

BLI Comparative Lab Test Report

MARCH 2016

Canon imagePROGRAF iPF780 vs. HP DesignJet T930



Canon imagePROGRAF iPF780



HP DesignJet T930

	Canon imagePROGRAF iPF780	HP DesignJet T930
Advantage ✓		
Colour Image Quality	✓	
Black Image Quality	✓	
Colour Print Productivity	✓	
Black Print Productivity	✓	
Banner Printing	=	=
Poster Printing	✓	
Direct Print 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 T930, and produce a report comparing the relative strengths and weaknesses of the two products in terms of image quality, productivity, ink consumption, direct print 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 T930 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 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 the HP T930 runs out of ink, however, printing must stop for the cartridge to be replaced, leading to operator downtime. 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 a partial page is wasted.

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 devices was of a high standard and would easily satisfy customer needs. The Canon iPF780, however, was the stronger performer; it delivered superior photographic output quality, with better colour saturation, more natural-looking skin tones, and excellent definition in dark and light contrast areas. It also surpassed its HP competitor with a much larger colour gamut in all modes tested when printing on both plain and (especially) photo-quality paper, where it had an impressive CIE volume of 643,228 compared with 452,584 with the HP unit. One notable advantage of the Canon model is its unidirectional printing selection in the driver, which eliminates banding on the Canon iPF780's output, even in Fast mode.

In terms of device and driver feature sets, the Canon iPF780 has plenty of advantages over its rival HP model. It has higher cartridge capacities, smaller ink drop sizes, more media profiles, and a flexible layout nesting option to save on paper. (The HP model offers a similar feature but doesn't support the same flexibility and control over image placement). Canon users can integrate the iPF780 device with a smaller-format MFP to produce enlarged, poster-size copies via the free Color imageRUNNER Enlargement Copy Mode, a feature not offered by HP.

Not without its advantages, the HP T930 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 T930's rear-mounted stacker assembly which can hold up to 50 printed sheets in perfect alignment. Mixed energy usage results were noted, however. The HP model has lower energy consumption when printing—120 watts compared with 140 watts for the Canon model, while the Canon unit's energy consumption in standby mode (where it may spend more of its time) is lower than that of the HP model (0.5 W compared with 1.3 W).

Both models allow files to be retrieved from cloud storage for printing. The Canon model supports direct PDF printing; however, the HP's Mobile Printing service offers additional functionality not available with the Canon unit, including support for easy printing from Apple or Android mobile devices via a wireless network connection or Wi-Fi Direct, while users can also submit PDF, TIFF and JPEG files remotely via email to the T930 for printing. Canon offers an app which enables PDF printing, but only from Apple iPads.

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 T930.

Colour Image Quality

	Canon imagePROGRAF iPF780	HP DesignJet T930
Advantage ✓		
Text	✓	
Fine Lines	✓	
Halftone Range	=	=
Halftone Fill		✓
Solid Density	✓	
AEC Graphics	=	=
GIS Graphics	=	=
Business Graphics	✓	
Photographic Images	✓	
Colour Gamut (plain paper, Fast)	✓	
Colour Gamut (plain paper, Standard/Normal)	✓	
Colour Gamut (plain paper, High/Best)	✓	
Colour Gamut (gloss paper, High/Best)	✓	

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

- + The Canon model delivered superior optical densities in all modes for cyan and magenta; it also had higher density for yellow in Fast Economy and Fast modes, and comparable density in Standard/Normal and High/Best modes. The HP DesignJet T930 delivered a higher optical density for composite black in Standard/Normal mode and comparable density in Best/High mode, while the Canon model had higher density for composite black in Fast Economy and Fast modes. Overall, the T930's Fast Economy mode and Fast mode deliver far poorer optical density for all colours (in particular, cyan and magenta) compared to the Canon device.
- + When printing on plain paper in Fast Economy mode, the Canon model delivered a colour gamut that was more than eight times larger than that of the HP T930 with a CIE volume of 127,478 versus a CIE volume of just 14,404 for the HP unit.
- + In Fast mode using plain paper, the Canon model delivered a 40.5% larger colour gamut with a CIE volume of 193,062, while the HP model produced a CIE volume of 137,431.
- + When printing on plain paper using the Standard/Normal driver settings, the Canon model delivered a 43.7% larger colour gamut—with a CIE volume of 221,132 compared with 153,924 for the HP device.
- + When printing on plain paper in High/Best Quality mode, the Canon iPF780 delivered a 27.4% larger colour gamut, with a CIE volume of 224,605 versus a CIE volume of 176,335 for the HP model.
- + In High/Best quality settings using photo-quality paper, the Canon model delivered a 42.1% larger colour, with a CIE volume of 643,228 compared with 452,584 for the HP T930.
- + The Canon iPF780 delivered consistently excellent text quality in colour across all tested modes except Fast, where serif and sans serif fonts were legible down to the 3-pt. or 4-pt. level, with some ink bleed; in

all other modes fonts were legible down to 3-pt. size with no breakup. For the HP model, in Fast mode its fonts were legible down to the 3-pt. level, but displayed poor fills; 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, with no bleed. However, in Best Quality mode, all fonts were legible down to 3-pt. size but a slight amount of bleed was apparent.

- + Fine lines produced by both devices remained distinct down to the 0.1-pt. level, except for the HP model's Fast mode in which fine lines were distinct at the 0.25-pt. mark. White-on-black fine lines were only visible at 0.25-pt. level for both the Canon and HP models, and were rated fair for all modes tested.
- + In all fast and standard modes, the Canon unit produced circles that were rated good—at 0.1-pt. level circles were smooth and unbroken, while circles produced in high quality mode were improved and given a very good rating. The HP device delivered blurred, indistinct circles in Fast and Normal modes, whilst in Best mode circles at 0.1-pt. level were rated only as good.
- Colour halftone range was excellent with both models, with distinct transitions between all levels.
- Colour halftone fills were slightly grainy on plain paper for the Canon model in all modes, whilst the HP model's halftone fills were consistently rated good.
- 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 both models when viewed under magnification, as would be expected on plain paper.
- 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 and more vibrant colours than did the HP device.
- + When comparing photographic images in Standard/Normal and High/Best Quality modes, the Canon model delivered superior detailing in dark and light contrast areas and better saturation than the HP device.
- + Skin tones produced by the Canon model were natural-looking, even on plain paper, with the HP model's skin tones slightly yellowish in comparison.
- + The Canon iPF780 produced the 1x1 pixel grid in CMY with no quality issues: coverage was good (in Fast and High quality modes) and very good in Standard mode across all colours. The HP T930 delivered good coverage in Best mode, but its 1x1 pixel grid output was only rated fair in Normal and Fast modes.
- + One factor that can influence overall image quality is unidirectional printing, which means that the print-head travels in one direction over the image, a feature that is available as a driver setting for 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, except 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.
- + Overall, the Canon model was the stronger performer in BLI's assessment of colour image quality. The Canon iPF780 exhibited higher cyan and magenta densities, while yellow and black densities were comparable for both units. 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 superior text, fine lines and circles, and a much larger colour gamut in all modes on both plain and photo quality papers. While the HP model offered better colour halftone fills (which were slightly grainy in all modes with the Canon unit), there was no other aspect where it truly stood out.

Black Image Quality

	Canon imagePROGRAF iPF780	HP DesignJet T930
Advantage ✓		
Text	✓	
Fine Lines	✓	
Halftone Range	=	=
Halftone Fill	=	=
Solid density	=	=
AEC Graphics	=	=
Business Graphics	✓	
Photographic Images	✓	

- In Fast Economy and Standard/Normal quality modes, the Canon model delivered higher optical densities for black, whilst it had comparable density in High/Best mode; the HP T930 delivered the higher optical density for black in Fast mode.
- + 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 mode, where they were legible down to 5-pt. size. With the HP T930, 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. With its consistent performance, along with the higher density, the Canon model had a distinct edge overall for text.
- + The HP device exhibited some ink bleed or overspray in text and line art in Fast and Best modes when viewed under magnification, which was not observed in Normal mode. Fonts were legible down to the smallest 3-pt. size with both models. The Canon iPF780 delivered crisp fonts, and only suffered from ink bleed in Fast mode.
- + Fine lines in BLI's line art test target remained distinct down to the 0.1-pt. level in all modes for the output of both devices. The Canon output was rated good in all modes, while HP fine lines were rated good in Standard and High Quality modes and fair in Fast mode. Both units produced white-on-black fine lines at 0.25-pt. level in all modes, however HP output was rated poor in Fast mode as white lines were barely visible. 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 unit, and received very good ratings in the two higher quality modes, as opposed to the good rating for the HP T930.
- Both models delivered a very good halftone range—from the 10% to 100% dot-fill levels in all modes, with smooth transitions between all levels.
- Halftone fill results in all modes were rated good for both models.
- Both units delivered dark solids with comparable optical density.
- 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, producing darker solids; a higher optical density in Fast Economy and Standard/Normal quality modes; smoother gradations in business graphics and crisp text, 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, except Normal, when viewed under magnification. Both models delivered excellent AEC and GIS graphics.

Print Productivity

	Canon imagePROGRAF iPF780	HP DesignJet T930
Advantage ✓		
First Page Out From Weekend Non-Use	✓	
First Page Out From Ready State	✓	
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)	✓	

- + The Canon iPF780 delivered an 11.2% faster first-page-out time of 111.03 seconds after a weekend of non-use, compared with 125.08 seconds for the HP device. Start-up time before printing commenced was 46.71 seconds for the Canon model and 54.22 seconds for the HP unit.
- + The Canon device delivered a 21.6% faster first-page-out time of 67.82 seconds from its ready state, compared with 86.56 seconds for the HP device. Start-up time before printing commenced was 17.07 seconds for the Canon model compared with 15.60 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’s time was competitive with that of the HP model in Draft/Fast mode, but it was 21.4% faster in Standard/Normal mode, and 55.1% faster in High/Best Quality mode.
- + When printing BLI’s 12-page DWF test file in colour, the Canon unit had a competitive time to that of the HP model in Draft/Fast mode, but it was 28.1% faster in Standard/Normal mode, and 58.8% 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 competitive in Draft/Fast mode, but it was 27.7% faster in Standard/Normal mode, and 58.0% 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 printed on plain paper, the Canon iPF780 delivered a first-page-out time (56.42 seconds) that was (3.4%) slower than

the HP unit (54.59 seconds). The time to print five A0-size pages, however, was fractionally (1.9%) faster for the Canon iPF780 than for the HP device (245.35 seconds versus 250.11 seconds).

- + In BLI's single-page A0-size test with the Cottage Architectural Plan in Standard/Normal mode printed on plain paper, the Canon iPF780 delivered a first-page-out time (100.59 seconds) that was 31.9% faster than the HP T930 (147.62 seconds). The time to print five A0-size pages was 38.2% faster for the Canon iPF780 than for the HP device (454.66 seconds versus 735.34 seconds).
- + In BLI's single-page A0-size test with the Poster test file in Standard/Normal mode printed on heavy coated paper, the Canon iPF780 delivered a first-page-out time (190.10 seconds) that was 61.5% faster than the HP unit (494.38 seconds). The time to print five A0-size pages was 62.0% faster for the Canon iPF780 than for the HP device (969.99 seconds versus 2,550.66 seconds).
- + In BLI's single-page A0-size test with the Poster test file in High/Best Quality mode printed on heavy coated paper, the Canon iPF780 delivered a first-page-out time (461.10 seconds) that was 41.2% faster than the HP unit (784.10 seconds). The time to print five A0-size pages was 39.7% faster for the Canon iPF780 than for the HP device (2,293.85 seconds versus 3,805.12 seconds).
- + One factor that had an impact on productivity is that when the HP T930 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 are wasted.

Banner Printing

	Canon imagePROGRAF iPF780	HP DesignJet T930
Advantage ✓		
Productivity	=	=

- In Fast mode, the HP DesignJet T930 took about six seconds (1.44% less) time than the Canon iPF780 to print BLI's 36" x 105" banner (a 4,955-KB PDF file). No preview was available with the HP model, and it took 7 minutes, 8.84 seconds from PC release to final paper cut, compared with a total preview and print time of 7 minutes, 15.12 seconds for the Canon unit; although the HP T930 is slightly faster, the times are not directly comparable because of the HP model's lack of a preview.

Poster Printing

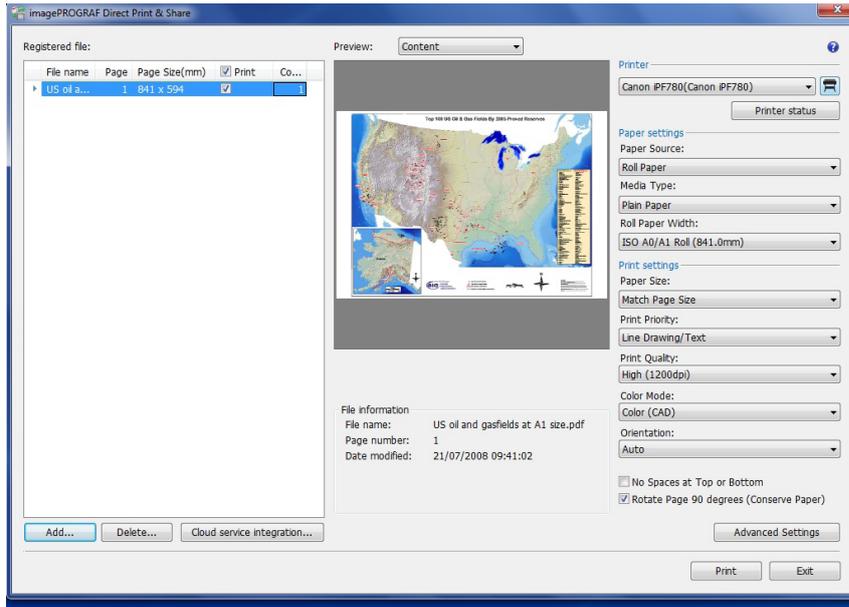
	Canon imagePROGRAF iPF780	HP DesignJet T930
Advantage ✓		
Image Quality	✓	
Productivity (Fast/Speed mode)		✓
Productivity (Standard/Normal mode)	✓	
Productivity (High/Best mode)	✓	

- When printing a poster in Fast mode at 300 dpi, the Canon model took 46.50 seconds to complete the job, while the HP unit took 38.23 seconds.
- + Some banding was evident in Fast mode with both models (across the whole image with the HP unit, but only in dark areas with the Canon model), while colours on the HP poster were slightly pale compared with the much brighter colours in the poster produced by the Canon model. When unidirectional printing was selected in the Canon print driver, banding was eliminated, but the time to print the banner increased to 62.93 seconds.
- + When printing a poster in Standard/Normal mode at 600 dpi, the Canon model took 59.22 seconds. The HP unit took slightly longer with a time of 1 minute, 17.47 seconds, and there was still some visible banding on its output, in both light and dark areas; HP's colours were much brighter in Standard mode (compared with Fast mode) but again, BLI noted that colours were not as bright as in the output of the Canon model.
- + Printing a poster in High quality (600 dpi) mode on the Canon model took 1 minute, 43.94 seconds, while printing the same poster on the HP model in Best mode took 2 minutes, 54.44 seconds, which represents a 40.4% faster print time for the Canon model.
- + At the High/Best Quality settings, there was no observable banding and definition of fine details was equally good on output from both models, but the Canon model produced the more vibrant, saturated colours overall.

Direct Print Submission Functionality

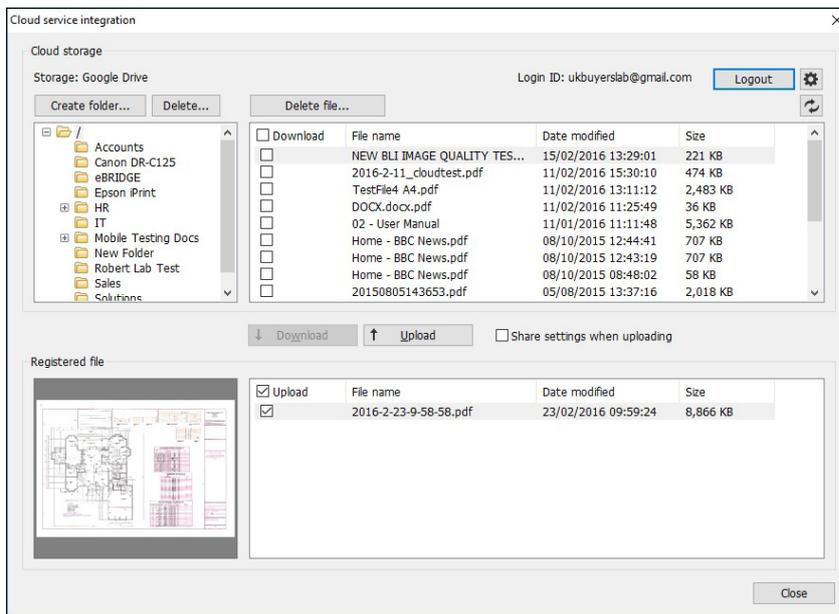
	Canon imagePROGRAF iPF780	HP DesignJet T930
Advantage ✓		
Ease of Use	=	=
Functionality	=	=

- Available as a free download from Canon's website, the iPF Direct Print & Share utility enables the direct printing of PDF, JPEG, TIFF and HPGL/2 files without the need for native applications or print drivers. The utility allows the user to preview print layouts and choose print settings without opening up the driver properties. It also lets the user print multiple files simultaneously.



Canon’s iPF Direct Print & Share utility gives users an image preview.

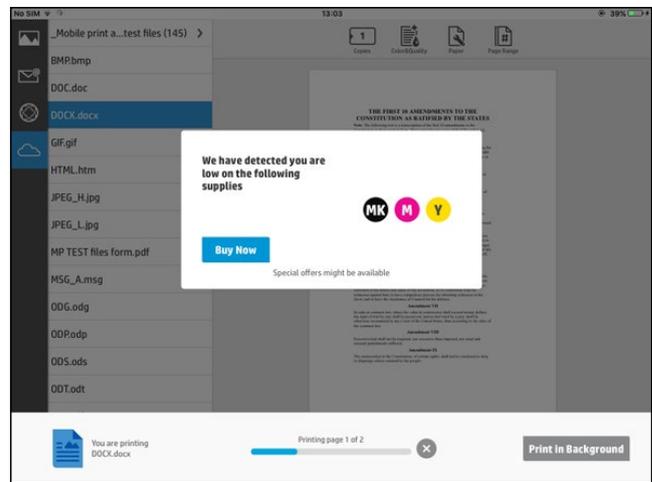
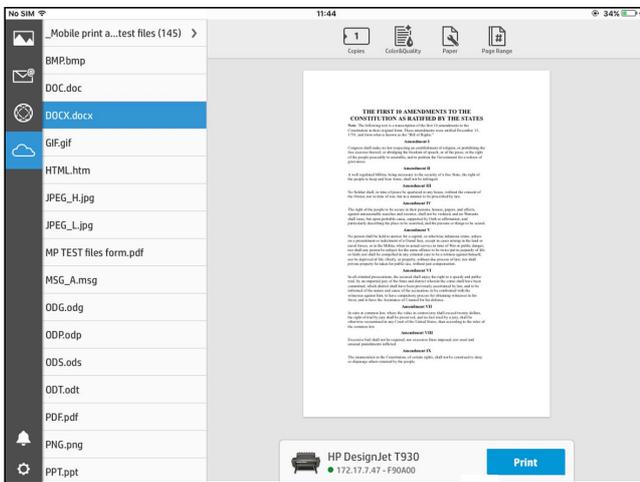
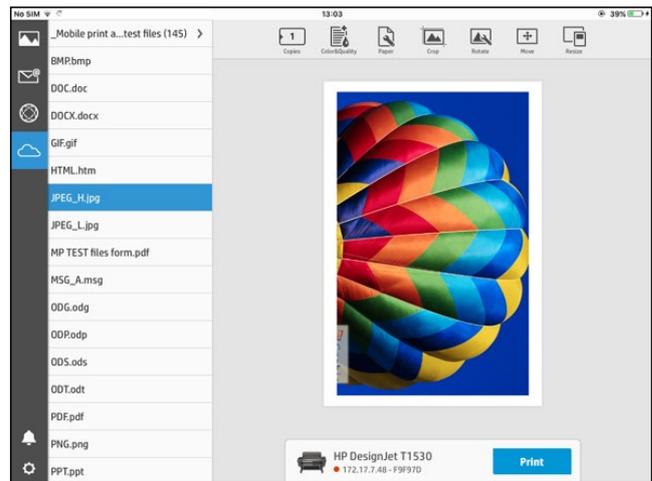
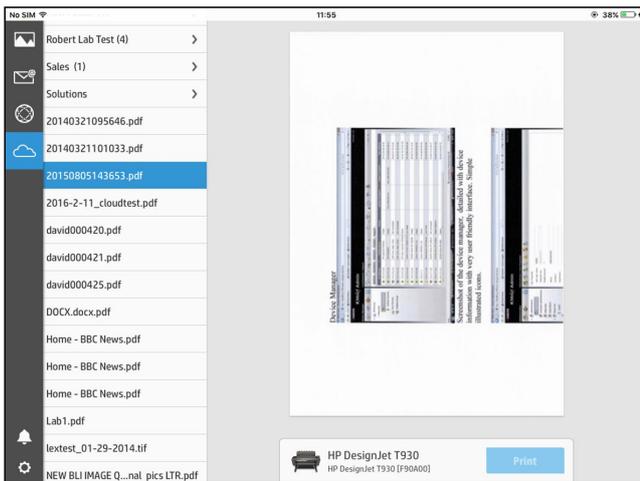
- Canon’s iPF Direct Print & Share supports “Shortcut Print” functionality, which enables users to define several print settings that might be commonly used in combination and represent them with a desktop icon. Akin to a hotfolder workflow, files are automatically printed with the predefined settings when users drag-and-drop them to the icon. Multiple desktop icons can be created for different print settings or combinations of print settings.



Retrieving files from Google Cloud using iPF Direct Print & Share.

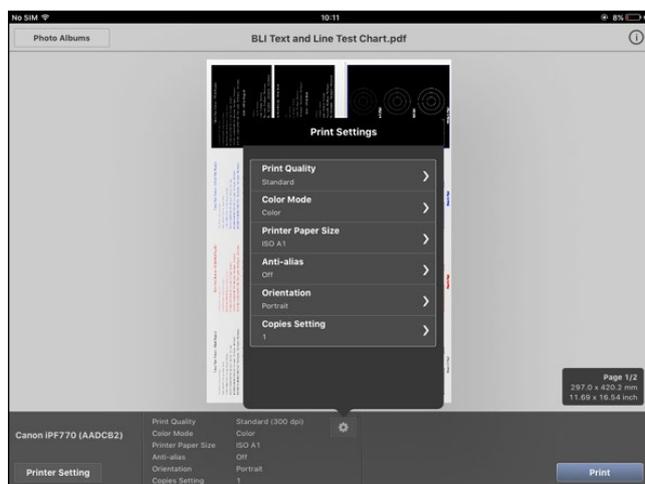
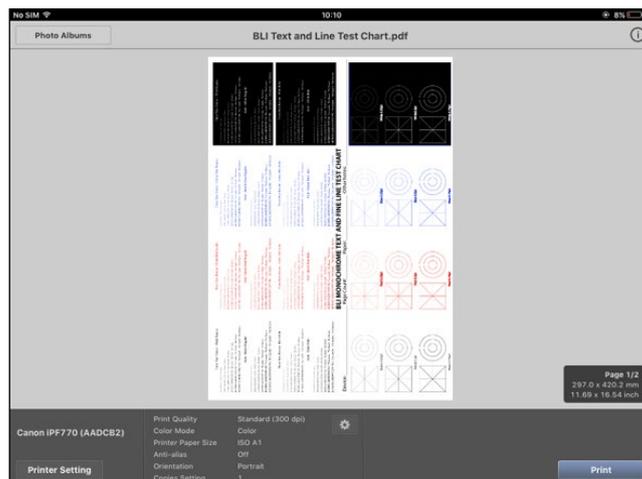
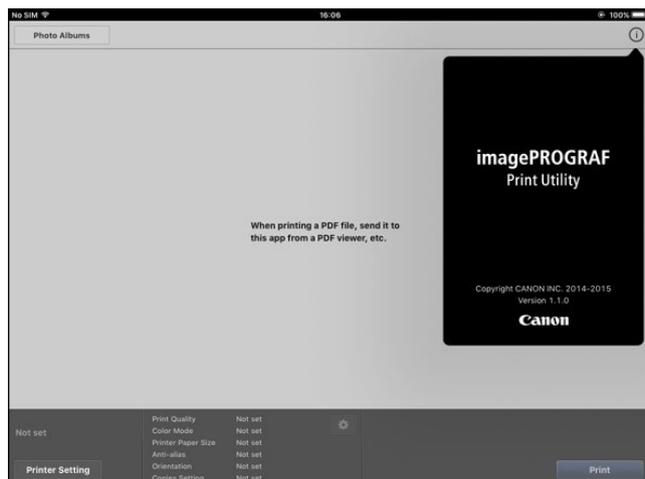
- Users can retrieve files from Google and AutoCAD 360 cloud storage services for printing via iPF Direct Print & Share; the utility lets users upload files to cloud storage while also offering the option of sharing files with other users at the same time (Google Drive only).

- The HP Mobile Printing service allows users to print directly from an iOS or Android smart device to a compatible HP large-format device. Unlike the previous version (ePrint & Share), users do not need to create an account in order to access direct print functionality, instead, the mobile device quickly pairs with the printer by LAN, via a wireless network connection or by Wi-Fi Direct for direct job submission. Android users have the extra step, however, of downloading and enabling the free HP Print Service Plugin app, which is available from Google Play, before being able to access the HP Printing service. Users can print a wide selection of file formats such as Microsoft Office documents, as well as PDF, JPEG and TIFF files; when they wish to print a file either stored locally on their device, an email attachment, or a document stored in a cloud service account, the user just needs to open the file and then selects the Share option, which then allows them to select and send their job to their preferred HP printer.



The HP Mobile Printing service enables Android and iOS mobile devices to pair with the T930 and other compatible HP devices easily. Users can retrieve files from cloud storage, preview images and perform image adjustments.

- In addition, the T930 supports HP ePrint functionality, whereby users are able to send print jobs remotely by email either from their workstation PC or from their mobile device to the device; PDF, TIFF and JPEG files (up to 10 MB) are supported.
- The Canon model also supports a free mobile print app, the Canon imagePROGRAF Print Utility, which enables PDF printing from Apple iPads to facilitate workflows for mobile workers.



Canon imagePROGRAF Print Utility app is available for iPad users; it offers an image preview and users have the ability to select printer options, such as orientation and colour mode.

Ink Consumption

Results—Overall weight of ink used (grams)

Results averaged across three tests of 50-set A1 printing in Standard/Normal mode	Canon imagePROGRAF iPF780	HP DesignJet T930
COTTAGE ARCHITECTURAL PLAN (Fast Economy Mode)	17.9	10.4
COTTAGE ARCHITECTURAL PLAN (Standard/Normal Mode)	34.0	41.6
ISO POSTER (Standard/Normal Mode)	91.6	100.2
GIS MAP (Standard/Normal Mode)	100.4	103.8
GIS MAP (High/Best Quality Mode)	102.1	112.0

- When producing 50 prints of a Cottage Architectural Plan in Fast Economy Mode, the Canon unit used 72.1% more ink than the HP T930. However, the HP model laid down so little ink that its colour gamut CIE volume was only 14,404 (just 11.3% 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 18.3% less ink than the HP T930.
- + When printing an ISO Poster in Standard/Normal Mode, the Canon unit used 8.5% less ink compared with the HP T930.
- + When printing a GIS Map in Standard/Normal Mode, the Canon iPF780 used 3.2% less ink compared with the HP device.
- + When printing a GIS Map in High/Best Quality Mode, the Canon iPF780 used 8.8% less ink compared with the HP device.

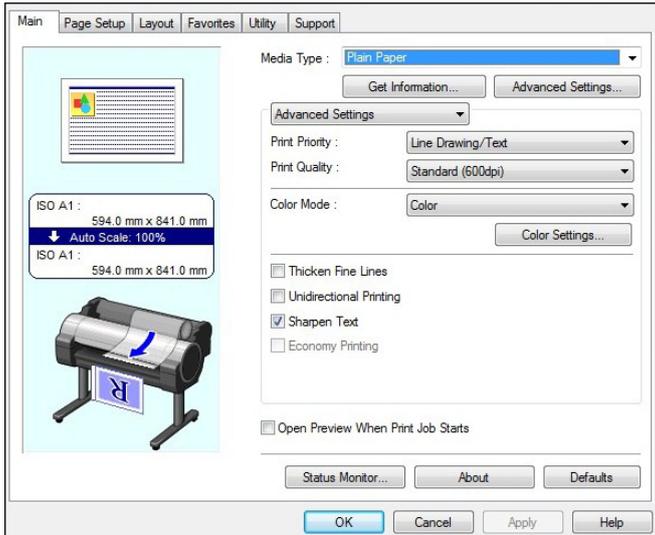
Device Feature Set

- + 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, 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. HP's cartridges cannot be replaced during operation.
- + The Canon unit supports a higher maximum cut-sheet media length of 1.6 m compared with 1.219 m for the HP unit.
- Both models offer USB 2.0 and Gigabit Ethernet connectivity.
- The catch tray of the Canon model does not enable printed sheets to be stacked neatly (and in the correct sequence), making collating output (especially towards the end of media rolls) more difficult than with the HP unit.
- BLI analysts were impressed with the design and build quality of the HP T930'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, except with photo paper.
- + 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 T930 only supports up to 0.5mm 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 T930's power consumption while active is lower—120 watts versus 140 watts—than that of the Canon model.

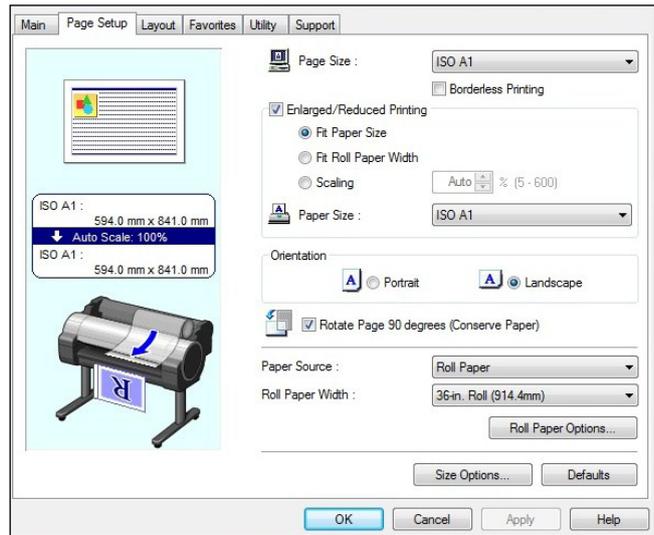
- + However, in standby mode (where it may spend more of its time) the HP T930's power consumption is higher (1.3 watts versus Canon's 0.5 watts).
- Noise emissions are slightly higher for the Canon model (48 dB) compared to the HP device (47 dB).

Driver Feature Set

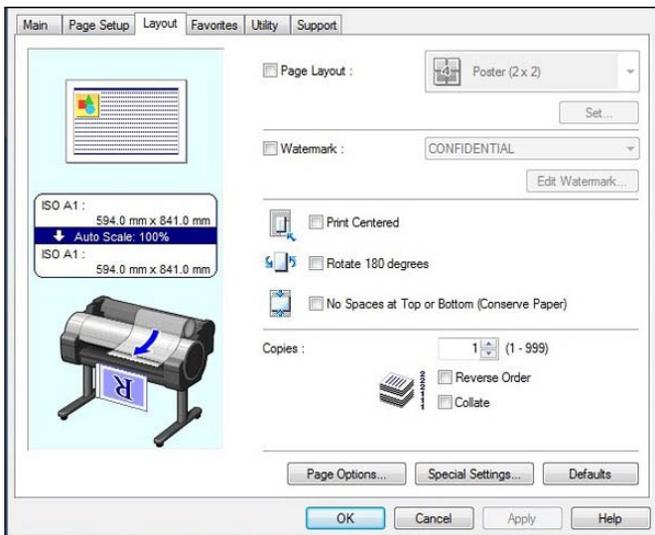
- + The Canon iPF780 has five speed settings (Fast 300, Standard 600, Fast 600, High 600 and High 1200), which are matched by three settings with the HP device (Fast, Normal and Best), although not all speed settings are available with all media types on the Canon model.
- Both the Canon GARO driver and the HP-GL/2 driver provide a useful overview of the settings for pre-defined 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 also supports, together with the ability to add custom stamps.
- 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).
- + 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.
- + The Canon driver includes the Color imageRUNNER Enlargement Copy Mode utility, which is standard with the 32-bit version of the driver and is available as a download for the 64-bit version of the driver via the Printer Driver Extra Kit. It 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 (available for free download via the Printer Driver Extra Kit) that enables files—even those 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 HP unit offers a similar nesting feature, which can be activated directly on the control panel and from the print driver utility. However, unlike the Canon tool, it does not allow users to have precise control over the positioning of jobs, rather it will randomly position jobs to print across the width of a page, either in job order sent or in 'optimized' layout order.
- + 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. No such plug-in is available to HP users.



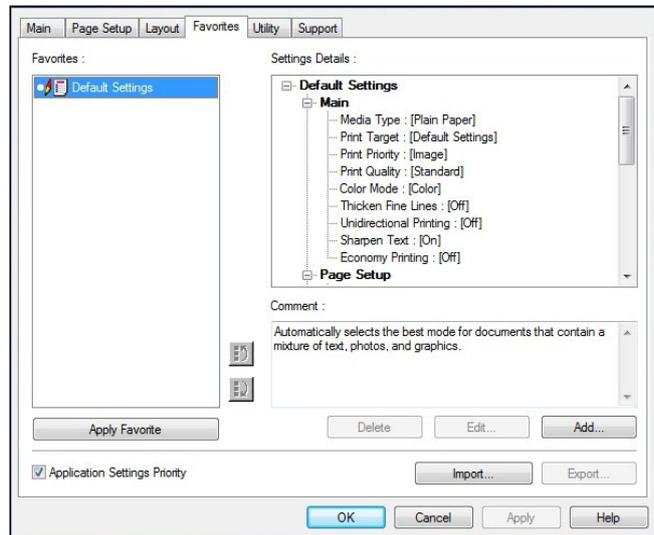
Canon Print Driver Main Tab



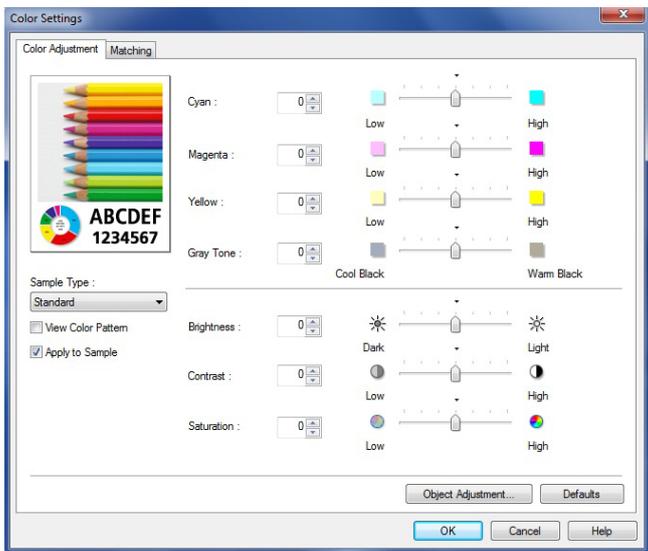
Canon Print Driver Page Setup Tab



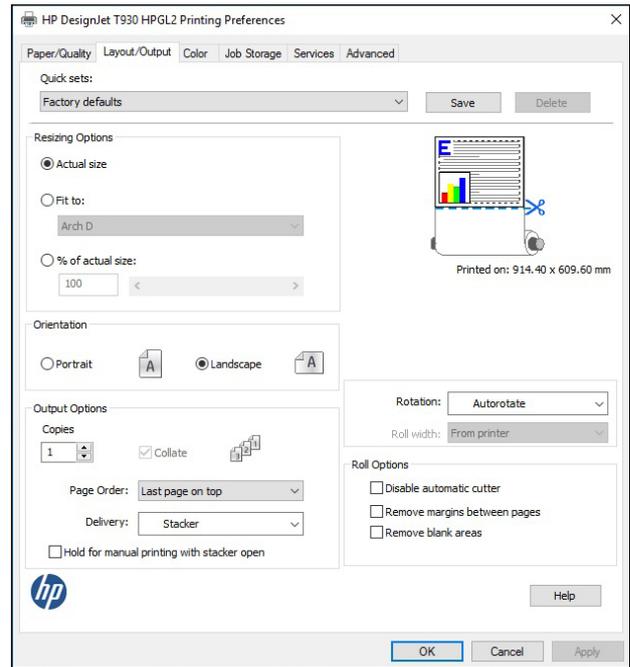
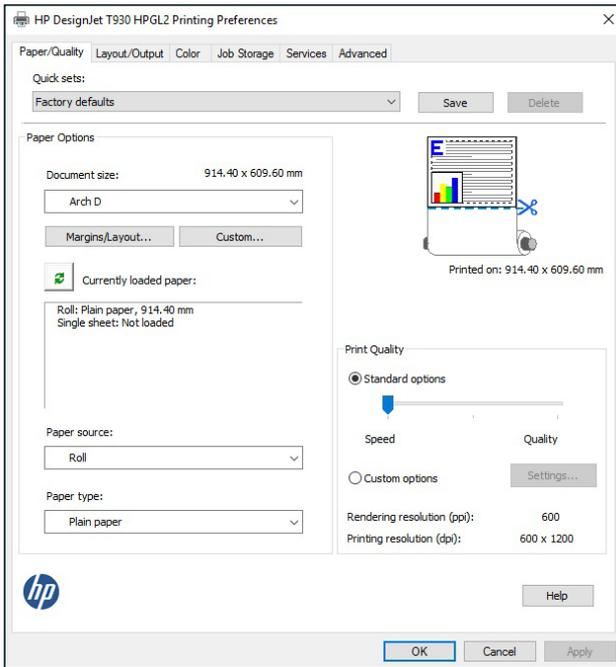
Canon Print Driver Layout Tab



Canon Print Driver Favourites Tab

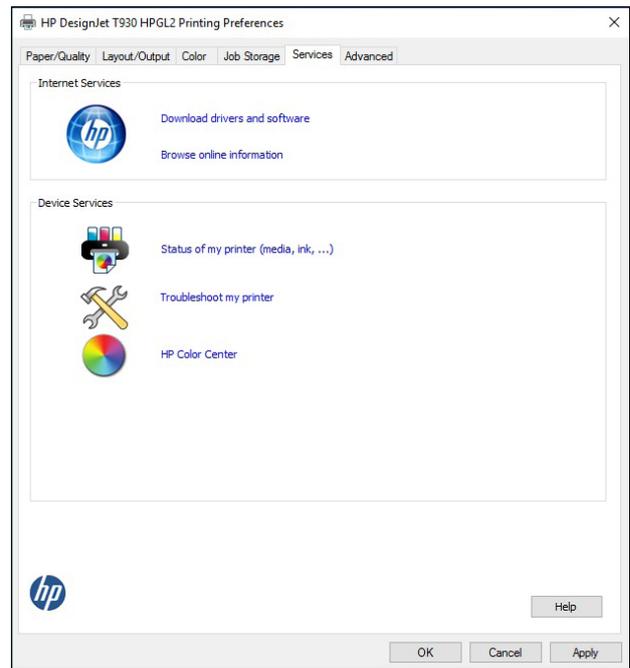
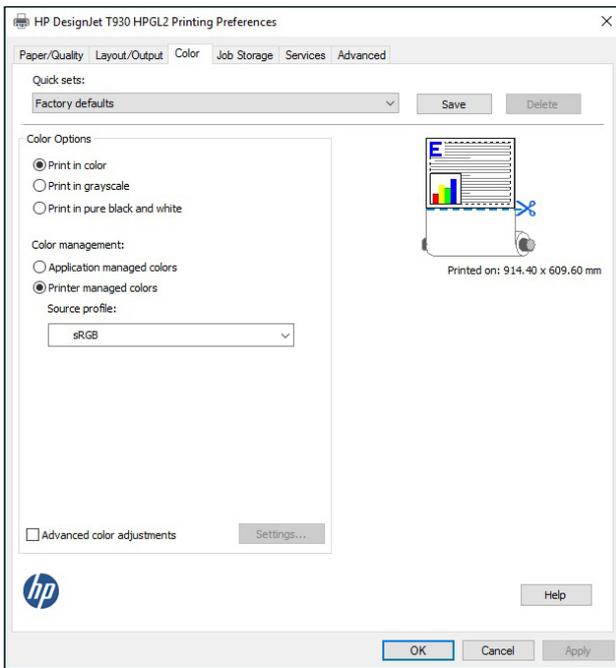


Canon Print Driver Colour Adjustment Tab



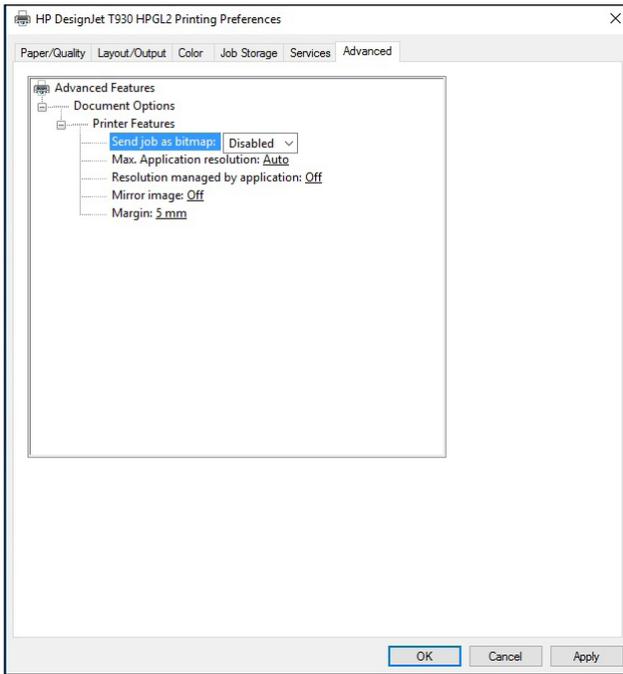
HP Print Driver Paper/Quality Tab

HP Print Driver Layout/Output Tab

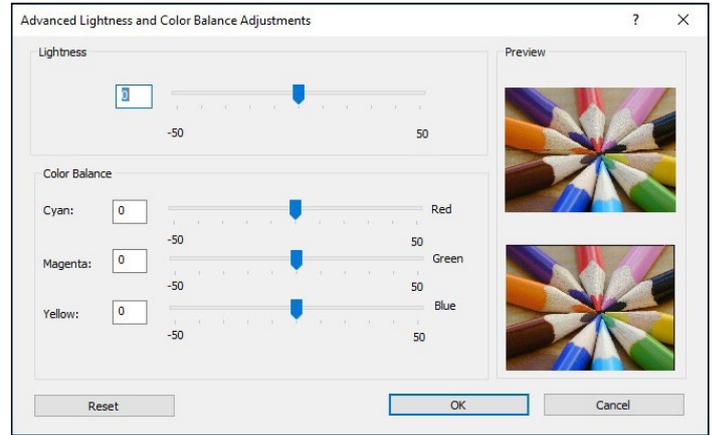


HP Print Driver Colour Tab

HP Print Driver Services Tab



HP Print Driver Advanced Tab



HP Print Driver Colour Controls under Printer Preferences

SUPPORTING TEST DATA

Print Productivity

Job Stream Productivity

Mixed File Types, Same Size

	Canon imagePROGRAF iPF780 (time in seconds)		HP DesignJet T930 (time in seconds)
Draft	693.09	Fast	703.67
Standard	1,262.66	Normal	1,605.55
High	1,828.93	Best	4,071.42

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 T930 (time in seconds)	
Draft	408.28	Fast	404.59
Standard	768.39	Normal	1,068.32
High	1,100.79	Best	2,672.17

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.

Monochrome Productivity

Canon imagePROGRAF iPF780 (time in seconds)		HP DesignJet T930 (time in seconds)	
Draft	410.18	Fast	407.38
Standard	766.92	Normal	1,060.40
High	1,111.91	Best	2,647.61

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 iPF850 (time in seconds)	HP DesignJet T930 (time in seconds)
Time Before Printing Commences	46.71	54.22
First Page Out	111.03	125.08

First-Page-Out Productivity From Ready State

	Canon imagePROGRAF iPF850 (time in seconds)	HP DesignJet T930 (time in seconds)
Time Before Printing Commences	17.07	15.60
First Page Out	67.82	86.56

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: Plain Paper, Fast Economy mode

	Canon imagePROGRAF iPF850 (time in seconds)	HP DesignJet T930 (time in seconds)
First Page Out	56.42	54.59
Five Pages Out	245.35	250.11

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.

A0 First-Page-Out and Throughput Productivity: Plain Paper, Standard/Normal Mode

	Canon imagePROGRAF iPF850 (time in seconds)	HP DesignJet T930 (time in seconds)
First Page Out	100.59	147.62
Five Pages Out	454.66	735.34

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.

A0 First-Page-Out and Throughput Productivity: Coated Paper, Standard/Normal Mode

	Canon imagePROGRAF iPF850 (time in seconds)	HP DesignJet T930 (time in seconds)
First Page Out	190.10	494.38
Five Pages Out	969.99	2,550.66

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.

A0 First-Page-Out and Throughput Productivity: Coated Paper, High/Best Mode

	Canon imagePROGRAF iPF850 (time in seconds)	HP DesignJet T930 (time in seconds)
First Page Out	461.10	784.10
Five Pages Out	2,293.85	3,805.12

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

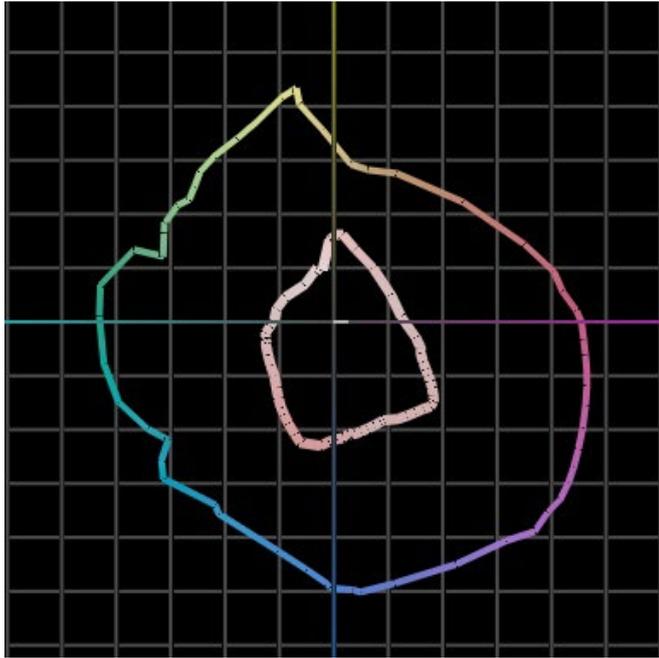
Canon imagePROGRAF iPF780								
Plain Paper								
	Fast Economy		Fast		Standard		High	
	50%	100%	50%	100%	50%	100%	50%	100%
Cyan	0.19	0.55	0.50	1.07	0.54	1.12	0.51	1.14
Magenta	0.17	0.51	0.46	0.99	0.50	1.04	0.48	1.11
Yellow	0.12	0.37	0.39	0.78	0.43	0.84	0.41	0.86
Black	0.27	1.02	0.65	1.39	0.74	1.43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

HP DesignJet T930								
Plain Paper								
	Fast Economy		Fast		Normal		Best	
	50%	100%	50%	100%	50%	100%	50%	100%
Cyan	0.16	0.24	0.46	0.58	0.40	0.65	0.41	0.69
Magenta	0.19	0.36	0.58	0.69	0.47	0.90	0.50	0.96
Yellow	0.09	0.20	0.48	0.59	0.51	0.84	0.50	0.84
Black	0.23	0.84	0.43	1.37	0.56	1.53	0.57	1.46

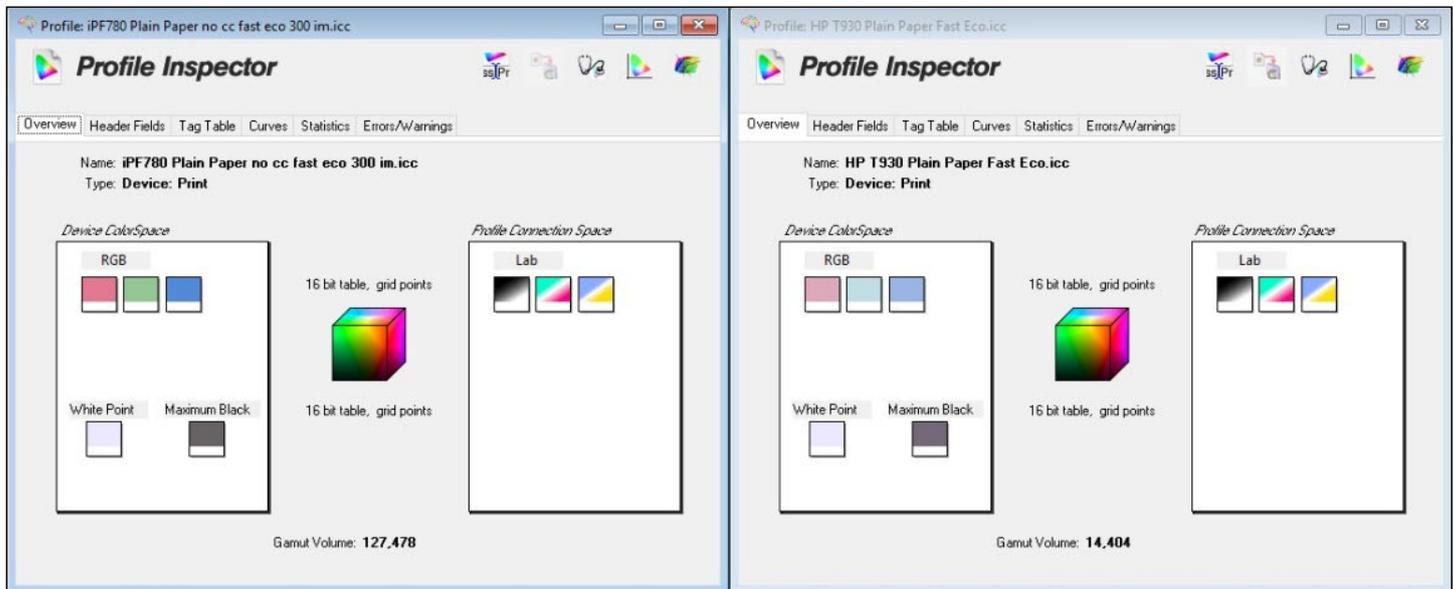
Note: Colour density readings were assessed by printing a BLI IQ test target file on plain paper in default colour settings at all quality settings available and measuring the density of 100% dot fill and 50% dot fill using an XRite 508 densitometer.

Colour Gamut Comparisons

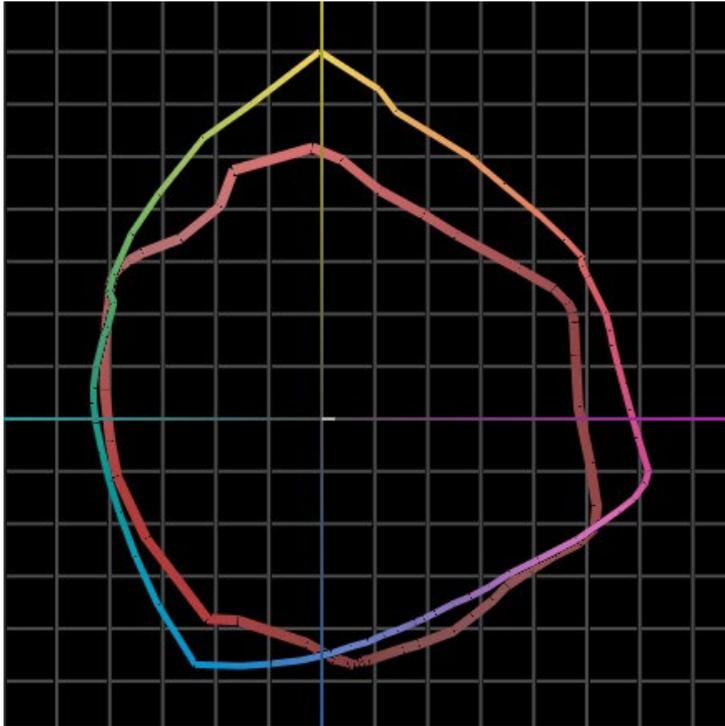
Media Type/Settings	Canon imagePROGRAF iPF780	HP DesignJet T930
Plain Paper Fast Economy	127,478	14,404
Plain Paper Fast	193,062	137,431
Plain Paper Standard/Normal	221,132	153,924
Plain Paper High/Best	224,605	176,335
Glossy Photo High/Best	643,228	452,584



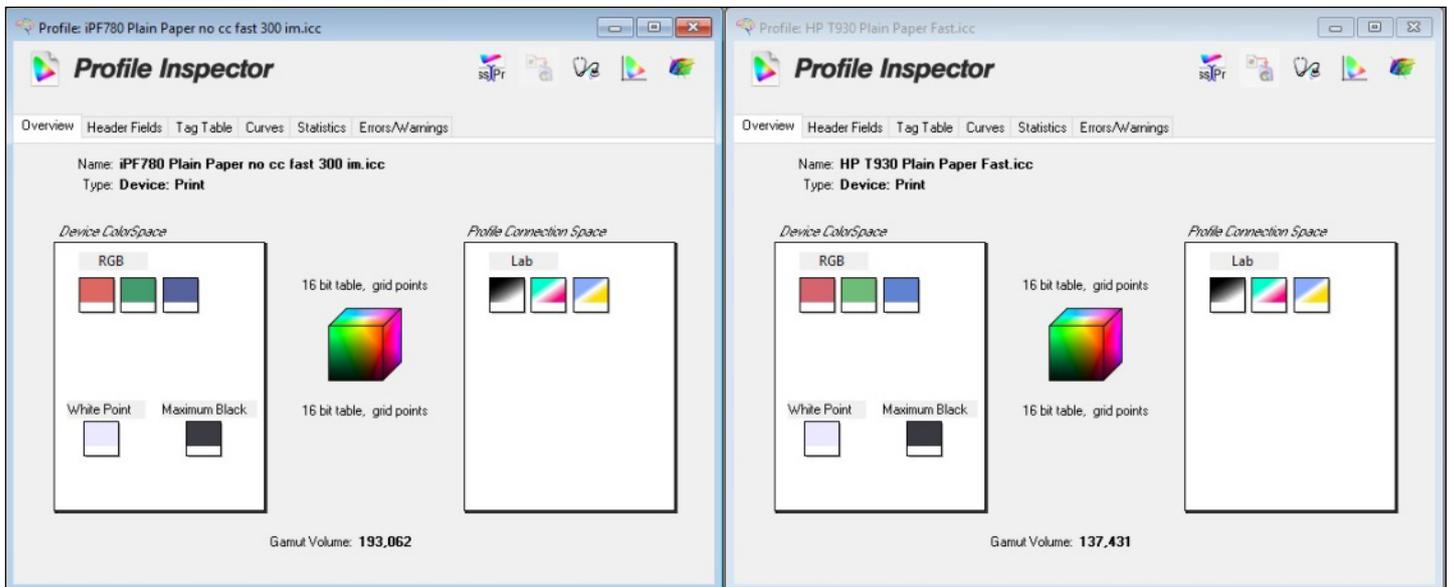
HP DesignJet T930 colour gamut on plain paper in Fast Economy settings (red) versus Canon imagePROGRAF iPF780 colour gamut (shown chromatically) on plain paper in Fast Economy settings.



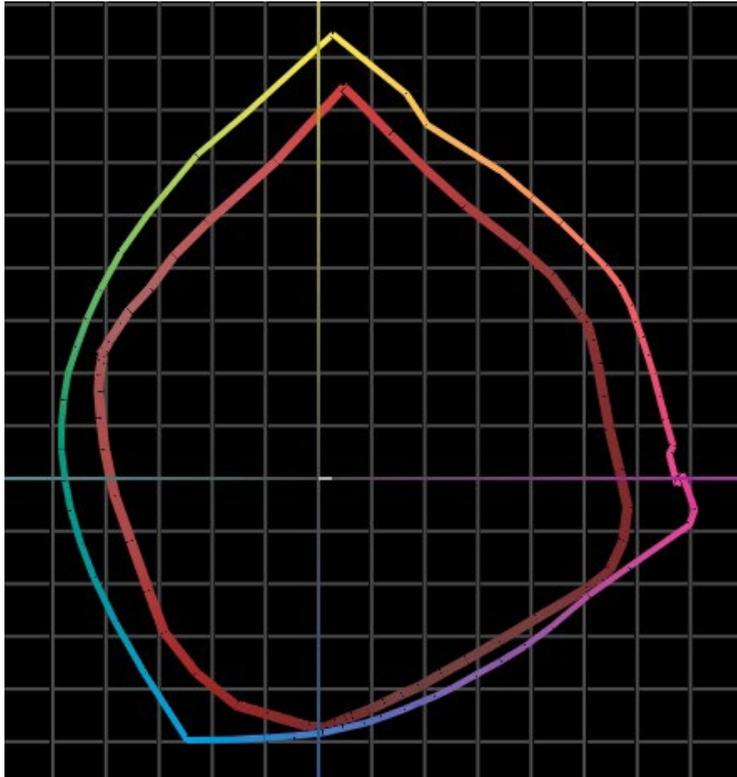
Colour gamut profiles for the Canon iPF780 (left) and HP DesignJet T930 (right) on plain paper in Fast Economy mode.



HP DesignJet T930 colour gamut on plain paper in Fast settings (red) versus Canon imagePROGRAF iPF780 colour gamut (shown chromatically) on plain paper in Fast settings.



Colour gamut profiles for the Canon iPF780 (left) and HP DesignJet T930 (right) on plain paper in Fast mode.



HP DesignJet T930 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.

Profile: iPF780 Plain Paper no cc standard 600 im.icc

Profile Inspector

Overview | Header Fields | Tag Table | Curves | Statistics | Errors/Warnings

Name: **iPF780 Plain Paper no cc standard 600 im.icc**
Type: Device: Print

Device ColorSpace

RGB

White Point

Maximum Black

Profile Connection Space

Lab

16 bit table, grid points

16 bit table, grid points

Gamut Volume: **221,132**

Profile: HP T930 Plain Paper Normal.icc

Profile Inspector

Overview | Header Fields | Tag Table | Curves | Statistics | Errors/Warnings

Name: **HP T930 Plain Paper Normal.icc**
Type: Device: Print

Device ColorSpace

RGB

White Point

Maximum Black

Profile Connection Space

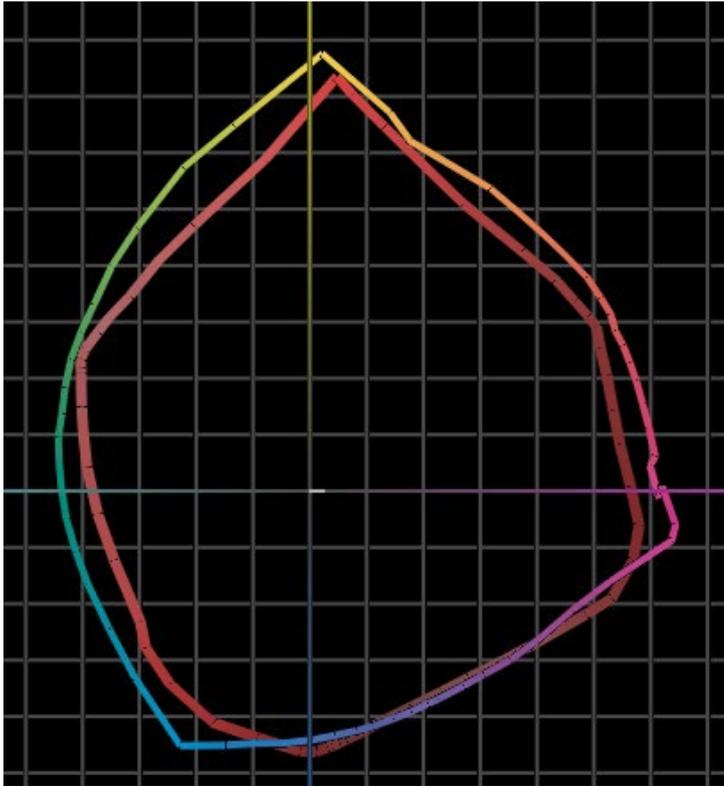
Lab

16 bit table, grid points

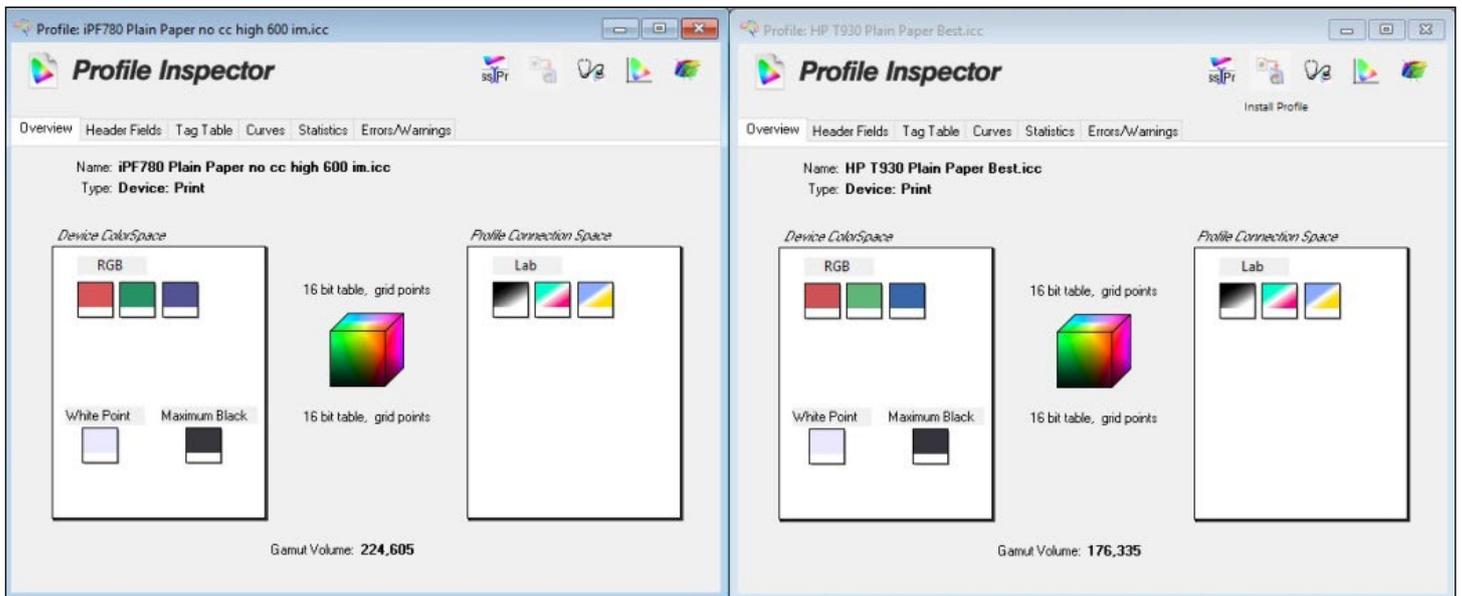
16 bit table, grid points

Gamut Volume: **153,924**

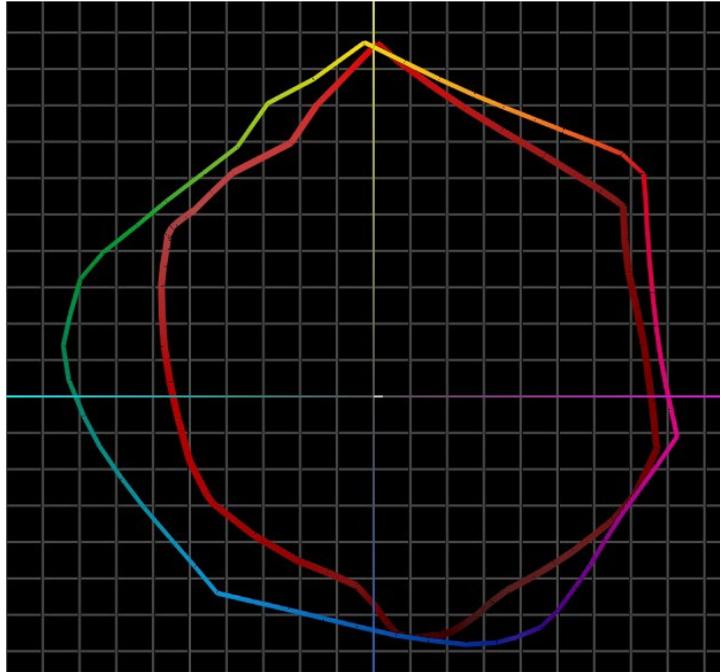
Colour gamut profiles for the Canon iPF780 (left) and HP DesignJet T930 (right) on plain paper in Standard/Quality mode.



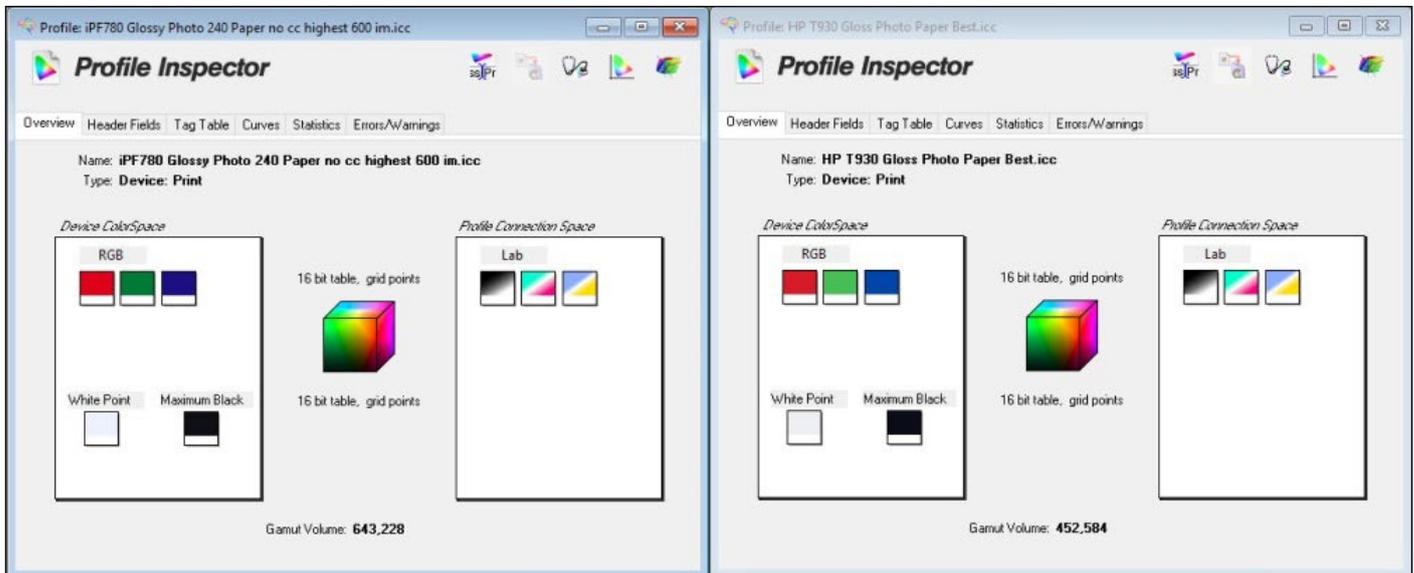
HP DesignJet T930 colour gamut on plain paper in Best Quality settings (red) versus Canon imagePROGRAF iPF780 colour gamut (shown chromatically) on plain paper in High Quality settings.



Colour gamut profiles for the Canon iPF780 (left) and HP DesignJet T930 (right) on plain paper in High quality/Best mode.



HP DesignJet T930 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.



Colour gamut profiles for the Canon iPF780 (left) and HP DesignJet T930 (right) on photo quality paper in High quality/Best mode.

Black Print Quality

Solid Density

	Canon imagePROGRAF iPF780				HP DesignJet T930			
Density Block								
	Fast Economy	Fast	Standard	High	Fast Economy	Fast	Normal	Best
1	1.03	1.38	1.43	1.46	0.90	1.51	1.40	1.46
2	1.03	1.39	1.44	1.44	0.87	1.49	1.40	1.47
3	1.04	1.36	1.42	1.45	0.89	1.48	1.38	1.46
4	1.03	1.35	1.42	1.44	0.86	1.48	1.40	1.47

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 T930
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 and 300 ml for CMYK	✓	40 ml (Starter), 130 ml, 300 ml (CMY, G and PBk); 69 ml (Starter) 130 ml and 300 ml (MBk)
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	✓	Only with photo paper
Maximum outside diameter of roll paper	150 mm	✓	140 mm
Maximum printable paper roll length	18 m (varies according to the OS and application)		91 m
Maximum cut-sheet media length	1.6 m	✓	1.219 m
Maximum media thickness for roll paper	0.8 mm	✓	0.5 mm
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	✓	Yes (320-GB HDD)

	Canon imagePROGRAF iPF780	Advantage		HP DesignJet T930
Interface	10/100/1000Base-T/TX Ethernet, USB 2.0			1000Base-T Ethernet, USB 2.0
PDL	GAR0, HP-GL/2, HP RTL		✓	HP-GL/2, HP-RTL, TIFF, JPEG, CALS G4, HP-PCL3 GUI, URF
Net weight (unpacked)	67.9 kg	✓		87 kg
Power consumption when in standby	0.5 W	✓		1.3 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 T930
Speed settings	5 (Fast 300, Standard 600, Fast 600, High 600 and 1200)	✓		3 (Fast, Normal and Best Quality)
Economy mode	Yes			Yes (only in Fast mode)
Predefined profiles	7	✓		4
Overview of profile settings provided	Yes			Yes
Media profiles	44 + 5	✓		35
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)		✓	Yes (Date, Time, Name, Page Number) plus ability to add custom stamps
Image rotation	Yes, auto 180 degrees			Yes, auto 90 degrees
Option to preview before print	Yes	✓		No
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 (flexible placement)	✓		Yes (automatic placement)
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 T930 Cartridge (grams)

	Photo Black	Grey	Matte Black	Cyan	Magenta	Yellow
Weight of cartridge prior to installation	193.0	189.9	194.2	191.5	191.2	191.9
Weight of cartridge at end of life	57.3	57.3	57.3	57.3	57.3	57.3
Net weight of ink	135.7	132.6	136.9	134.2	133.9	134.6
Total ink weight across six cartridges						807.9

Table 3: 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	2.8	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 (Normal Mode) on the HP DesignJet T930 (grams)

	Photo Black	Grey	Matte Black	Cyan	Magenta	Yellow	
Test Run 1 Net weight of ink used	0.3	0.1	7.3	1.3	0.8	0.2	
Test Run 2 Net weight of ink used	0.2	0.2	7.3	1.6	0.8	0.3	
Test Run 3 Net weight of ink used	0.2	0.2	7.5	1.4	1.0	0.5	
Average amount of ink used across three runs	0.2	0.2	7.4	1.4	0.9	0.3	
Total ink weight across six cartridges for 50-page run (based on averages)							10.4

Table 5: Ink Used in Three 50-Page Runs of Office Poster 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 Office Poster Test Document (Normal mode) on the HP DesignJet T930 (grams)

	Photo Black	Grey	Matte Black	Cyan	Magenta	Yellow	
Test Run 1 Net weight of ink used	0.4	0.4	26.4	8.8	3.5	1.6	
Test Run 2 Net weight of ink used	0.4	0.4	26.7	8.8	3.4	1.7	
Test Run 3 Net weight of ink used	0.5	0.5	27.2	8.9	3.6	1.7	
Average amount of ink used across three runs	0.4	0.4	26.8	8.8	3.5	1.7	
Total ink weight across six cartridges for 50-page run (based on averages)							41.6

Table 7: Ink Used in Three 50-Page Runs of GIS Map Test Document (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)					91.6

Table 8: Ink Used in Three 50-page Runs of GIS Map Test Document (Normal mode) on the HP DesignJet T930 (grams)

	Photo Black	Grey	Matte Black	Cyan	Magenta	Yellow
Test Run 1 Net weight of ink used	0.6	4.0	20.5	54.9	15.6	4.4
Test Run 2 Net weight of ink used	0.5	4.4	20.9	55.5	15.9	4.3
Test Run 3 Net weight of ink used	0.6	4.1	20.2	54.0	15.6	4.5
Average amount of ink used across three runs	0.6	4.2	20.5	54.8	15.7	4.4
Total ink weight across six cartridges for 50-page run (based on averages)						100.2

Table 9: 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 six cartridges for 50-page run (based on averages)					100.4

Table 10: Ink Used in Three 50-page Runs of GIS Map Test Document in Normal mode on the HP DesignJet T930 (grams)

	Photo Black	Grey	Matte Black	Cyan	Magenta	Yellow
Test Run 1 Net weight of ink used	0.6	35.4	11.1	27.9	10.3	17.5
Test Run 2 Net weight of ink used	0.4	35.9	11.1	28.2	10.4	17.7
Test Run 3 Net weight of ink used	0.5	36.2	11.5	28.4	10.3	18.1
Average amount of ink used across three runs	0.5	35.8	11.2	28.2	10.3	17.8
Total ink weight across six cartridges for 50-page run (based on averages)						103.8

Table 11: 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	Yellow
Test Run 1 Net weight of ink used	38.5	22.0	23.1	5.4	9.2	4.4
Test Run 2 Net weight of ink used	39.1	23.2	24.9	6.8	9.6	4.3
Test Run 3 Net weight of ink used	40.0	22.5	25.9	6.8	9.4	4.5
Average amount of ink used across three runs	39.2	22.6	24.6	6.3	9.4	4.4
Total ink weight across six cartridges for 50-page run (based on averages)						102.1

Table 12: Ink Used in Three 50-page Runs of GIS Map Test Document in Best Quality mode on the HP DesignJet T930 (grams)

	Photo Black	Grey	Matte Black	Cyan	Magenta	Yellow
Test Run 1 Net weight of ink used	5.4	32.2	10.1	32.1	11.8	19.0
Test Run 2 Net weight of ink used	6.9	33.2	10.5	33.5	14.2	19.3
Test Run 3 Net weight of ink used	5.3	31.0	9.9	31.3	11.6	18.6
Average amount of ink used across three runs	5.9	32.1	10.2	32.3	12.5	19.0
Total ink weight across six cartridges for 50-page run (based on averages)						112.0

Ink Consumption Test Methodology Overview

Buyers Lab's ink consumption analysis was conducted using three document types (architectural plan, ISO 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 iPF850 was installed in BLI's lab with the latest "01.00" level of firmware (as of March 2015) 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 Plan, Print Priority settings were set to Line Drawing/Text with Quality set to 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 T930 was installed in BLI's lab with the latest "MRY_04_01_00.2" level of firmware (as of February 2016) and connected to a Windows 10 workstation using a 1000BaseT TCP/IP connection. The HP GL/2 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 ISO Poster and the GIS map, the Normal 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.

For both models 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

This product was tested in BLI's environmentally controlled 3,000-square-foot UK test lab, which replicates typical office conditions.

Test Equipment

BLI's dedicated test network, consisting of Windows 2008 and Microsoft Exchange servers, Windows 7 workstations, 10/100/1000BaseTX network switches and CAT6 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 a BLI 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 and 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

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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