

KPI Comparative Lab Test Report

FEBRUARY 2018

Canon imagePROGRAF TX-4000

vs. HP DesignJet T1300 ePrinter

Advantage ✓	Canon imagePROGRAF TX-4000	HP DesignJet T1300 ePrinter
Colour Image Quality	✓	
Black Image Quality	✓	
Print Productivity	✓	
Banner Printing	✓	
Poster Printing	✓	
Direct Print Submission Functionality	=	=
Ink Consumption	✓	
Device Feature Set	✓	
Print Driver Feature Set	✓	

TEST OBJECTIVE

Keypoint Intelligence – Buyers Lab was commissioned by Canon Europe to conduct confidential document imaging device performance testing on the Canon imagePROGRAF TX-4000 and the HP DesignJet T1300 ePrinter, and produce a report comparing the relative strengths and weaknesses of the two products in the areas of image quality, productivity, banner and poster printing, direct print submission functionality, device feature set, driver functionality, and ink consumption. All testing was performed in Buyers Lab's European test facility in Wokingham, UK.

Executive Summary

Designed to meet the demands for high productivity and exceptional image quality of both the high-end Computer-Aided Design (CAD) inkjet market and entry-level LED plotter market, the 5-colour, 44-inch Canon imagePROGRAF TX-4000 proved to be more than capable of fulfilling these requirements. This model gave an outstanding performance overall, and outclassed the HP DesignJet T1300 ePrinter in most areas of the evaluation. Specifically, the Canon model delivered superior productivity, better colour and black image quality, richer device and driver feature sets, and lower ink consumption in all three tests.

Whether printing after a weekend of non-use, from a ready state, or printing Buyers Lab's jobstream (which replicates a typical mixed workflow for a large-format unit), the Canon TX-4000 delivered superior speeds across the board. Buyers Lab technicians observed that the speed advantage of the Canon model became more pronounced as the quality level was increased, which enables Canon users to achieve optimum image quality without sacrificing productivity. Both models offer a dual-roll design—a productivity boost for environments where users need to print regularly on different media types or sizes—and while the time to switch between rolls was comparable for both models, the Canon TX-4000 bested the competitor in Buyers Lab's dual-roll job stream evaluation. One significant productivity-boosting advantage for the Canon model is its hot-swap ink tank design, which lets users replace empty inks while the device is actively printing. In contrast, when the HP T1300 runs out of ink, printing has to stop for a cartridge to be replaced, which leads to some operator downtime.

In terms of image quality, both models delivered high-quality results when printing technical documents and graphics—results that would easily satisfy any AEC (Architectural, Engineering and Construction), CAD, or GIS (Geographic Information Systems) customer requirements. Yet, the Canon model had a clear overall advantage, producing larger colour gamuts, impressively pin-sharp text, smoother circles and halftone coverage and brighter colours in photographic output versus the HP T1300. In monochrome mode, the HP model had higher optical density—perhaps helped by the fact that HP includes grey, photo black and matte black inks, as opposed to Canon's matte black and black inks. Neither model produced very natural-looking skin tones, which were yellowish on output from both units. One advantage for the Canon model is its unidirectional print driver option. When selected, this option eliminated banding on the Canon TX-4000's poster output in Fast mode; whilst it should be noted that Buyers Lab analysts observed banding on the HP device's output only when printing posters in Fast mode, the HP device does not offer a unidirectional printing feature which can rectify such issues. The Canon unit also outperformed the HP unit in Buyers Lab's ink consumption testing, using less ink than the HP device did with all three test documents used.

The Canon TX-4000's feature set—both for the device and the driver—is much stronger than that of the HP model. It has higher standard and maximum memory capacities and a 500-GB hard drive as standard (the HP model has a 160-GB hard drive as an extra-cost option), to aid with job processing and job storage. Other benefits available with the Canon model include a much higher ink cartridge capacity, a lower rated energy consumption while printing, more media profiles, and a flexible layout nesting option to save on paper. (The HP model offers a similar layout feature but the same flexibility and control over image placement are not available.) Both models support direct printing of JPEG, TIFF and PDF files from a USB flash drive providing convenience to mobile workers, plus HP users have a further advantage of being able to email their jobs directly to the printer for instant printing, while Canon users can print via the Canon Print Service mobile app (Android currently supported, with iOS support to follow in 2018).

In conclusion, based on its superior image quality, faster productivity across the board, stronger device and driver feature sets, and lower ink consumption, Buyers Lab judges the Canon imagePROGRAF TX-4000 as clearly the stronger performer in its large-format production evaluation.

Colour Image Quality

Advantage ✓	Canon imagePROGRAF TX-4000	HP DesignJet T1300 ePrinter
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 Quality)	✓	
Colour Gamut (Matte Coated Paper, High/Best Quality)	✓	

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

O Buyers Lab's image quality test evaluation was conducted using Canon Standard Plain Paper 2 and HP Universal Bond.

- + The Canon TX-4000 delivered superior optical densities in all modes for cyan, magenta and yellow, while the HP T1300 delivered higher optical densities for composite black in all modes.
- + In Buyers Lab's colour gamut assessment conducted in Fast mode, the Canon TX-4000 delivered a 20.4% larger colour gamut, with a CIE volume of 200,598 versus a CIE volume of 166,652 for the HP model.
- + The Canon model produced a 58.8% larger colour gamut in Standard/Normal mode—with a 332,964 CIE volume versus a CIE volume of 209,677 for the HP device.
- + In High/Best quality settings, the Canon TX-4000 delivered a 58.1% larger colour gamut than the HP T1300, with a CIE volume of 343,545 versus a CIE volume of 217,295 for the HP model.
- + When printing on matte coated paper using Canon's High quality setting and the HP T1300's Best quality setting, the Canon model delivered a 28.1% larger colour gamut than that of the HP unit, with a CIE volume of 410,918 compared with a CIE volume of 320,801 for the HP unit.
- + Both models produced dark, pin-sharp Arial sans serif text that was legible down to the smallest (3-pt.) type size, with no breakup or bleed in all tested modes, but the Canon TX-4000 had a slight advantage in High/Best mode with characters rated excellent versus very good for the HP model. Serif characters produced by the Canon model, again, displayed no bleed and were fully formed, crisp and legible down to the 5-pt. size in Fast and Standard modes, and 3-pt. size in High mode. Times Roman text was legible down to the 3-pt. level in Fast and Quality modes, and 4-pt. level in Best mode for the HP T1300, but characters produced in Fast and Best modes were less distinct as they exhibited slight ink bleed.

- Fine lines produced by both devices remained visible and intact down to the 0.1-pt. level and were rated very good in all modes except Fast, where the HP model's lines were slightly blurred and the Canon unit's horizontal lines lacked sharpness.
- + The Canon TX-4000 produced clean, smooth and fully formed 0.1-pt. circles that were rated very good in Fast and High modes and excellent in Standard mode. Circles produced by the HP T1300 were fully formed at 0.1-pt. but rated only good in Fast and Normal modes as they were slightly jagged, while in Best mode, they were smoother and rated very good.
- Both models produced the 1x1 pixel grid in CMY with no quality issues, and coverage was consistently very good across all colours.
- Both devices delivered colour halftone output across the full range—from the 10% to 100% dot-fill levels in all modes, with distinct transitions between all levels.
- + The Canon TX-4000 delivered very good, consistently smooth colour halftone fills in all modes, while the HP model delivered smooth halftone coverage that was rated very good in Fast and Normal modes, and good in Best mode (as coverage was slightly grainy).
- + When evaluating Architectural, Engineering and Construction (AEC) graphics in all modes, the Canon and HP models' output exhibited an excellent level of detail, but the Canon model delivered more distinct fine lines and sharper text formation when viewed under magnification.
- When evaluating Geographic Information Systems (GIS) graphics in Standard/Normal and High/Best modes, both units produced very good detail and showed an equally good depth of field—a critical factor in delivering a realistic three-dimensional rendering of topographical features—the Canon TX-4000's output displayed richer saturation in Standard/Normal mode whereas colours were muted on the HP model's output.
- + Colour business graphics produced by the Canon TX-4000 exhibited slightly smoother transitions from light to dark areas and sharper fine details than those produced by the HP device.
- + When comparing photographic images in Fast mode, the Canon TX-4000 delivered finer detailing and brighter colours than the HP unit. In Standard/Normal and High/Best modes, both models delivered superb detailing in dark and light contrast areas with good saturation, but colours were consistently brighter and there was greater depth in the Canon unit's output.
- Skin tones produced by both models were slightly yellow in all modes.
- + Overall, Buyers Lab technicians judged the Canon TX-4000 as the superior performer in Buyers Lab's colour image quality evaluation. It delivered pin-sharp crisp text and fine lines, smoother circles and brighter, more saturated colours as well as larger colour gamuts under all test conditions, while the HP T1300 ePrinter delivered higher composite black optical density. Importantly, as befitting the needs of their target market, both models produced excellent detailing in GIS graphics with equally very good depth of field, but the Canon model had a slight advantage in AEC drawings with sharper fine lines and text.

Black Image Quality

Advantage ✓	Canon imagePROGRAF TX-4000	HP DesignJet T1300 ePrinter
Text	✓	
Fine Lines	✓	
Halftone Range	=	=
Halftone Fill	✓	
Solid density		✓
AEC Graphics	✓	
Business Graphics	✓	
Photographic Images	✓	

- When printing in monochrome, the HP T1300 delivered darker solids with higher optical densities in all tested modes.
- + Black serif fonts produced by the Canon TX-4000 unit were dark, crisp and legible down to the smallest 3-pt. level in High quality mode, and 4-pt. level in Fast and Standard modes, while sans serif characters were pin-sharp and legible at the 3-pt. size in all modes. There was no ink bleed visible on text produced by the TX-4000. In contrast, the HP device delivered fully formed black fonts legible down to the 3-pt. level in Fast and Normal modes, but with some ink bleed and overspray evident. In Best mode, HP's serif fonts were legible at the 4-pt. size and sans serif fonts were legible at the 3-pt. size, with no bleed.
- + In Buyers Lab's line art reproduction test, both models' fine lines remained distinct at the 0.1-pt. level in all modes and were rated very good. White-on-black fine lines produced by both models were intact at the 0.25-pt. level in all quality modes, and were rated very good for the Canon TX-4000 across the board, but only fair for the HP T1300 as they were less distinct.
- + Circles produced by both models were fully formed at 0.1-pt, but the Canon TX-4000 delivered far smoother circles (which were rated very good in all modes) than those produced by the HP unit, which were rated good in Fast and Standard modes as they were slightly jagged, and very good in Best mode.
- + Both models produced the 1x1 pixel grid in black with no quality issues, except for the HP T1300's grid in Fast mode which was slightly inconsistent; the Canon model's grids displayed smooth and uniform coverage and were rated very good (in Fast and Standard modes) and excellent in High mode versus good (in Fast mode) and very good (in Normal and Best modes) ratings for the HP unit.
- O Both models delivered comparable black halftone output across the full range—from the 10% to the 100% dot-fill levels—with distinct transitions between all levels.
- + Halftone fill coverage was slightly grainy in all modes for the HP device and was rated good. The Canon model delivered very smooth greyscale coverage that was rated excellent in Fast mode and very good in Standard and Best modes.
- + When evaluating AEC graphics in black in all modes, both models delivered very good detailing but the Canon TX-4000 had a slight advantage with crisper text and more distinct fine lines when viewed under magnification,

whereas output from the HP model appeared bolder and displayed slight ink bleed in Fast mode, but only when viewed under magnification.

- + Monochrome business graphics were produced more accurately by the Canon model, whereas some fine lines and circles were slightly less distinct in the output produced by the HP unit, but only when viewed under magnification.
- + Both models produced smooth greyscale photographic images on plain paper in all modes, displaying very good fine detailing in light and dark contrast areas. In Fast mode, there was a slight sepia tone on output from the Canon model, while the HP unit delivered better neutral grey tones. However, there was better depth in images produced by the Canon model, overall.
- + In Buyers Lab's monochrome image quality assessment, the Canon TX-4000 produced better quality overall, delivering superior text and fine lines (with no ink bleed), sharper business graphics and smoother greyscale coverage. The HP T1300 produced higher black optical densities across the board, however. In addition, the two devices delivered very good detailing in AEC graphics, a full halftone range and very good fine detailing in photographic images.

Print Productivity

Advantage ✓	Canon imagePROGRAF TX-4000	HP DesignJet T1300 ePrinter
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	✓	
Dual-roll Job Stream	✓	

- + The Canon TX-4000 delivered a much faster first-page-out time of 89.35 seconds after a weekend of non-use, compared with 108.48 seconds for the HP T1300. Start-up time before printing commenced was faster for the Canon model at 58.10 seconds, compared with 70.57 seconds for the HP unit.
- + The Canon device delivered a 23.2% faster first-page-out time of 45.59 seconds from its ready state, compared with 59.36 seconds for the HP device. Although start-up time before printing commenced was slower for the Canon model—21.95 seconds versus 17.73 seconds—the Canon TX-4000 is the faster device overall when taking into account both measurements.
- + When printing Buyers Lab's job stream, designed to simulate a typical mixed workflow for a large-format unit, the Canon TX-4000 delivered a far superior performance in High/Best quality mode, running 65.4% faster than the HP model. In the other tested modes, it was also faster—by 38.3% in Fast mode and 49.4% in Standard/Normal mode.

- + As both models offer a dual-roll design, Buyers Lab conducted a second job stream test in Fast mode to assess roll switching efficiency by printing the same files, but alternating them between the two rolls. The Canon TX-4000 completed the dual-roll job stream in 762.86 seconds—27.1% faster than the 1,046.41 seconds taken by the HP T1300.
- O Buyers Lab analysts observed that, although Canon's faster speed gave it the overall edge when printing to dual rolls, the actual time taken to switch between rolls (around 22 seconds) was similar for both models.
- + When printing Buyers Lab's 12-page DWF test file in colour, the Canon unit was 45.2% faster in Fast mode, 53.1% faster in Standard/Normal mode, and 68.5% faster in High/Best quality mode.
- + Similarly, when printing Buyers Lab's 12-page DWF test file in monochrome, the Canon unit was 42.9% faster than the HP model in Fast mode, 51.5% faster in Standard/Normal mode, and 70.2% faster in High/Best quality mode.
- + In Buyers Lab's single-page A0-size test, the Canon TX-4000 delivered a first-page-out time (117.55 seconds) that was 32.3% faster than that of the HP unit (173.67 seconds). The Canon model was also 36.7% faster than the HP T1300 when printing five A0-size pages (523.25 seconds versus 826.34 seconds).
- + The Canon model's unique sub ink tank system provides a further boost to productivity. When the HP T1300 model runs out of ink, printing must stop for a cartridge to be replaced, which leads to operator downtime. In contrast, when ink needs replacing on the Canon model it will continue to print, drawing ink from its sub tank, while ink is replaced so there's no operator downtime. For added convenience, the control panel alerts users to replace ink and also provides purchasing information.
- O Both the Canon and HP models will pause and alert the operator when they run out of paper. After a new roll is installed, each device resumes printing at the beginning of the interrupted page, rather than printing the portion of the page that remained before running out of paper, so less ink and paper is wasted.

Banner Printing

	Canon imagePROGRAF TX-4000	HP DesignJet T1300 ePrinter
Image Quality	=	=
Productivity	✓	

- + Both models successfully printed Buyers Lab's 36" x 105" banner (a 4,955-KB PDF file) in Fast mode. The HP DesignJet T1300 took 4 minutes, 7.50 seconds from PC release to final paper cut and provided no preview. In contrast, the Canon TX-4000 took 6.06 seconds to generate a preview at the workstation, and an additional 2 minutes, 0.41 seconds from preview to final paper. With a total preview and print time of 2 minutes, 6.47 seconds, the Canon TX-4000 is clearly the faster model.

Poster Printing

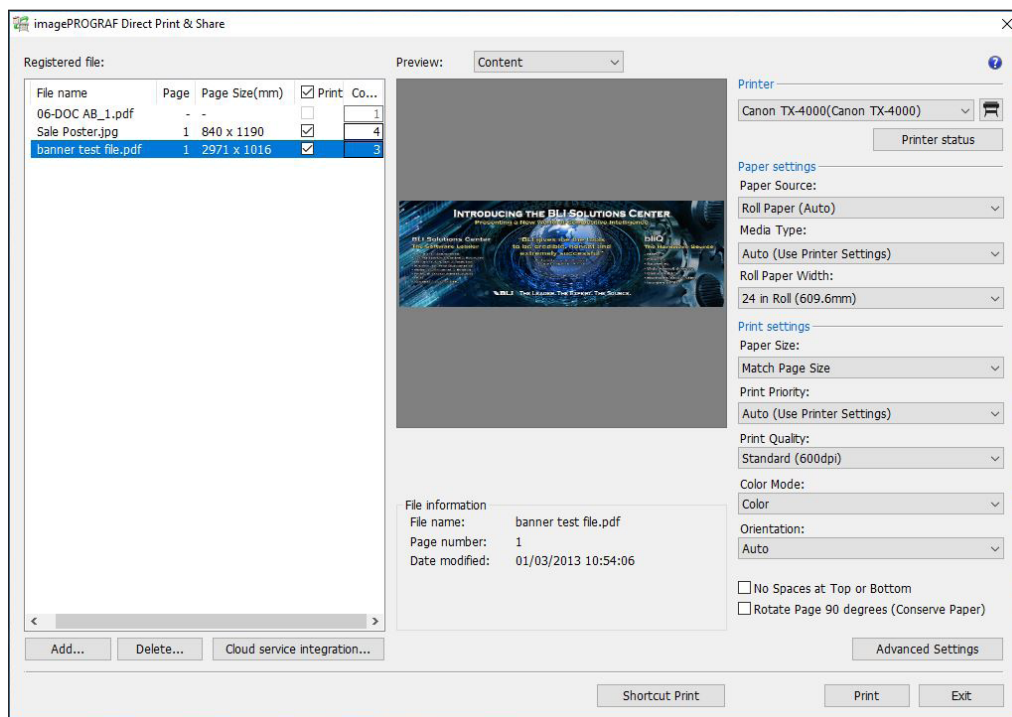
Advantage ✓	Canon imagePROGRAF TX-4000	HP DesignJet T1300 ePrinter
Image Quality (Fast mode)	✓	
Image Quality (Standard/Normal mode)	=	=
Image Quality (High/Best mode)	=	=
Productivity (Fast mode)	✓	
Productivity (Standard/Normal mode)	✓	
Productivity (High/Best mode)	✓	

- + When printing Buyers Lab's Poster test target in Fast mode at 300 dpi, the Canon TX-4000 took 37.88 seconds to complete the job, while the HP T1300 took 56.88 seconds. Slight banding was evident with both models, but only in the dark areas. When unidirectional printing (not supported on the HP model) was selected in the Canon print driver, banding was eliminated and the time to print the banner slowed to 56.74 seconds.
- + When printing a poster in Standard/Normal mode, the Canon model took 1 minute, 0.52 seconds. The HP unit took 1 minute, 34.94 seconds. Both models' output showed no banding.
- + When printing the poster in High quality mode (600 dpi), the Canon model took 1 minute, 43.26 seconds, which is 62.0% faster than the 4 minutes, 31.86 seconds taken by the HP model to print the poster in Best mode.
- At these High/Best quality settings, image quality was equally good on output from both models, with vibrant, saturated colours and good definition of fine details.

Direct Print Submission Functionality

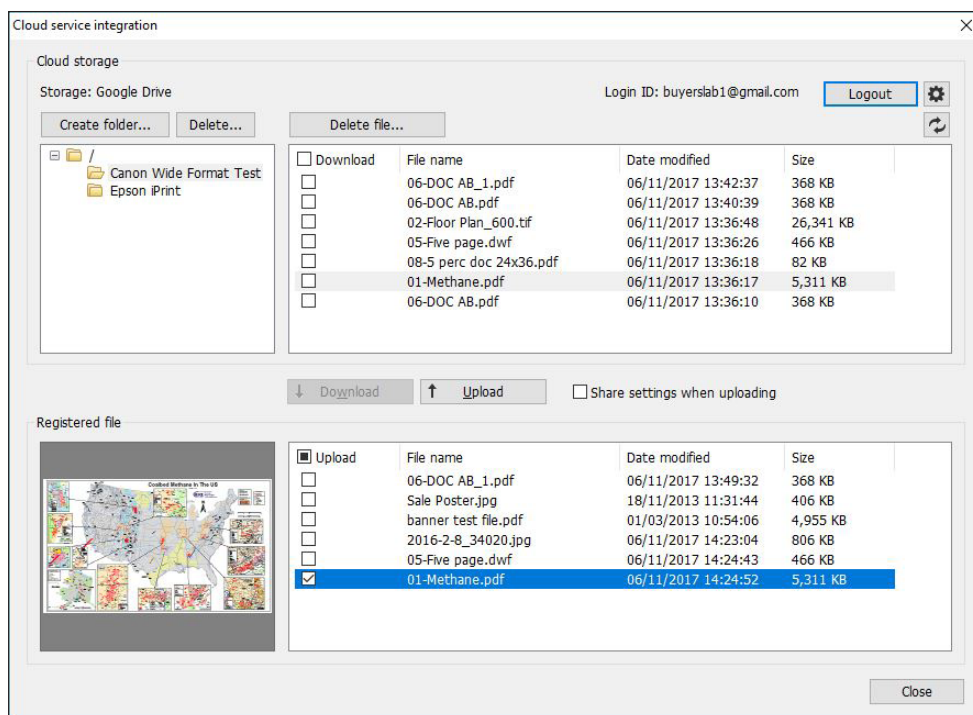
Advantage ✓	Canon imagePROGRAF TX-4000	HP DesignJet T1300 ePrinter
Ease of Use	=	=
Direct Print Submission Functionality	=	=

- Available as a free download from Canon's website, the imagePROGRAF 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. Via the utility, users can preview print layouts and select print settings without the need to open up the driver properties. For added convenience, it also lets users print multiple files simultaneously.



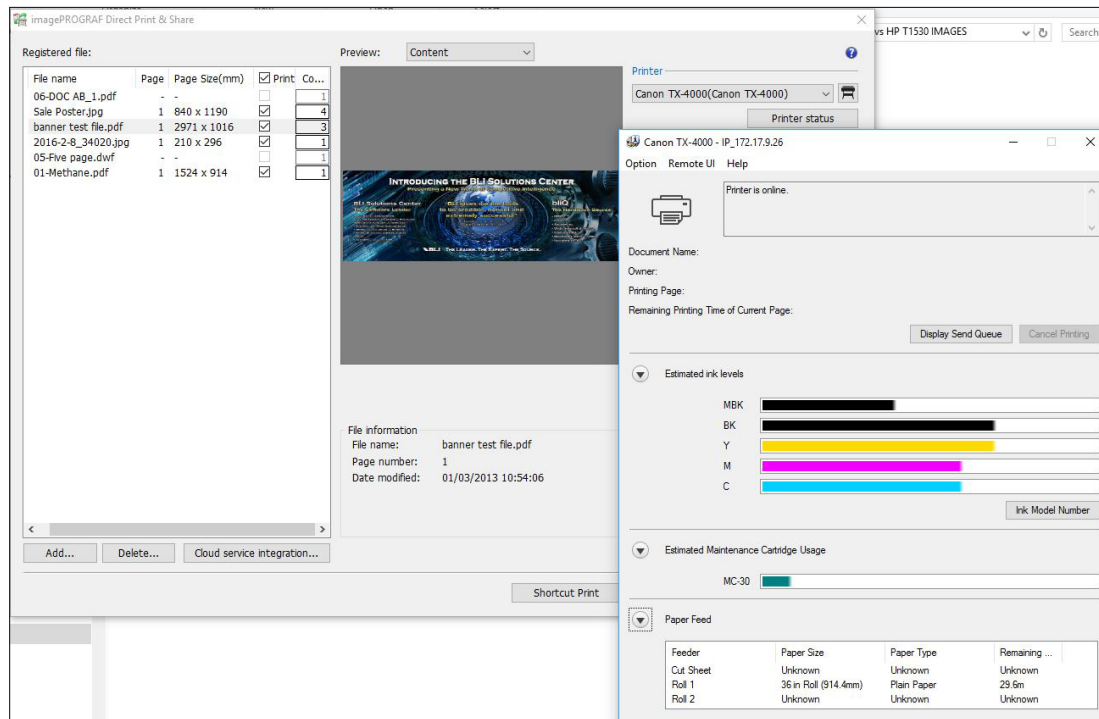
Canon's imagePROGRAF Direct Print & Share utility gives users an image preview.

- The imagePROGRAF Direct Print & Share utility supports "Shortcut Print" functionality, enabling users to create a desktop shortcut that includes commonly used print settings. Akin to a hot folder workflow, files are automatically printed with the predefined settings when users drag-and-drop the files to the desktop icon. Multiple desktop icons can be created for different print settings or combinations of print settings.



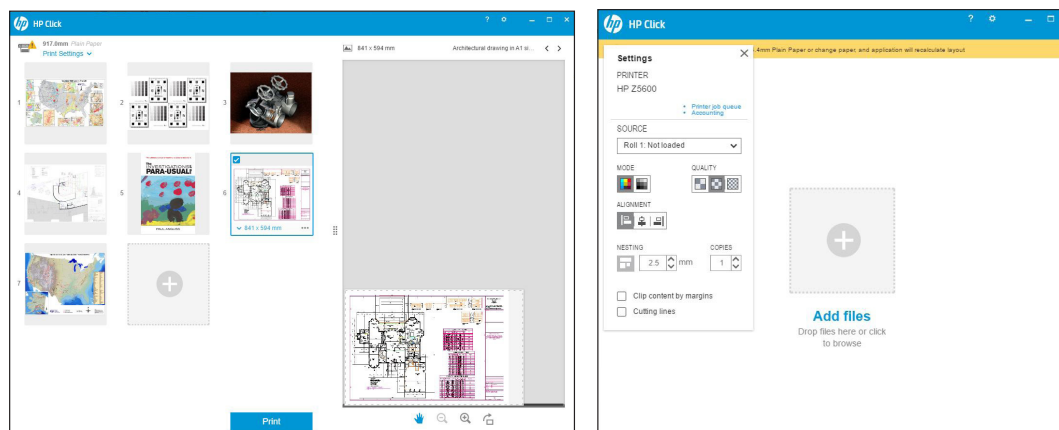
Retrieving files from Google Cloud using imagePROGRAF Direct Print & Share.

- Users can download stored files from Google Drive and AutoCAD 360 cloud storage services for printing via the imagePROGRAF Direct Print & Share utility, and can upload files directly to cloud storage as well, which boosts collaboration. For added convenience, the utility also offers the option of sharing files simultaneously with one or more users (via Google Drive only), who will receive an email notification with a link to download the shared file without the need to log in.



Users can view device status information via the utility.

- Available as a free download, HP Click printing software allows direct printing of PDF, JPEG, TIFF and HPGL/2 files from the PC desktop, without the need for native applications or print drivers. Via the utility, users can preview print layouts, resize and align images without the need to open up the driver properties. It also has an automatic nesting feature to reduce waste.



Via HP Click, users can select basic print settings, preview images, manipulate images as well as utilise the automatic nesting feature to reduce paper waste.

- The HP T1300 ePrinter supports HP ePrint functionality, whereby users are able to send print jobs remotely by email either via a workstation PC or a mobile device; PDF, TIFF and JPEG files (up to 10 MB) are supported. Unlike the Canon device, it does not support any mobile print app solutions for printing via smartphones and tablets.
- The Canon TX large-format series supports Canon Print Service, a mobile print app for Android users (with support for Apple iPad devices to follow in 2018), which is a productivity boost in environments where workers are travelling between sites or working flexibly.

Ink Consumption

Overall Weight of Ink Used (in Grams)

	Canon imagePROGRAF TX-4000	HP DesignJet T1300 ePrinter
Cottage Architectural Plan	29.6	51.5
ISO Poster	81.6	101.3
GIS Map	82.8	111.7

sResults are averaged across three sets of 50-page A0 printing in Standard/Normal mode.

- + When producing 50 prints of a Cottage Architectural Plan in Standard/Normal mode, the Canon unit used 42.5% less ink than the HP T1300.
- + When printing an ISO Poster in Standard/Normal mode, the Canon unit used 19.4% less ink than the HP T1300.
- + When printing a GIS Map in Standard/Normal mode, the Canon TX-4000 used 25.8% less ink than the HP device.

Device Feature Set

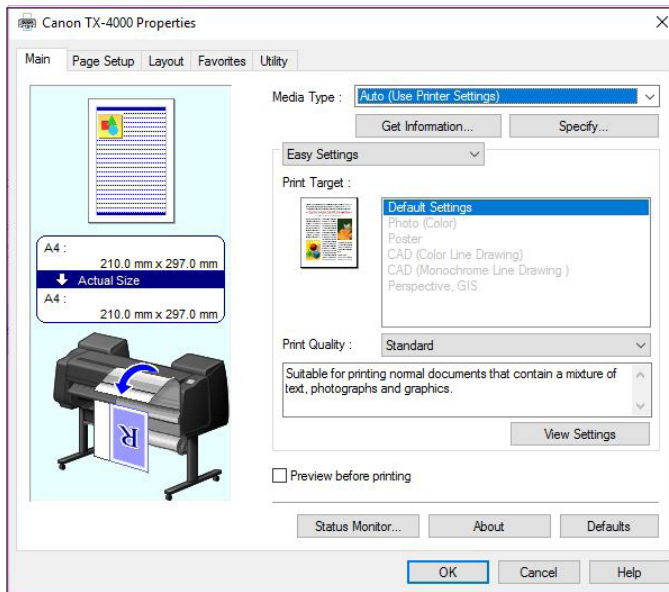
- + The total capacity of the Canon TX-4000's starter ink cartridges is 970 ml, which is higher than the 240 ml total starter ink volume available with the HP model.
- + Canon's replacement ink cartridge capacities are 160 ml, 330 ml and 700 ml for all colours, whereas the HP model offers 130 ml for CMY, Photo Black and Grey and 300 ml for Matte Black, and as a consequence they will need replacing less frequently than with the HP device.
- + Canon's ink cartridges are replaceable during operation, which helps reduce downtime for users. HP's cartridges cannot be replaced during operation.
- + If the Canon device detects that printhead nozzles are becoming clogged, it automatically starts a cleaning routine when there are no nozzles available to compensate for the clogged ones. This task would have to be done manually with the HP unit, although Buyers Lab analysts did not encounter any nozzle clogging issues with either model during testing.

- Both units utilise user-replaceable printheads, taking less than five minutes to replace on both models.
- Both models offer USB 2.0 and Gigabit Ethernet connectivity.
- Both models offer easy and quick roll paper loading with auto paper feed—once the user loads paper on to the device, alignment and width adjustments are automatically carried out without further user intervention.
- The Canon device includes a media mismatch option, which places jobs on hold that can't be printed due to the required media not being loaded, while jobs that can be completed are automatically printed; the queued jobs are printed once the required paper is loaded. In the event of a media mismatch on the HP device, users are provided with a warning directly in the print driver before the job is submitted and a control panel warning appears after it is submitted. The control panel's "Paper mismatch action" allows users either to put the job on hold or print it; all jobs that are slated for the paper types that are already loaded will be printed without delay.
- + The Canon TX-4000 offers user-friendly media loading options at the front (however, if the stacker is attached, it will need to be removed first in order to gain access to the rolls). In contrast, the HP device only allows media rolls to be loaded from the top rear and back of the device, which can be cumbersome if the device is positioned against a wall.
- For maximum convenience and minimum downtime, both models offer an optional dual-roll unit which gives users the added flexibility of switching between different media types or sizes without reloading the media each time.
- + Buyers Lab analysts noted that the TX-4000's optional Multifunction Roll System can also act as an auto Take-up-Roll unit with bi-directional rewind, which could be an extremely valuable feature in high-volume production environments, enabling large numbers of prints to be conveniently stored on a single roll. This option is not available for the HP device.
- + The Canon model offers a standard, non-upgradable RAM capacity of 128 GB, while the HP unit has a standard non-upgradable (virtual) RAM capacity of 32 GB.
- + A standard 500-GB hard drive is built in to the Canon device, which allows for the storage of commonly used documents and aids spooling workflow; the HP model only offers a 160-GB hard drive.
- + The Canon TX-4000 supports borderless printing regardless of what roll media type is being used, whilst the HP model only supports borderless printing with photo paper.
- + Both models support up to 0.8 mm media thickness for roll paper, but the Canon TX-4000 supports 170 mm as the outside diameter of the roll, while the HP T1300 supports 140 mm in diameter.
- The Canon TX-4000 comes with robust security features, including newly added hard drive encryption and protocol locking to prevent unauthorised access to the device; it also supports SNMP v3 (secure network protocol) and IPsec which provide further security by authenticating and encrypting data over the network. The HP T1300 supports Secure Disk Erase, which lets users choose whether to erase particular files or the whole hard drive.
- Both models come with a simple catch bin/basket to collect output from media rolls, which can be easily attached to the main units, and easily moved when detached. Both models also offer stacking capability, with the Canon TX-4000's stacker capable of collating up to 100 A0-sized CAD prints.
- The HP model is much lighter with a net weight of 86 kg versus 114 kg for the Canon unit.
- Both models offer a colour touchscreen user interface, which are similarly responsive and intuitive to navigate.
- + The Canon TX-4000's power consumption while printing is lower—107 watts versus 120 watts—than that of the HP model.
- Rated noise emissions are higher for the Canon model (51 dB) compared to the HP device (46 dB) while the devices are printing.

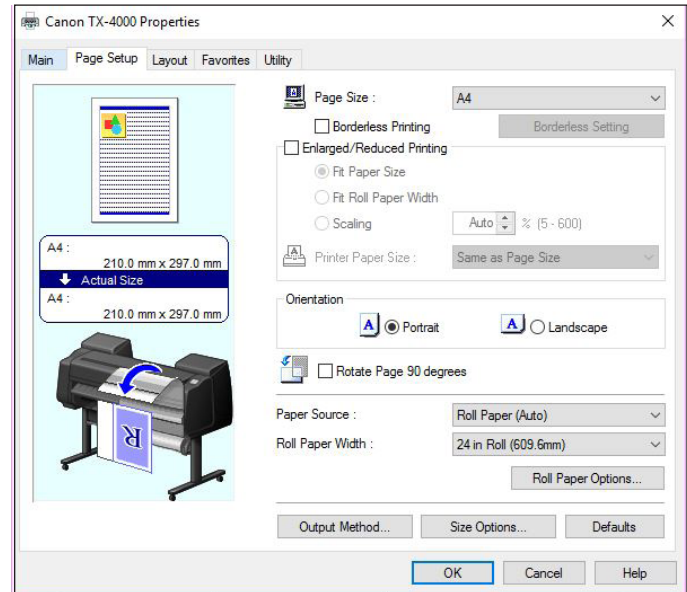
Driver Feature Set

- + The Canon TX-4000 has five speed settings (Fast 300, Standard 600, Fast 600, High 600 and 1200), which are matched by three settings on the HP device (Fast, Normal and Best Quality), although not all speed settings are available with all media types on the Canon model.
- O Both the Canon imagePROGRAF Printer Driver and the HP's HP-GL/2 driver provide a useful overview of the settings for predefined profiles.
- + Six predefined profiles are available with the Canon driver, while the HP driver offers five settings.
- + The Canon driver supports multi-up (2 to 16) printing, while the HP driver does not support multi-up printing.
- + The Canon 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), while the HP unit does not support this feature.
- O The Canon imagePROGRAF Printer Driver offers a broad range of built-in adjustments for CMY balance, brightness and contrast, while the HP T1300's HP-GL/2 driver also offers CMY balance and brightness adjustments. The Canon driver's advanced colour-matching selections include the ability to match ICC profiles and select the rendering intent based on different elements in the document. Under the Services tab in the HP driver, users can access ICC colour profiles and paper type management information via a link to the HP Color Centre.
- The HP driver provides a handy thumbnail preview for users to check the effects on the image as they make colour adjustments, which is not available in the Canon driver. In addition, the HP driver displays a list of all the current settings on each tab window, providing users with a quick, at-a-glance summary.
- + The Canon driver offers the option of unidirectional printing, even in Fast mode. With the printhead travelling in only one direction to create the desired image, this helps to avoid any banding across output. The HP driver does not offer this feature.
- + Both 64-bit and 32-bit versions of the Canon driver now include the Color imageRUNNER Enlargement Copy Mode utility. This enables users to integrate a Canon small-format MFP device with the TX-4000, whereby documents scanned at the MFP are automatically routed to a hot folder that is monitored by the TX-4000 driver. The image is then resized and printed, offering a fast, easy-to-use poster creation tool for office users. There is no equivalent functionality in the HP driver.
- + The Canon driver includes the Free Layout nesting tool (also available as a 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 the 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 or 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 the order jobs were 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. HP offers no equivalent software.
- O Canon's Accounting Manager, accessed via the Status Monitor, offers comprehensive accounting management for all print jobs. Users enter the actual costs for individual inks and media types, and the cost per job is calculated automatically and displayed. For each job, the media type, area, ink used and total print time are listed, and more detailed cost and consumption information can be obtained by double-clicking on an individual job name or by highlighting a range of different jobs. Job cost information can then be saved in .CSV format and opened in Excel. HP offers similar accounting management and tracking capabilities via the Accounting tab on its embedded web server page, or via the HP DesignJet Excel Accounting tool, which is available as a free download.

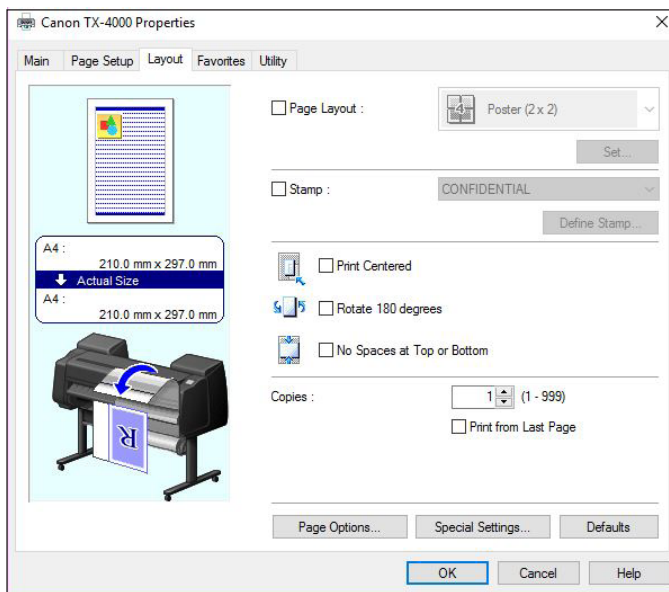
Test Models' Print Driver Screenshots



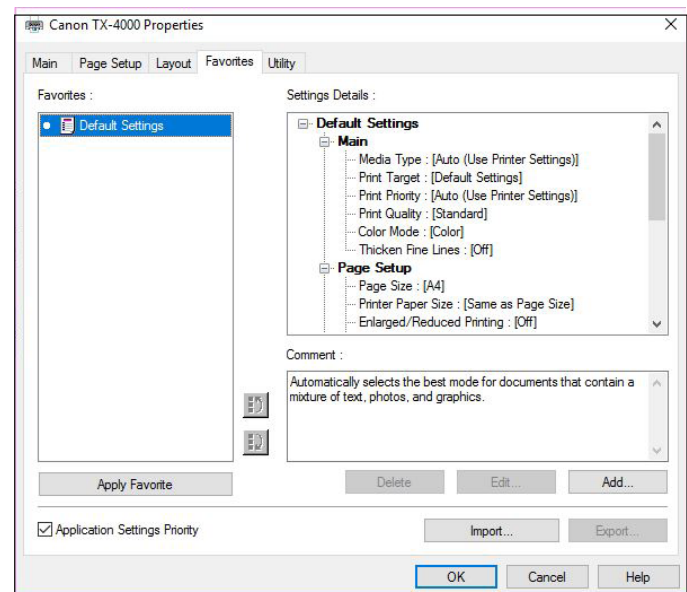
Canon imagePROGRAF TX-4000 Print Driver Main Tab



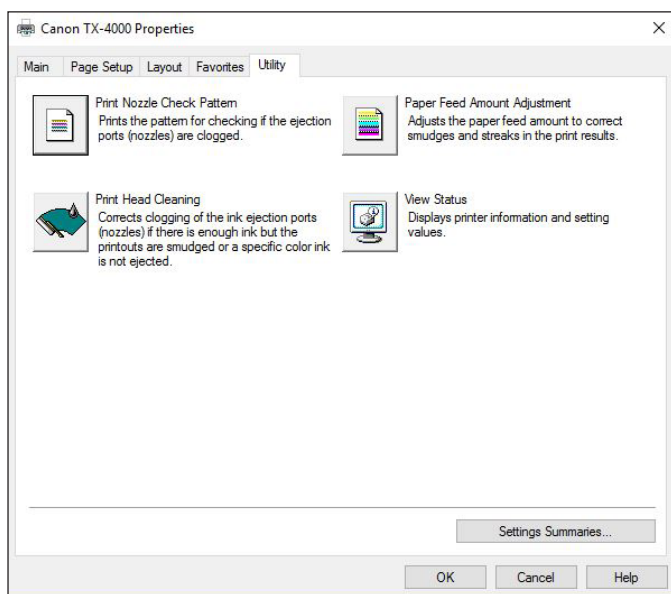
Canon imagePROGRAF TX-4000 Print Driver Page Setup Tab



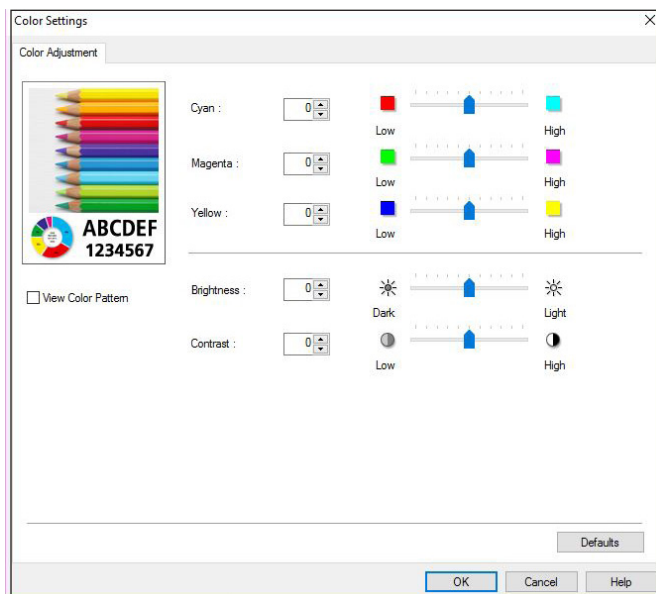
Canon imagePROGRAF TX-4000 Print Driver Layout Tab



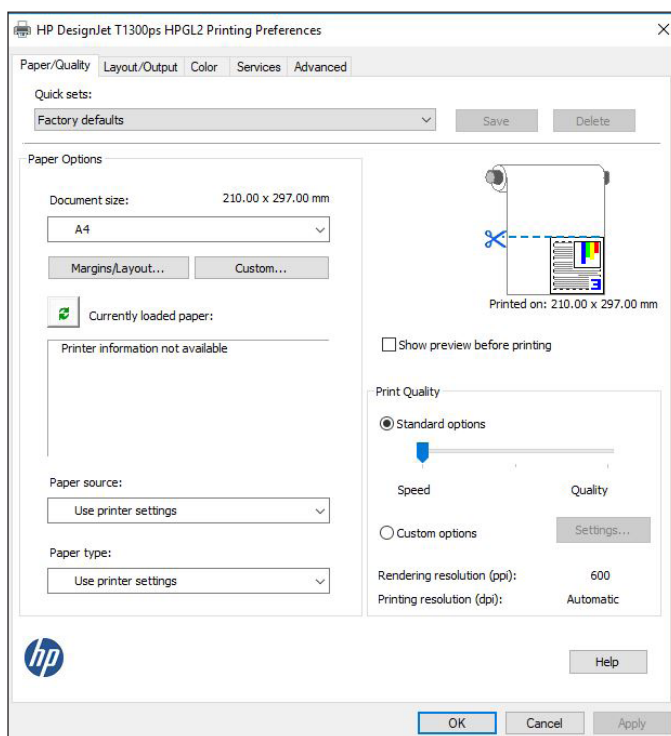
Canon imagePROGRAF TX-4000 Print Driver Favourites Tab



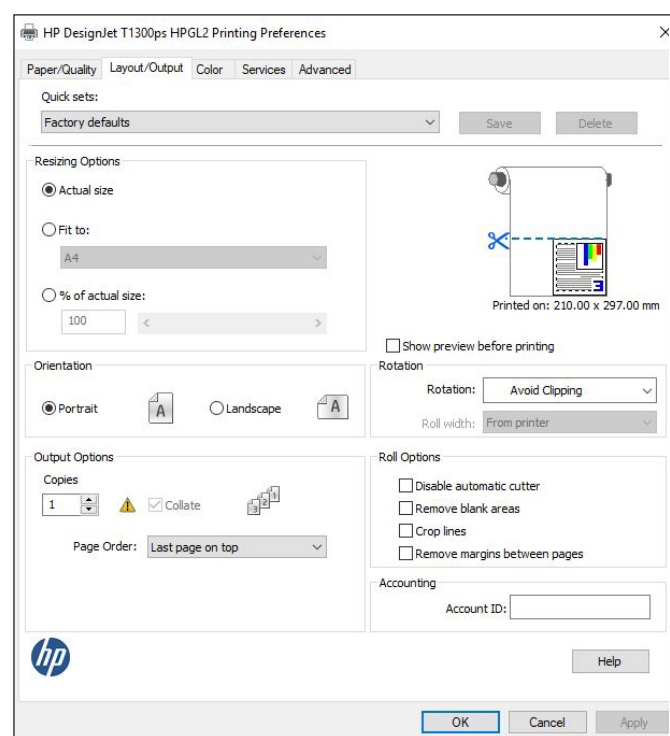
Canon imagePROGRAF TX-4000 Print Driver Utility Tab



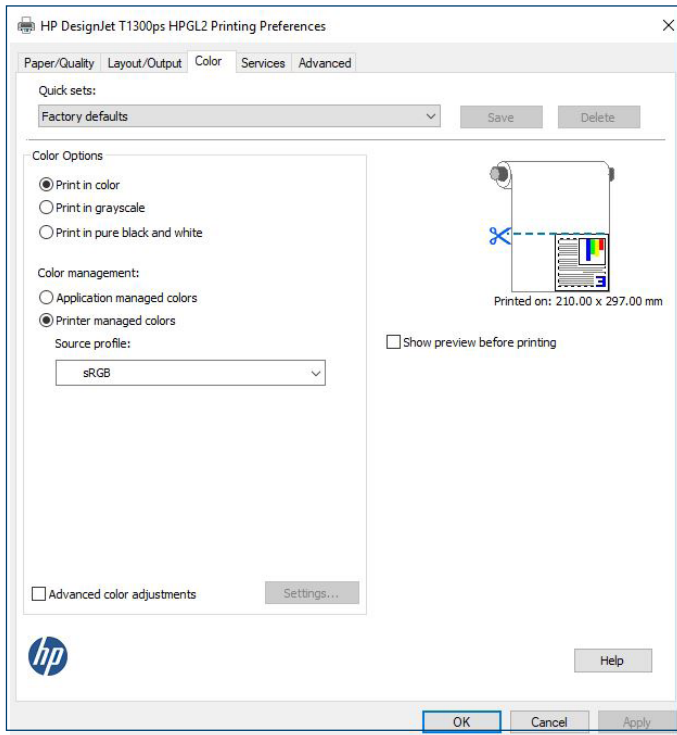
Canon imagePROGRAF TX-4000 Print Driver Colour Adjustment Tab



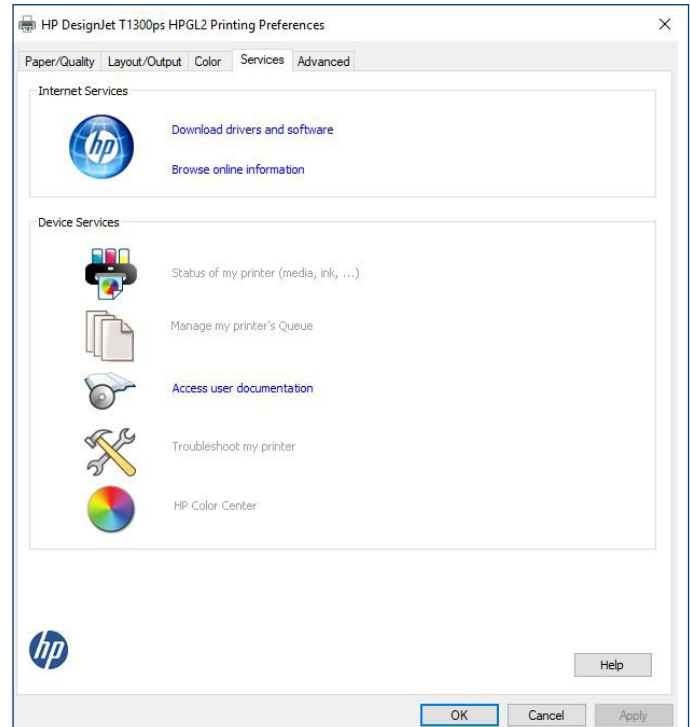
HP DesignJet T1300 ePrinter Print Driver Paper/Quality Tab



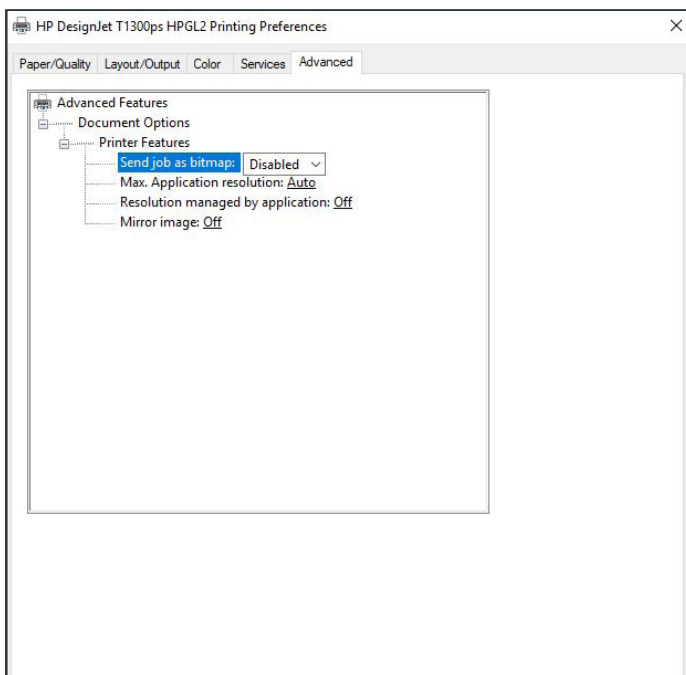
HP DesignJet T1300 ePrinter Print Driver Layout/Output Tab



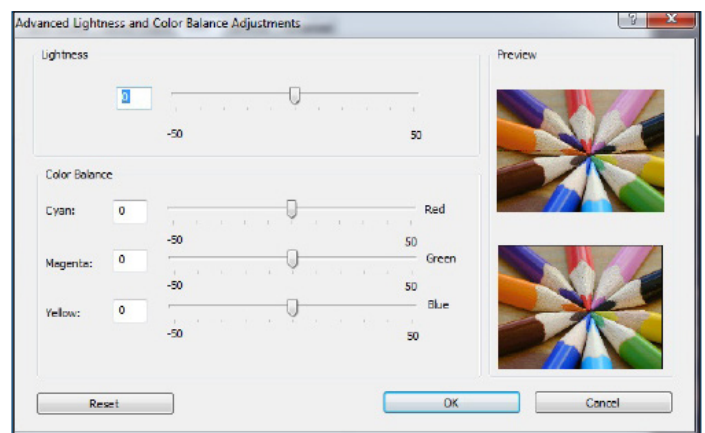
HP DesignJet T1300 ePrinter Print Driver Colour Tab



HP DesignJet T1300 ePrinter Print Driver Services Tab



HP DesignJet T1300 ePrinter Print Driver Advanced Tab



HP DesignJet T1300 ePrinter Print Driver Advanced Lightness and Colour Balance Adjustments

SUPPORTING TEST DATA

Print Productivity

Job Stream Productivity (in Seconds)

Mixed File Types, Same Size, Single Roll

Canon imagePROGRAF TX-4000		HP DesignJet T1300 ePrinter	
Fast	593.83	Fast	962.58
Standard	914.85	Normal	1,806.45
High	1,844.69	Best	5,338.96

Buyers Lab's job stream consists of nine files, including PDF, TIFF and DWF files totalling 19 pages, all at Arch D-size, ensuring that the files are set to fit to page. 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 44-inch rolls, with each file set to auto-rotate to save media.

Mixed File Types, Same Size, Dual Roll

Canon imagePROGRAF TX-4000		HP DesignJet T1300 ePrinter	
Fast	762.86	Fast	1,046.41

Buyers Lab's dual-roll job stream consists of nine files, including PDF, TIFF and DWF files totalling 19 pages, all at Arch D-size, ensuring the files are set to fit to page. 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, sending alternate jobs to different rolls, at which time the stopwatch begins; timing ends when the last page exits the device. Both devices were loaded with 44-inch rolls, with each file set to auto-rotate to save media.

Colour Productivity (in Seconds)

Canon imagePROGRAF TX-4000		HP DesignJet T1300 ePrinter	
Fast	337.95	Fast	616.97
Standard	578.90	Normal	1,234.32
High	1,063.65	Best	3,378.87

The 12-page DWF test file was printed using the device driver set to the plain paper/colour setting. Both devices were loaded with 44-inch rolls. The actual time indicated is the time it took to RIP, image and deliver all pages of the test document to the collection bin.

Monochrome Productivity (in Seconds)

Canon imagePROGRAF TX-4000		HP DesignJet T1300 ePrinter	
Fast	347.76	Fast	609.55
Standard	581.16	Normal	1,197.59
High	1,069.90	Best	3,588.41

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 44-inch rolls. The actual time indicated is the time it took to RIP, image and deliver all pages of the test document to the collection bin.

First-Page-Out Productivity after a Weekend of Non-Use (in Seconds)

	Canon imagePROGRAF TX-4000	HP DesignJet T1300 ePrinter
Time Before Printing Commences	58.10	70.57
First Page Out	89.35	108.48

First-Page-Out Productivity from Ready State (in Seconds)

	Canon imagePROGRAF TX-4000	HP DesignJet T1300 ePrinter
Time Before Printing Commences	21.95	17.73
First Page Out	45.59	59.36

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 44-inch rolls.

A0 First-Page-Out and Throughput Productivity (in Seconds)

	Canon imagePROGRAF TX-4000	HP DesignJet T1300 ePrinter
First Page Out	117.55	173.67
Five Pages Out	523.25	826.34

The single-page A0-size PDF test file was printed using the device driver with the plain paper/colour setting in default speed mode. The actual time indicated is the time it took to RIP, image and deliver five pages of the test document to the collection bin.

Colour Image Quality

Colour Optical Density Evaluation

Canon imagePROGRAF TX-4000						
	Fast		Standard		High	
	50%	100%	50%	100%	50%	100%
Cyan	0.47	1.03	0.54	1.29	0.56	1.33
Magenta	0.40	0.86	0.46	1.20	0.47	1.23
Yellow	0.42	0.85	0.48	1.05	0.49	1.08
Black	0.48	1.54	0.56	1.47	0.58	1.45

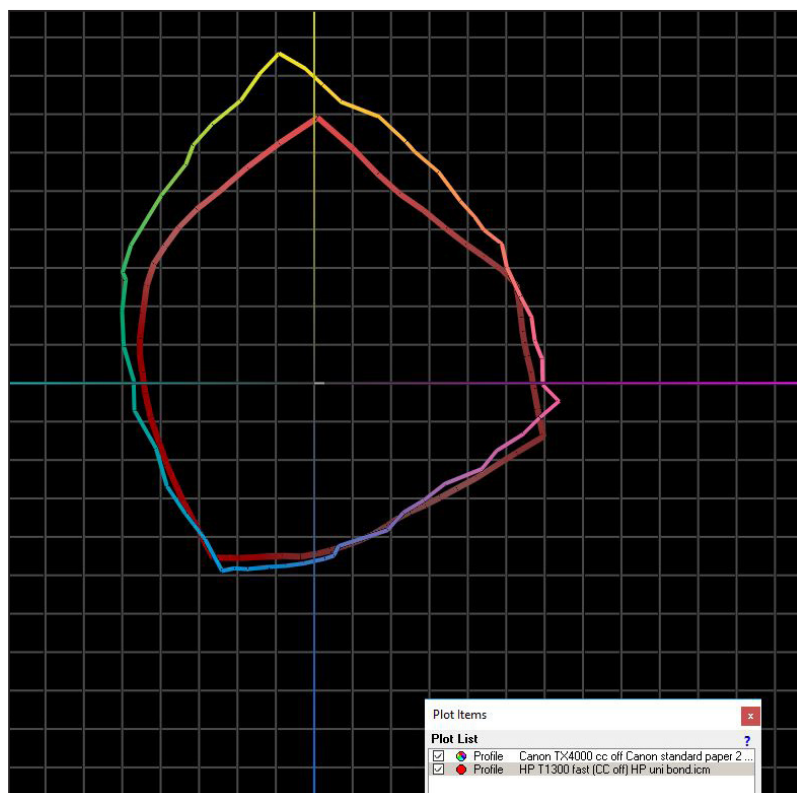
HP DesignJet T1300 ePrinter						
	Fast		Normal		Best	
	50%	100%	50%	100%	50%	100%
Cyan	0.42	0.95	0.48	1.10	0.54	1.12
Magenta	0.38	0.96	0.42	1.12	0.46	1.13
Yellow	0.32	0.73	0.47	0.92	0.44	0.90
Black	0.49	1.61	0.51	1.59	0.59	1.53

Note: Colour density readings were assessed by printing a Buyers Lab proprietary PDF test target file on Canon Standard Plain Paper 2 and HP Universal Bond in default colour settings at all quality settings available, and measuring the density of 100% dot fill and 50% dot fill using an XRIte exac^{DP} densitometer.

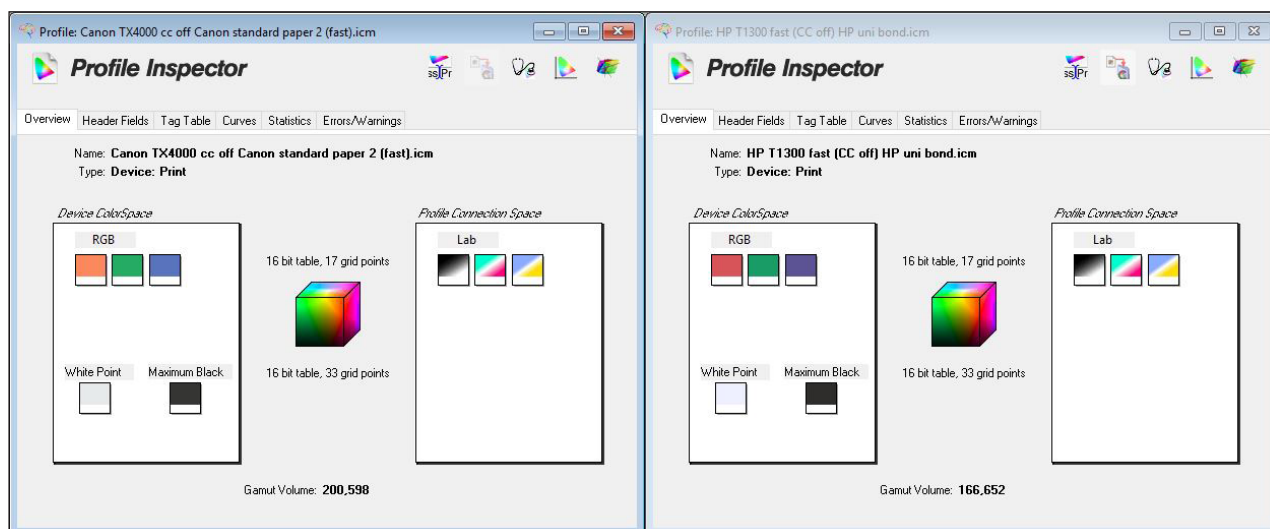
Colour Gamut Comparisons

Media Type/Settings	Canon imagePROGRAF TX-4000	HP DesignJet T1300 ePrinter
Plain Paper Fast	200,598	166,652
Plain Paper Standard/Normal	332,964	209,677
Plain Paper High/Best	343,545	217,295
Matte Coated High/Best	410,918	320,801

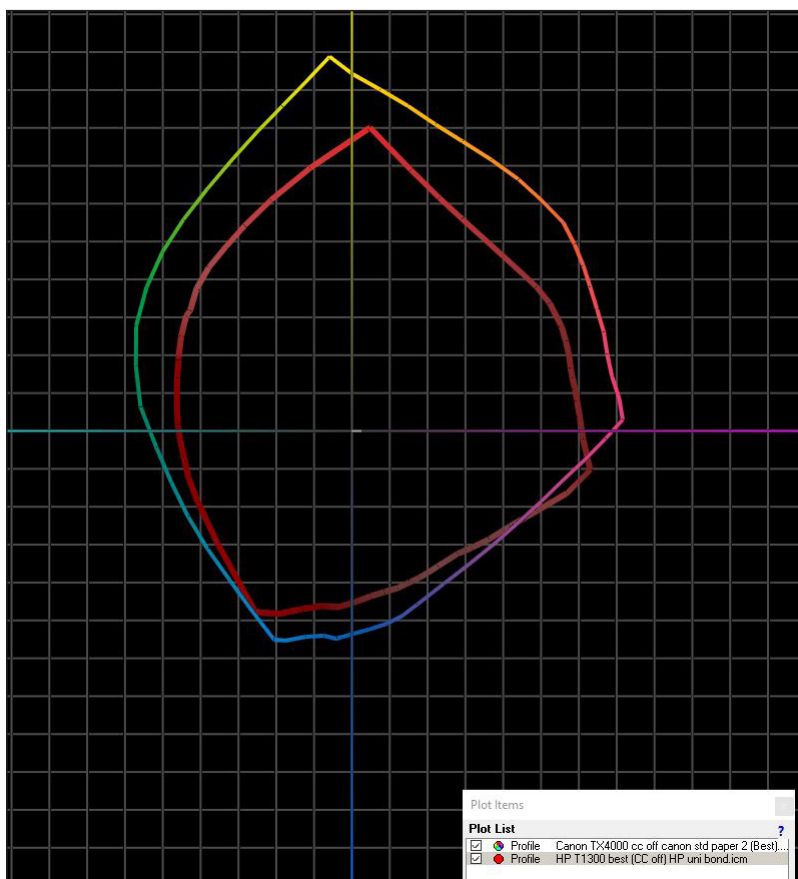
Colour Gamut Comparison



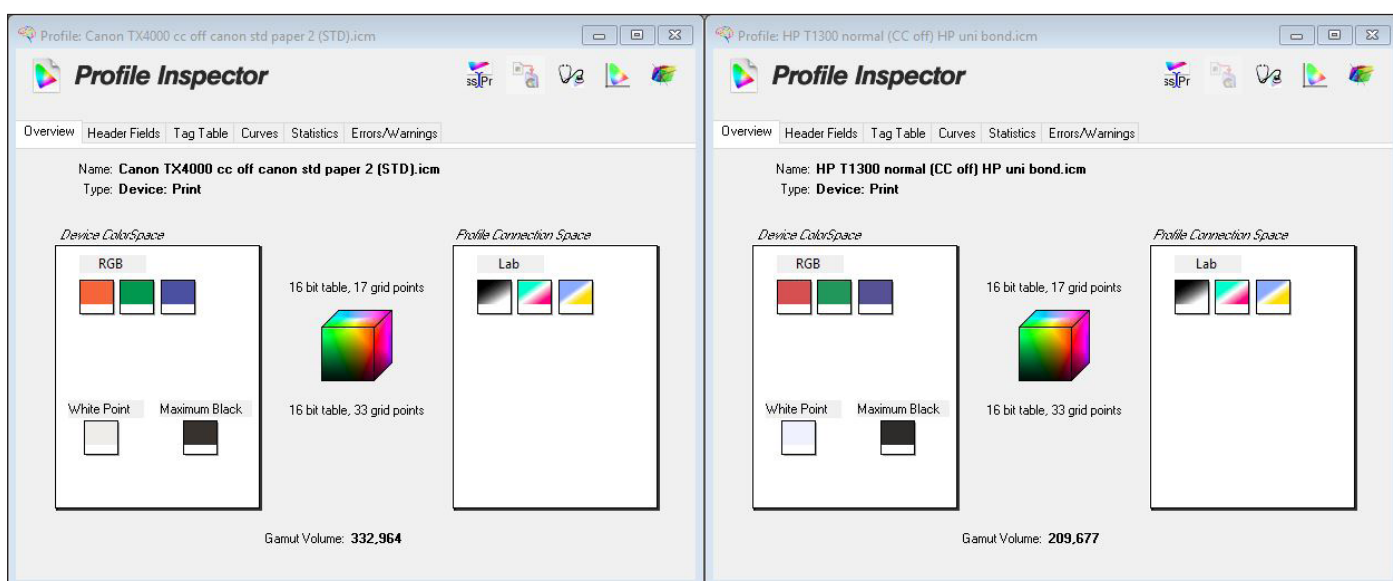
Canon imagePROGRAF TX-4000 colour gamut on Canon Standard Plain Paper 2 in Fast settings (shown chromatically) versus HP DesignJet T1300 ePrinter colour gamut (shown in red) on HP Universal Bond paper in Fast settings.



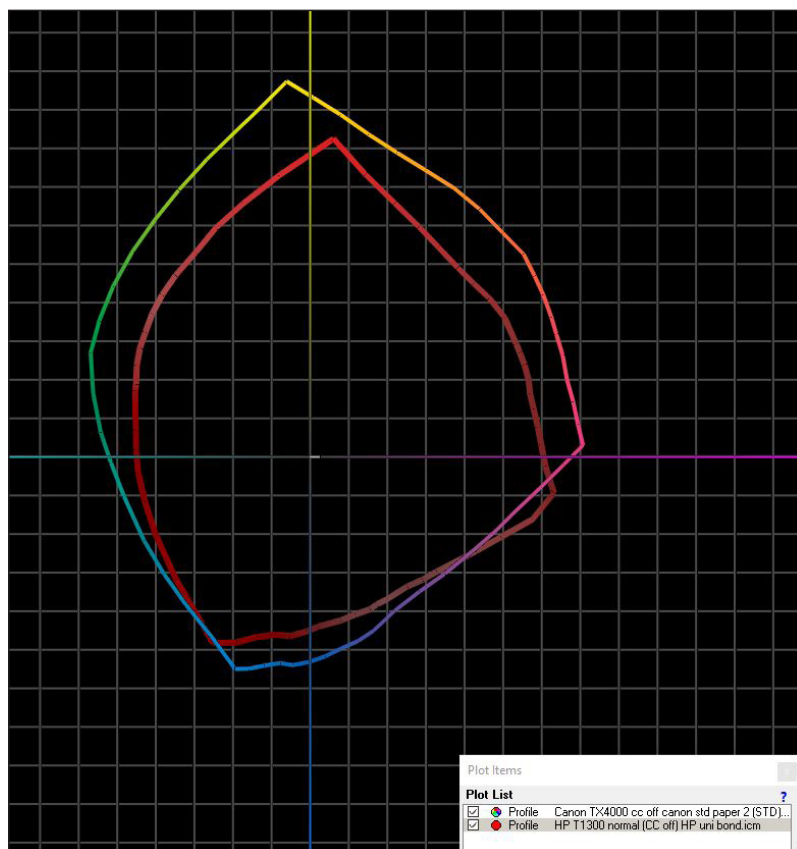
Colour gamut profile for Canon imagePROGRAF TX-4000 (left) and HP DesignJet T1300 (right) in Fast mode.



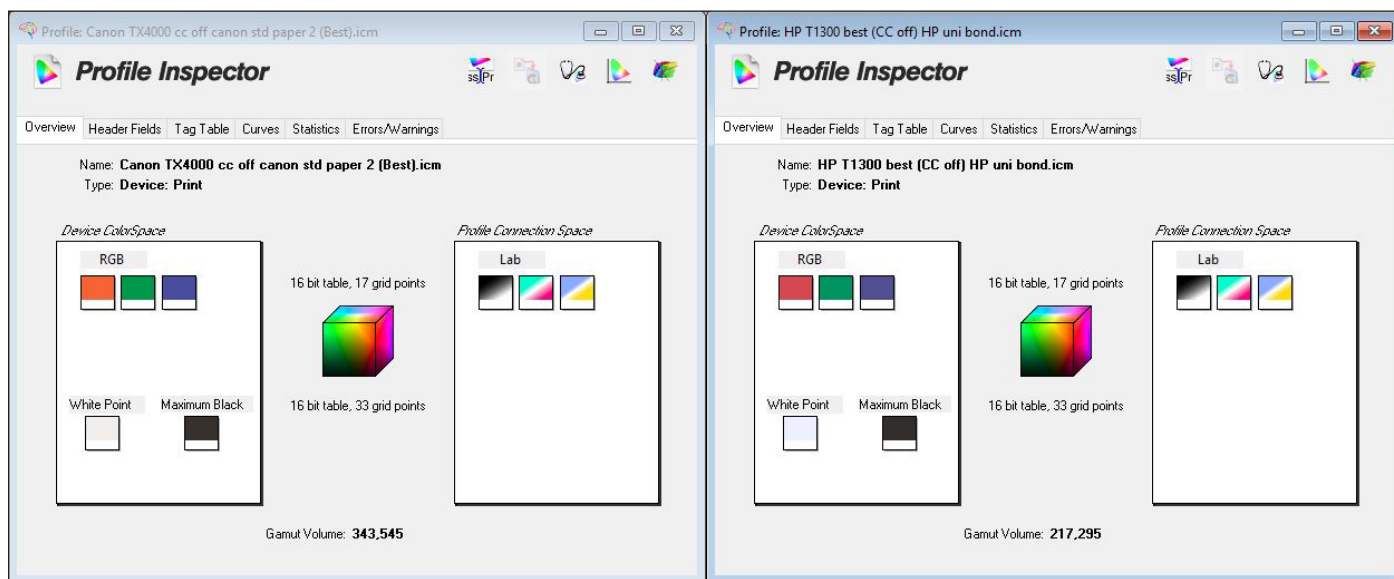
Canon imagePROGRAF TX-4000 colour gamut on Canon Standard Plain Paper 2 in Standard settings (shown chromatically) versus HP DesignJet T1300 ePrinter colour gamut (shown in red) on HP Universal Bond paper in Normal settings.



Colour gamut profile for Canon imagePROGRAF TX-4000 (left) and HP DesignJet T1300 (right) in Standard/Normal modes.



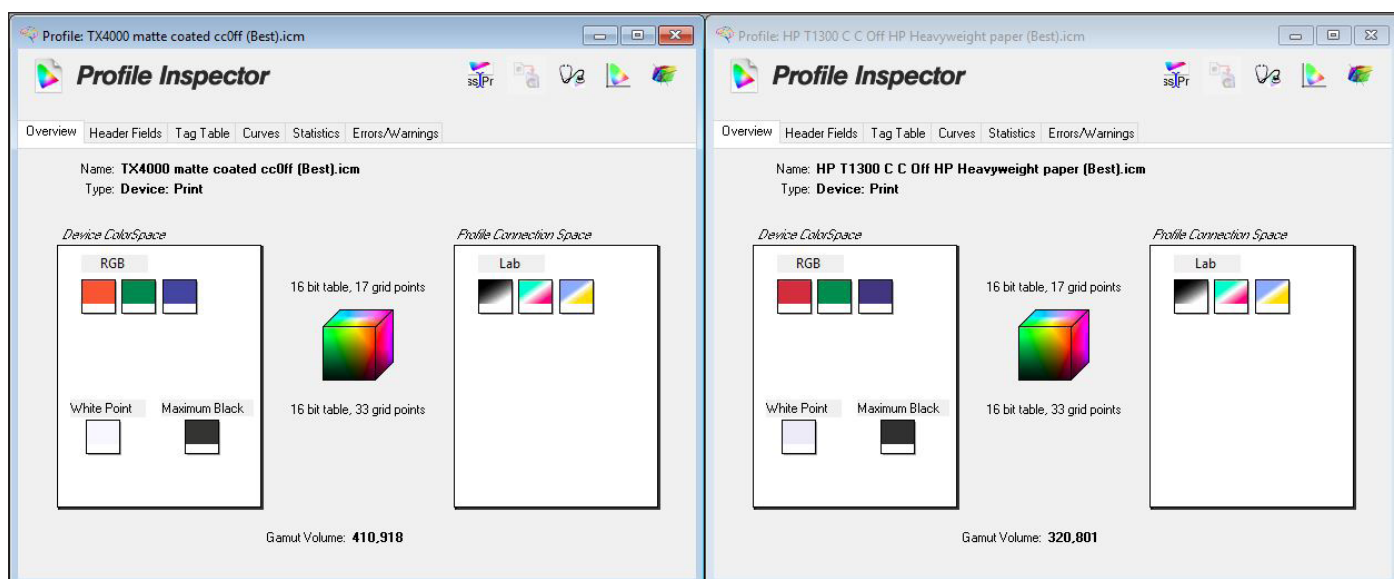
Canon imagePROGRAF TX-4000 colour gamut on Canon Standard Plain Paper 2 in High settings (shown chromatically) versus HP DesignJet T1300 ePrinter colour gamut (shown in red) on HP Universal Bond paper in Best settings.



Colour gamut profile for Canon imagePROGRAF TX-4000 (left) and HP DesignJet T1300 (right) in High/Best Quality modes.



Canon imagePROGRAF TX-4000 colour gamut on matte coated paper in High quality settings (shown chromatically) versus HP DesignJet T1300 ePrinter colour gamut (shown in red) on matte coated paper in Best settings.



Colour gamut profile for Canon imagePROGRAF TX-4000 (left) and HP DesignJet T1300 (right) on matte coated paper in High/Best Quality modes.

Black Print Quality

Black Optical Density Evaluation

Canon imagePROGRAF TX-4000				HP DesignJet T1300 ePrinter		
Density Block						
	Fast	Standard	High	Fast	Normal	Best
1	1.54	1.50	1.46	1.61	1.58	1.52
2	1.54	1.51	1.46	1.61	1.59	1.53
3	1.53	1.52	1.46	1.60	1.59	1.51
4	1.55	1.52	1.46	1.61	1.59	1.51

Note: Solid black density measurements are based on four readings taken from a Buyers Lab 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 exact[™] densitometer.

Device Feature Set

	Canon imagePROGRAF TX-4000	Advantage		HP DesignJet T1300 ePrinter
Max. image resolution	2400 x 1200 dpi			2400 x 1200 dpi
Number of inks	5		✓	6
Ink tanks replaceable during operation	Yes	✓		No
Ink-drop size	5 picoliter	✓		6 picoliter (C, G, M, pK); 9 picoliter (mK, Y)
Ink capacity out of the box	970 ml (330 ml MBK; 160 ml CMYK)	✓		240 ml (40 ml x 6)
Ink cartridge capacity	160/330/700 ml (CMYK, MBK)	✓		69 ml/130 ml for C, G, M, Y, pK; 130/300 ml for MBK
Number of nozzles	MBK: 5,120 nozzles; other colours: 2,560 nozzles each; 15,360 nozzles in total	✓		6,336 nozzles in total (2,112 nozzles per printhead)
Number of printheads	1 (User-replaceable)			3 (2 colours per printhead; user-replaceable)
Line accuracy	+/-0.1% or less			+/-0.1%
Minimum line width	0.02 mm			0.02 mm
Minimum print margins	3 mm	✓		5 mm
Borderless (0 mm) printing	Yes (Roll only)	✓		Yes (Photo paper only)
Maximum outside diameter of roll paper	170 mm	✓		140 mm
Maximum printable paper roll length	18 m		✓	91 m

	Canon imagePROGRAF TX-4000	Advantage		HP DesignJet T1300 ePrinter
Maximum cut-sheet media length	1.6 m			INA
Maximum media thickness for roll paper	0.8 mm			0.8 mm
Maximum media width	44 inches			44 inches
Media loading	Top and Front			Top Rear and Rear
Roll paper	Optional Multifunction Roll System (with auto take up)			Optional dual
Optional media handling	Roll holder set			Roll feed spindle
Standard RAM	128 GB	✓		32 GB (virtual)
Maximum RAM	128 GB	✓		32 GB (virtual)
Hard drive Capacity	500-GB (Standard)	✓		160-GB (Standard)
Interface	10/100/1000Base-T/TX Ethernet, USB 2.0			1000Base-T Ethernet, USB 2.0
PDL	HP-GL/2, HP RTL			Adobe PostScript 3, Adobe PDF 1.7, HP-GL/2, HP-RTL, TIFF, JPEG, CALS G4, HP PCL 3 GUI
Net weight (unpacked)	114 kg		✓	86 kg
Power consumption when in standby	INA			27 W
Power consumption when active	107 W	✓		120 W
Acoustic pressure	Operation: 51 dB (A) or less; Standby: 35 dB (A) or less		✓	Operation: 46 dB (A); Standby: 29 dB (A)
Acoustic power	INA			Operation: 6.1 Bels

INA – Information not available

Driver Feature Set

	Canon imagePROGRAF TX-4000	Advantage		HP DesignJet T1300 ePrinter
Speed settings	5 (Fast 300, Standard 600, Fast 600, High 600 and 1200)	✓		3 (Fast, Normal and Best)
Economy mode	Yes			Yes
Predefined profiles	6 (Default, Photo (colour), Poster, CAD (colour line drawing), CAD (mono line drawing) and Perspective GIS)	✓		5 (Default, CAD, GIS, Photo and B/W Photo)
Overview of profile settings provided	Yes			Yes
Media profiles	53 + 10 user customizable special options	✓		28
IQ optimized for print profiles	Yes			Yes
Watermark	Yes	✓		No

	Canon imagePROGRAF TX-4000	Advantage		HP DesignJet T1300 ePrinter
Sharpen text	Yes			Yes (Max. Detail setting)
Thicken fine lines	Yes			Yes (Max. Detail setting)
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, 90 degrees and auto 180 degrees	✓		Yes, 90 degrees
Option to preview before print	Yes			Yes
CMYK balance adjustment	Yes (CMY)			Yes (CMY)
Brightness adjustment	Yes			Yes
Contrast adjustment	Yes			Yes
Saturation adjustment	No			No
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			Yes
Disable automatic cutter	Yes			Yes
Unidirectional printing selection option	Yes	✓		No

The Canon imagePROGRAF TX-4000 comes bundled with PosterArtist Lite.

Ink Consumption

Table 1: Amount of Ink in each Canon imagePROGRAF TX-4000 Cartridge (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Weight of cartridge prior to installation	952.9	777.6	805.8	786.2	785.2
Weight of cartridge at end of life	205.5	205.5	205.5	205.5	205.5
Net weight of ink	747.4	572.1	600.3	580.7	579.7
Total ink weight across five cartridges					3,080.2

Table 2: Amount of Ink in each HP DesignJet T1300 ePrinter Cartridge (in Grams)

	Grey	Photo Black	Matte Black	Yellow	Magenta	Cyan
Weight of cartridge prior to installation	175.8	185.4	161.4	178.0	185.0	184.1
Weight of cartridge at end of life	56.9	56.9	56.9	56.9	56.9	56.9
Net weight of ink	118.9	128.5	104.5	121.1	128.1	127.2
Total ink weight across six cartridges						728.3

Table 3: Ink Used in Three 50-Page Runs of Cottage Architectural Plan Test Document (Standard Mode) on the Canon imagePROGRAF TX-4000 (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	16.0	3.1	3.8	4.3	2.2
Test Run 2 Net weight of ink used	16.6	3.3	4.7	4.4	3.0
Test Run 3 Net weight of ink used	14.9	3.5	3.9	3.5	1.8
Average amount of ink used across three runs	15.8	3.3	4.1	4.1	2.3
Total ink weight across five cartridges					29.6

Table 4: Ink Used in Three 50-Page Runs of Cottage Architectural Plan Test Document (Normal Mode) on the HP DesignJet T1300 ePrinter (in Grams)

	Grey	Photo Black	Matte Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	1.6	10.3	21.5	3.7	4.6	9.8
Test Run 2 Net weight of ink used	1.2	11.6	21.0	3.3	4.2	9.6
Test Run 3 Net weight of ink used	1.6	11.8	21.0	3.5	4.5	9.6
Average amount of ink used across three runs	1.5	11.2	21.2	3.5	4.4	9.7
Total ink weight across six cartridges for 50-page run (based on averages)						51.5

Table 5: Ink Used in Three 50-Page Runs of ISO Poster Test Document (Standard Mode) on the Canon imagePROGRAF TX-4000 (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	20.5	2.6	2.0	21.5	33.1
Test Run 2 Net weight of ink used	19.5	3.8	5.1	27.3	27.2
Test Run 3 Net weight of ink used	18.9	3.0	3.1	25.6	31.9
Average amount of ink used across three runs	19.6	3.1	3.4	24.8	30.7
Total ink weight across five cartridges					81.6

Table 6: Ink Used in Three 50-Page Runs of ISO Poster Test Document (Normal Mode) on the HP DesignJet T1300 ePrinter (in Grams)

	Grey	Photo Black	Matte Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	3.8	9.0	10.4	7.2	19.6	51.6
Test Run 2 Net weight of ink used	3.9	8.8	10.3	7.3	19.6	51.6
Test Run 3 Net weight of ink used	3.8	9.1	10.1	7.1	19.4	51.2
Average amount of ink used across three runs	3.8	9.0	10.3	7.2	19.5	51.5
Total ink weight across six cartridges for 50-page run (based on averages)						101.3

Table 7: Ink Used in Three 50-Page Runs of GIS Map Test Document (Standard Mode) on the Canon imagePROGRAF TX-4000 (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	25.0	3.4	14.2	15.9	24.8
Test Run 2 Net weight of ink used	24.8	3.7	13.4	16.9	23.8
Test Run 3 Net weight of ink used	24.0	3.5	13.3	16.3	25.5
Average amount of ink used across three runs	24.6	3.5	13.6	16.4	24.7
Total ink weight across five cartridges					82.8

Table 8: Ink Used in Three 50-page Runs of GIS Map Test Document (Normal Mode) on the HP DesignJet T1300 ePrinter (in Grams)

	Grey	Photo Black	Matte Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	39.9	5.4	7.2	21.3	13.2	26.9
Test Run 2 Net weight of ink used	39.7	4.1	7.1	20.8	13.0	26.2
Test Run 3 Net weight of ink used	39.2	4.6	6.8	20.6	13.0	26.0
Average amount of ink used across three runs	39.6	4.7	7.0	20.9	13.1	26.4
Total ink weight across six cartridges for 50-page run (based on averages)						111.7

Ink Consumption Test Methodology Overview

Buyers Lab's ink consumption analysis was conducted using three document types (Cottage Architectural Plan, ISO Poster and GIS map). Each document was formatted as a PDF (except for the Cottage Architectural Plan, which was formatted as a DWG TrueView Drawing) and sized at ISO A0.

The Canon imagePROGRAF TX-4000 was installed in Buyers Lab's lab with the latest "01.10" level of firmware (as of October 2017) and connected to a Windows 10 workstation using a 1000BaseT TCP/IP connection. The Canon imagePROGRAF Printer Driver was used for all testing 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 T1300 ePrinter was installed in Buyers Lab's lab with the latest IG_11_00_00.10 level of firmware and connected to a Windows 10 workstation using a 1000BaseT TCP/IP connection. The HP-GL/2 driver was used for all testing, 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 CAD with quality set to Normal. For the ISO Poster, print priority settings were set to Poster with quality set to Normal, and for the GIS map print priority settings were set to Perspective GIS with quality set to Normal.

Before installing the ink cartridges, Buyers Lab 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.

Test Environment

Products were tested in Buyers Lab's environmentally controlled UK test lab, which replicates typical office conditions.

Test Equipment

Buyers Lab's dedicated test network, consisting of Windows 2008 and Microsoft Exchange servers, Windows 10 workstations, 10/100/1000BaseTX network switches and CAT6 cabling.

Test Procedures

The test methods and procedures employed by Buyers Lab in its lab testing include Buyers Lab's proprietary procedures and industry-standard test procedures. In addition to a number of proprietary test documents, Buyers Lab uses industry standard files including a Buyers Lab 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 XRite i1 profile software and an i1 Pro colour spectrophotometer, and analysed using XRite i1i0 Advanced Scanning Table. Density of black and colour output was measured using an XRite exact^{XP} densitometer.

About Keypoint Intelligence - Buyers Lab

Keypoint Intelligence is a one-stop shop for the digital imaging industry. With our unparalleled tools and unmatched depth of knowledge, we cut through the noise of data to offer clients the unbiased insights and responsive tools they need in those mission-critical moments that define their products and empower their sales.

For over 50 years, Buyers Lab has been the global document imaging industry's resource for unbiased and reliable information, test data, and competitive selling tools. What started out as a consumer-based publication about office equipment has become an all-encompassing industry resource. Buyers Lab evolves in tandem with the ever-changing landscape of document imaging solutions, constantly updating our methods, expanding our offerings, and tracking cutting-edge developments.

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