 6.5 Bels			6.5 Bels (Printing), 5.8 B(A) (Ready)

Driver Feature Set

	Canon imagePROGRAF iPF780	Advantage		HP Designjet T920 ePrinter
Speed settings	5 (Fast 300, Standard 600, Fast 600, High 600 and 1200)	✔		3 (Fast, Normal and Best Quality), depending on paper chosen
Economy mode	Yes			Yes
Predefined profiles	7	✔		4
Overview of profile settings provided	Yes			Yes
Media profiles	44 + 5	✔		33
IQ optimized for options	Yes			Yes
Watermark	Yes	✔		No
Sharpen text	Yes			Yes
Thicken fine lines	Yes	✔		No
Mirror image	Yes			Yes
Multi-up printing	Yes, 2 to 16	✔		No
Poster print mode	Yes (2 by 2)	✔		No
Page stamping	Yes (Date, Time, Name, Page Number)	✔		Not supported
Image rotation	Yes, auto 180 degrees			Yes, auto 180 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			Yes
Brightness adjustment	Yes			Yes
Contrast adjustment	Yes			Yes
Saturation adjustment	Yes			Yes
Advanced colour management options	Yes			Yes
Enlargement Copy Mode	Yes	✔		No
Free Layout Capability	Yes	✔		No
MS Office Plug-in	Yes	✔		No
Accounting Capability	Yes	✔		No
Disable automatic cutter	Yes			Yes
Unidirectional printing selection option	Yes	✔		No
Integration with MFP	Yes	✔		No

Ink Consumption

Table 1

Amount of Ink in Each Canon iPF780 Cartridge (grams)

	Cyan	Magenta	Yellow	Matte Black	Black
Weight of cartridge prior to installation	401.5	397.5	394.9	398	403.7
Weight of cartridge at end of life	75.0	75.0	75.0	75.0	75.0
Net weight of ink	326.5	322.5	319.9	323.0	328.7
Total ink weight across five cartridges					1,620.6

Table 2

Amount of Ink in Each HP Designjet T920 Cartridge (grams)

	Photo Black	Grey	Matte Black	Cyan	Magenta	Yellow
Weight of cartridge prior to installation	190.0	199.5	194.9	190.9	191.3	192.1
Weight of cartridge at end of life	55.0	55.0	55.0	55.0	55.0	55.0
Net weight of ink	135.0	144.5	139.9	135.9	136.3	137.1
Total ink weight across six cartridges						828.7

Table 3

Ink Used in Three 50-Page Runs of Cottage Architectural Plan Test Document (Fast Economy Mode) on the Canon iPF780 (grams)

	Cyan	Magenta	Yellow	Matte Black	Black
Test Run 1 Net weight of ink used	2.8	2.3	2.2	10.0	1.2
Test Run 2 Net weight of ink used	2.5	2.0	2.0	10.0	1.4
Test Run 3 Net weight of ink used	1.9	2.1	1.8	10.2	1.4
Average amount of ink used across three runs	2.4	2.1	2.0	10.1	1.3
Total Ink Weight across five cartridges for 50-page run (based on averages)					17.9

Table 4

Ink Used in Three 50-Page Runs of Cottage Architectural Plan Test Document (Fast Economy Mode) on the HP Designjet T920 (grams)

	Photo Black	Grey	Matte Black	Cyan	Magenta	Yellow
Test Run 1 Net weight of ink used	0.2	0.2	7.2	1.4	0.7	0.3
Test Run 2 Net weight of ink used	0.3	0.2	7.2	1.6	0.9	0.3
Test Run 3 Net weight of ink used	0.2	0.2	7.3	1.5	0.9	0.3
Average amount of ink used across three runs	0.2	0.2	7.2	1.5	0.8	0.3
Total Ink Weight across six cartridges for 50-page run (based on averages)						10.3

Table 5

Ink Used in Three 50-Page Runs of Cottage Architectural Plan Test Document (Standard Mode) on the Canon iPF780 (grams)

	Cyan	Magenta	Yellow	Matte Black	Black
Test Run 1 Net weight of ink used	2.9	1.9	1.4	25.3	1.4
Test Run 2 Net weight of ink used	3.1	2.0	2.2	25.0	2.0
Test Run 3 Net weight of ink used	3.0	2.4	1.8	25.7	1.9
Average amount of ink used across three runs	3.0	2.1	1.8	25.3	1.8
Total Ink Weight across five cartridges for 50-page run (based on averages)					34.0

Table 6

Ink Used in Three 50-Page Runs of Cottage Architectural Plan Test Document (Normal Mode) on the HP Designjet T920 (grams)

	Photo Black	Grey	Matte Black	Cyan	Magenta	Yellow
Test Run 1 Net weight of ink used	0.4	0.4	27.2	9.2	3.6	1.8
Test Run 2 Net weight of ink used	0.3	0.3	26.7	9.1	3.4	1.3
Test Run 3 Net weight of ink used	0.5	0.4	27.5	9.1	3.6	1.7
Average amount of ink used across three runs	0.4	0.4	27.1	9.1	3.5	1.6
Total Ink Weight across six cartridges for 50-page run (based on averages)						42.2

Table 7

Ink Used in Three 50-Page Runs of Office Poster Test Document in Standard mode on the Canon iPF780 (grams)

	Cyan	Magenta	Yellow	Matte Black	Black
Test Run 1 Net weight of ink used	48.1	18.4	9.7	2.5	14.2
Test Run 2 Net weight of ink used	47.6	18.4	9.1	2.5	14.7
Test Run 3 Net weight of ink used	45.4	18.7	9.1	2.9	13.7
Average amount of ink used across three runs	47.0	18.5	9.3	2.6	14.2
Total ink weight across five cartridges for 50-page run (based on averages)					91.7

Table 8

Ink Used in Three 50-Page Runs of Office Poster Test Document in Normal mode on the HP Designjet T920 (grams)

	Photo Black	Grey	Matte Black	Cyan	Magenta	Yellow
Test Run 1 Net weight of ink used	9.2	5.2	15.7	55.8	23.4	7.3
Test Run 2 Net weight of ink used	9.1	5.0	15.6	55.6	23.3	7.3
Test Run 3 Net weight of ink used	9.3	5.2	15.7	55.4	23.3	7.4
Average amount of ink used across three runs	9.2	5.1	15.7	55.6	23.3	7.3
Total Ink Weight across six cartridges for 50-page run (based on averages)						116.3

Table 9

Ink Used in Three 50-Page Runs of Office Poster Test Document in High Quality mode on the Canon iPF780 (grams)

	Cyan	Magenta	Yellow	Matte Black	Black
Test Run 1 Net weight of ink used	51.0	19.7	10.9	7.9	16.3
Test Run 2 Net weight of ink used	50.9	20.0	10.8	7.2	15.0
Test Run 3 Net weight of ink used	49.5	20.0	10.3	6.7	15.6
Average amount of ink used across three runs	50.5	19.9	10.7	7.3	15.6
Total ink weight across five cartridges for 50-page run (based on averages)					103.9

Table 10

Ink Used in Three 50-Page Runs of Office Poster Test Document in Best Quality mode on the HP Designjet T920 (grams)

	Photo Black	Grey	Matte Black	Cyan	Magenta	Yellow
Test Run 1 Net weight of ink used	11.7	9.4	18.2	60.3	31.0	8.4
Test Run 2 Net weight of ink used	12.5	8.8	21.3	59.2	28.3	8.3
Test Run 3 Net weight of ink used	12.1	7.3	19.5	58.3	28.1	8.1
Average amount of ink used across three runs	12.1	8.5	19.7	59.3	29.1	8.3
Total Ink Weight across six cartridges for 50-page run (based on averages)						136.9

Table 11

Ink Used in Three 50-Page Runs of GIS Map Test Document in Standard mode on the Canon iPF780 (grams)

	Cyan	Magenta	Yellow	Matte Black	Black
Test Run 1 Net weight of ink used	36.9	20.3	25.1	7.7	8.6
Test Run 2 Net weight of ink used	36.6	21.3	24.9	10.7	8.6
Test Run 3 Net weight of ink used	37.3	21.8	23.8	9.3	8.6
Average amount of ink used across three runs	36.9	21.1	24.6	9.2	8.6
Total Ink Weight across five cartridges for 50-page run (based on averages)					100.5

Table 12

Ink Used in Three 50-page Runs of GIS Map Test Document in Normal mode on the HP Designjet T920 (grams)

	Photo Black	Grey	Matte Black	Cyan	Magenta	Yellow
Test Run 1 Net weight of ink used	4.9	38.8	10.4	27.8	14.6	21.0
Test Run 2 Net weight of ink used	4.9	39.5	10.4	28.3	14.6	21.3
Test Run 3 Net weight of ink used	5.0	38.8	12.7	28.1	14.5	21.2
Average amount of ink used across three runs	4.9	39.0	11.2	28.1	14.6	21.2
Total Ink Weight across six cartridges for 50-page run (based on averages)						118.9

Table 13

Ink Used in Three 50-Page Runs of GIS Map Test Document in High Quality mode on the Canon iPF780 (grams)

	Cyan	Magenta	Yellow	Matte Black	Black
Test Run 1 Net weight of ink used	38.5	22.0	23.1	5.4	9.2
Test Run 2 Net weight of ink used	39.1	23.2	24.9	6.8	9.6
Test Run 3 Net weight of ink used	40.0	22.5	25.9	6.8	9.4
Average amount of ink used across three runs	39.2	22.6	24.6	6.3	9.4
Total Ink Weight across five cartridges for 50-page run (based on averages)					102.1

Table 14

Ink Used in Three 50-page Runs of GIS Map Test Document in Best Quality mode on the HP Designjet T920 (grams)

	Photo Black	Grey	Matte Black	Cyan	Magenta	Yellow
Test Run 1 Net weight of ink used	5.2	45.1	11.9	26.2	13.9	21.9
Test Run 2 Net weight of ink used	6.2	41.1	13.0	30.6	15.8	22.4
Test Run 3 Net weight of ink used	5.7	39.5	13.1	29.1	15.8	22.0
Average amount of ink used across three runs	5.7	41.9	12.7	28.6	15.2	22.1
Total Ink Weight across six cartridges for 50-page run (based on averages)						126.2

Ink Consumption Test Methodology Overview:

Buyers Lab's ink consumption analysis was conducted using three document types (architectural plan, office TIFF poster and GIS PDF map). The Cottage Architectural Plan was formatted as a DWG TrueView Drawing, and all documents were sized at ISO A0.

The Canon imagePROGRAF iPF780 was installed in BLI's lab with the latest level of firmware (as of March 2014) 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 Cot-

tage Architectural Plan, Print Priority settings were set to Line Drawing/Text with Quality set to Fast (600 dpi) and Standard (600 dpi). For the ISO Poster and the GIS map, Print Priority settings were set to Image with Quality set to Standard (600 dpi).

The HP Designjet T920 was installed in BLI's lab with the latest level of firmware (as of March 2014) and connected to a Windows 7 workstation using a 1000BaseT TCP/IP connection. The device was left in default configuration throughout testing. The HP ESC/P 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. For the Cottage Architectural Plan, the Fast quality setting was used. For the ISO Poster, the Normal quality setting was used, and for the GIS map Best quality setting was used.

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 iPF780: one cartridge was then run to exhaustion and the weight of the empty cartridge was recorded.

HP Designjet T920: 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 2008 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 are 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 Inc.

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.

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