Keypoint Intelligence Comparative Lab Test Report

Canon imagePROGRAF TX-4100 vs. HP DesignJet T1700dr

Advantage ✓	Canon imagePROGRAF TX-4100	HP DesignJet T1700dr
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 was commissioned by Canon Europe to conduct confidential document imaging device performance testing on the 44-inch Canon imagePROGRAF TX-4100 and the HP DesignJet T1700dr, 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 Keypoint Intelligence's European test facility in Wokingham, UK.

Executive Summary

The Canon imagePROGRAF TX-4100 outshone the HP DesignJet T1700dr in virtually all areas of Keypoint Intelligence's wide format evaluation, with superior image quality, higher productivity, lower ink consumption, and richer device and driver feature sets. The Canon TX-4100 is a fast device, whether printing from ready state or printing our jobstream (which replicates a typical mixed workflow for a large-format unit), and overall the HP unit simply was no match for it. Uptime is boosted thanks to the TX-4100's hot swap ink tank design, enabling inks to be replaced while the device remains active, whereas

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ink replacement on the HP unit requires print activity to cease. Image quality-wise, both models delivered high quality output that would easily satisfy the expectations of customers from the Architectural, Engineering and Construction (AEC), Computer-Aided Design (CAD) and Geographic Information Systems (GIS) markets. However, there were clear differences in certain areas with the Canon TX-4100 delivering far better colour halftone images that exhibited brighter colours, better depth of field and natural, warm skin tones, as well sharper and cleaner text and fine lines. The HP T1700dr produced truer neutral grays aided by the inclusion of grey in its ink set. Both devices provide additional flexibility with direct print submission utilities (of which Canon's has been newly enhanced, boosting user friendly operation), and mobile print support. There are many attractive features available with the Canon unit, that are lacking with the HP T1700dr. Heading the list is a high capacity stacker and auto media take-up unit option for longer unattended workflows; unidirectional print mode that eliminates banding even in Fast mode; borderless printing; and flexible nesting to save on paper (which is also offered on the HP unit but without the same flexibility and control over image placement).

Image Quality

Advantage ✓	Canon imagePROGRAF TX-4100	HP DesignJet T1700dr
Text	✓	
Fine Lines	✓	
Halftone Range	=	=
Halftone Fill	=	=
Solid Density	✓	
AEC Graphics	✓	
GIS Graphics	=	=
Colour Photographic Images	✓	
Monochrome Photographic Images		✓
Colour Gamut (Plain Paper, Fast)	✓	
Colour Gamut (Plain Paper, Standard/ Normal)	✓	
Colour Gamut (Plain Paper, High/Best)	✓	
Colour Gamut (Matte Coated Paper, High/Best)	=	=

+, –, and O represent positive, negative and neutral attributes, respectively.
All image quality testing was conducted on Canon Standard Plain Paper 2 and HP Universal Bond.

+ In terms of black optical density, the Canon TX-4100 delivered superior results on plain paper in all modes. The Canon unit also produced higher optical densities for all colours in Standard/Normal and High/Best quality modes, compared to the HP device. In Fast mode, the HP T1700dr delivered higher magenta optical density, Canon's yellow density was higher, and cyan and composite black densities were comparable.

+ When printing on plain media in Fast mode, the Canon TX-4100 delivered a 22.7% larger colour gamut, with a volume of 175,055 versus a volume of 142,620 for the HP model.

+ The Canon device produced an 89.3% larger colour gamut when printing on plain paper using Standard/ Normal settings (with a volume of 299,173 versus a volume of 158,048 for the HP model).

+ On plain paper in High/Best Quality settings, the Canon TX-4100 produced an 86.8% larger colour gamut than the HP T1700dr, with a volume of 308,086 versus a volume of 164,887 for the HP model.

O When printing on matte coated paper in highest quality settings, the Canon model delivered a fractionally larger colour gamut than that of the HP T1700dr, with a volume of 398,619 compared with 396,404 for the HP unit.

+ The Canon TX-4100 produced very good distinct text in colour that was legible down to the smallest (3-pt.) type size, with no breakup or bleed, in all tested modes; black serif and sans serif characters were clean and crisp and excellent across the board. The HP T1700dr produced very good colour and black text overall, with characters legible at the 3-pt. size in all modes. However, they were less crisp due to some ink bleed in Fast and Normal modes.

+ Fine lines produced by both devices remained distinct at the 0.1-pt. level across all modes, but with some differences in quality. Fine lines from the Canon TX-4100 were slender and clean, and judged excellent in High quality mode. There was some bleed evident in output produced by the HP model in Fast and Standard mode, and while they were very good overall, there was no distinction in line thickness between 0.1pt. and 0.25pt.

+ Circles produced by the Canon unit were smooth, clean, and distinct and judged very good at the 0.1-pt. level in Fast and Standard mode, and excellent in High quality mode. The HP T1700dr produced dark bold circles at the 0.1-pt. level, which weren't distinguishable from those at the 0.25-pt. level. They were less smooth in Fast and Normal modes, but rated very good in Best quality mode.

+ The Canon TX-4100 produced very good 1x1 pixel grids in CMYK in all modes, with consistent coverage and uniform dots. While the HP model delivered intact 1x1 grids in all colours, dot formation was slightly inconsistent in Fast and Normal modes, though more distinct and well-formed in Best quality mode.

O Both devices delivered very good, consistently smooth colour and greyscale halftone output across the full range—from the 10% to 100% dot-fill levels—in all modes with distinct transitions between all levels.

+ Architectural, Engineering and Construction (AEC) graphics output from both devices exhibited an excellent level of detail in all modes. However, in Fast and Standard/Normal modes the Canon TX-4100 had a slight edge over the HP unit for its crisper text and cleaner lines when viewed under magnification, while HP's output was bolder and displayed slight ink bleed, but only when viewed under magnification.

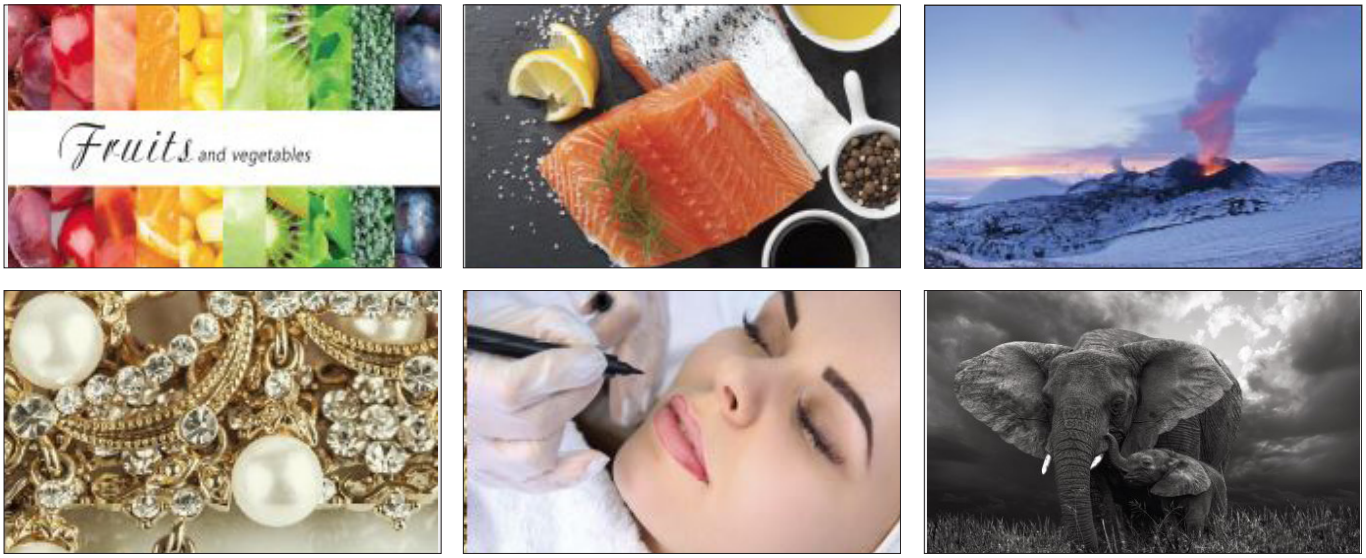
O Geographic Information Systems (GIS) graphics in Standard/Normal and High/Best modes on plain paper were reproduced to a very high standard on both units, with very good depth of field—a critical factor in delivering a realistic three-dimensional rendering of topographical features. Text stood out better on the HP's output, while the Canon had slightly better detailing around the contours.

+ Photographic image reproduction was better handled on the Canon TX-4100; its colours were consistently brighter (with memory colours and metallics more natural-looking and faithful to the originals), detailing was very good, and it delivered greater depth of field in all tested modes. In contrast, images produced on the HP T1700dr lacked vibrancy and were flat, even in Best quality mode.

- Both models produced smooth greyscale images in Standard/Normal and High/Best modes, exhibiting excellent detailing in light contrast areas. There was a sepia tone on output from the Canon TX-4100 however, while the HP T1700dr delivered truer neutral grey tones, ultimately giving it the edge.

+ Skin tones produced by the Canon TX-4100 were warm and natural-looking overall, while those produced by the HP model were pale and lacked contrast in all quality modes.

+ Overall, Keypoint Intelligence technicians judged the Canon TX-4100's image quality output as stronger across the board, owing to its crisp text, clean and distinct fine lines, richer and brighter colours, natural-looking skin tones as well as its larger colour gamut sizes. While the HP unit had excellent truer neutral greys, its output suffered from slight ink bleed (under magnification) and colour photographic output lacked vibrancy.



Keypoint Intelligence's colour and greyscale halftone test targets

Print Productivity

Advantage ✓	Canon imagePROGRAF TX-4100	HP DesignJet T1700dr
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	✓	
A0 Throughput Speed (Default mode)	✓	

+ After a weekend of non-use, the Canon TX-4100's first page out time was twice as fast as the HP model (97.20 seconds versus 215.28 seconds for the HP T1700dr). Start-up time before printing commenced was also faster for the Canon model at 55.32 seconds, compared with 149.06 seconds for the HP unit.
+ The Canon device delivered a 42.5% faster first-page-out time of 58.88 seconds from its ready state, compared with 102.44 seconds for the HP T1700dr. Its start-up time before printing commenced was faster, too—18.12 seconds compared with 33.91 seconds for the HP model.
+ When printing Keypoint Intelligence's job stream, designed to simulate a typical mixed workflow for a large-format unit, the Canon TX-4100 was 45.2% faster than the HP model in Fast mode, 53.4% faster in Standard/Normal mode, and 63.6% faster in High/Best mode.
+ As both models offer a dual-roll design, KPI conducted a second job stream test, sending the same files as alternate jobs to different rolls to test both models' efficiency when switching between rolls. The Canon TX-4100 completed the dual-roll job stream in Fast mode in 758.43 seconds—24.4% faster than that of the HP T1700dr model (1,003.72 seconds).
+ When printing the 12-page DWF test file in colour, the Canon TX-4100 was faster than the HP unit in all modes tested; it was 45.0% faster in Fast mode; 48.7% faster in Standard/Normal mode; and 64.6% faster in High/Best mode.
+ Similarly, when printing KPI's 12-page DWF test file in monochrome, the Canon model was the faster model across the board; it was 45.4% faster in Fast mode; 48.7% faster in Standard/Normal mode and 64.6% faster in High/Best mode than the HP device.
+ When printing KPI's single-page A0-size test target in Standard/Normal mode, the Canon TX-4100's first-page-out time of 85.04 seconds was 37.3% faster than that of the HP unit (135.69 seconds). The time to print five A0-size pages was 44.1% faster for the Canon TX-4100 than for the HP device (432.07 seconds versus 772.63 seconds).

+ When the unit runs out of paper, the Canon TX-4100 pauses and alerts the operator. After a new roll is installed, it resumes printing at the start 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. In contrast, the HP unit will resume printing the rest of the interrupted page after a new roll is installed and therefore the page must be reprinted in its entirety.

Banner Printing

Advantage ✓	Canon imagePROGRAF TX-4100	HP DesignJet T1700dr
Image Quality	✓	
Productivity	✓	

+ The Canon TX-4100 successfully printed Keypoint Intelligence's 36" x 105" banner (a 4,955-KB PDF file) in Fast mode, taking 5.53 seconds to generate a preview at the desktop, and an additional three minutes, 30.81 seconds from preview to final paper cut. In contrast, the HP T1700dr took 7.92 seconds to create a preview, however, it was unable to process the file or print any portion of the banner.

Poster Printing

Advantage ✓	Canon imagePROGRAF TX-4100	HP DesignJet T1700dr
Image Quality	✓	
Productivity (Fast mode)	✓	
Productivity (Standard/Normal mode)	✓	
Productivity (High/Best Quality mode)	✓	

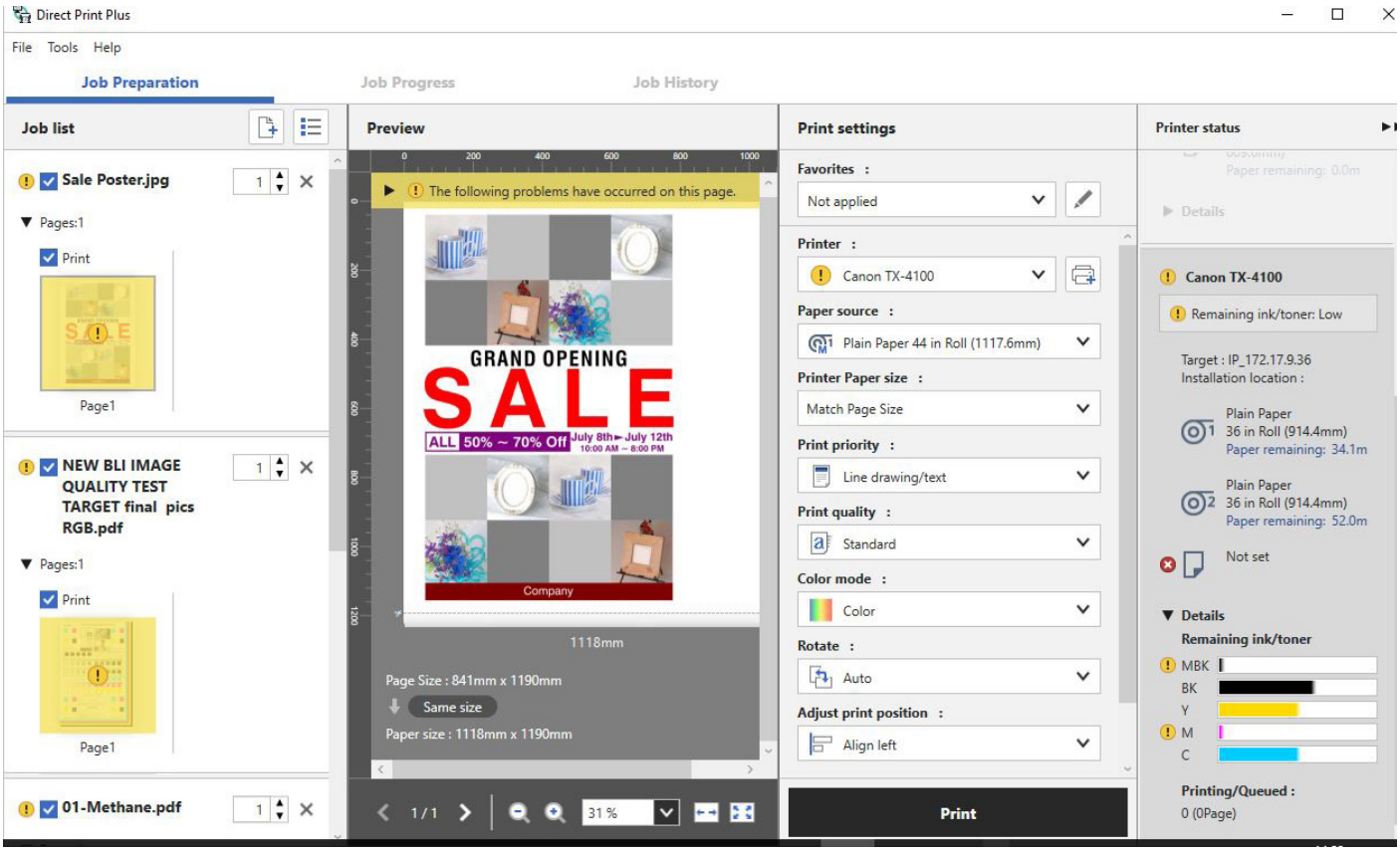
+ When printing KPI's A1-sized Poster test target in Fast mode at 300 dpi, the Canon TX-4100 took 21.58 seconds to complete the job, while the HP T1700dr took 37.14 seconds.
+ Banding was evident on output printed in Fast mode by both models (across the whole image with the HP unit, but only in dark areas with the Canon model). When unidirectional printing was selected in the Canon print driver (not available on the HP unit), banding was eliminated with an increased print time of 37.97 seconds.
+ The Canon model took 39.21 seconds to print the poster in Standard mode at 600 dpi, besting the HP unit's 1 minute, 8.69 seconds in Normal mode.
+ In Standard/Normal mode, the Canon poster showed no banding, while HP's poster exhibited minimal banding in dark areas.
+ When printing the poster in High/Best mode, the Canon model took 1 minute, 24.11 seconds, two thirds faster than the HP unit's 3 minutes, 33.28 seconds result when printing in Best mode.

O As expected, at the High/Best Quality settings, there was no observable banding on output from both models.

Direct Print Submission Functionality

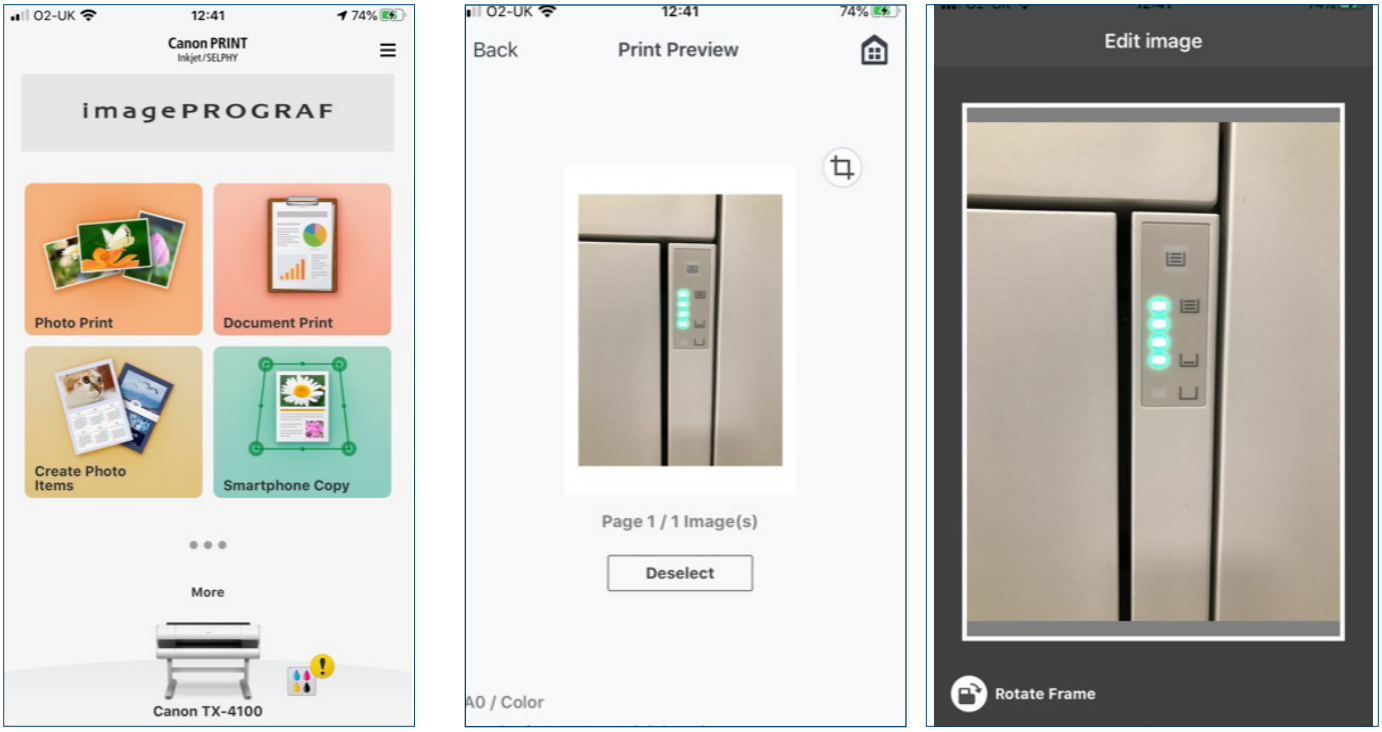
Advantage ✓	Canon imagePROGRAF TX-4100	HP DesignJet T1700dr
Direct Print Submission Functionality	=	=
Mobile App Integration	=	=

O Canon's Direct Print Plus is the newly enhanced job submission utility successor to imagePROGRAF Direct Print & Share. While it offers the same user friendly operation, the interface is more appealing and clean. And, with a new PDF engine developed by Canon, Direct Print Plus provides improved processing and printing of PDF files. There are three tabbed sections: Job Preparation (the home screen), Job Progress, and Job History. The Job Preparation screen is arranged in four sections—Job list, Preview, Print settings, and Printer status—providing easy access to job settings, job thumbnail previews and at-a-glance printer and consumable status information, without the need to link to Status Monitor (a necessary step with the former utility). The bi-directional communication between the utility and printer means there's less chance of media mismatch.

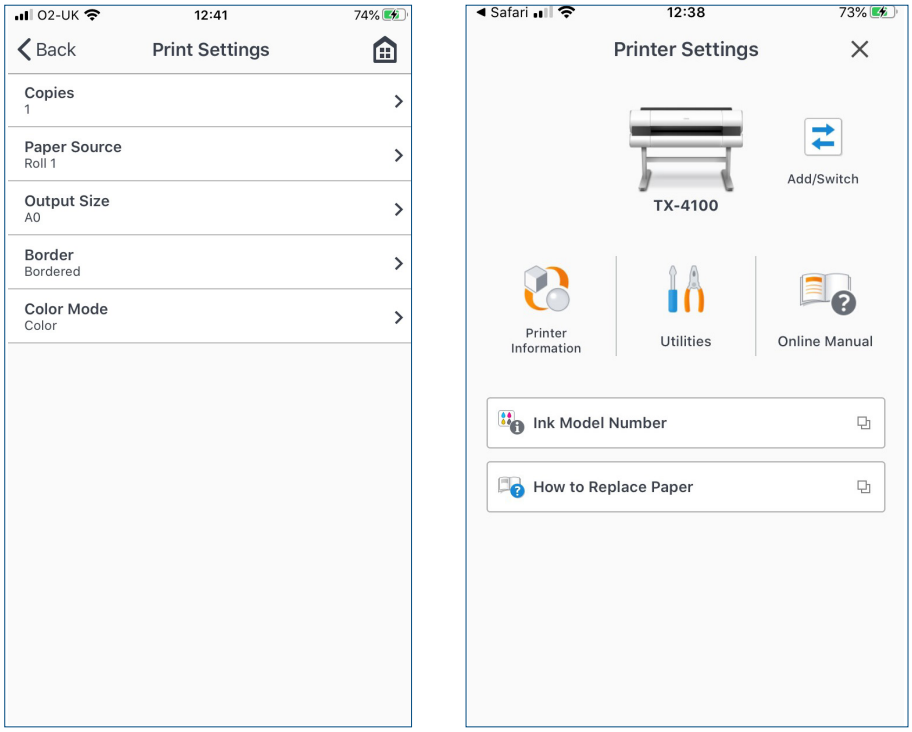


Direct Print Plus job submission software enables the direct printing of PDF, JPEG, TIFF, and HPGL/2 files without the need for native applications or print drivers. From the Job History tab, users can prints jobs selected from the print history log again using the same settings as when last printed.

- As with the predecessor utility, Direct Print Plus supports “Shortcut Print” functionality which helps streamline print workflows. Akin to a hot folder workflow, users can create desktop shortcuts that allow drag and drop automatic file printing with predefined print settings, including. Multiple desktop icons can be created containing different print settings or combinations of print settings.
- The Canon TX large format series supports Canon PRINT, a free-to-download mobile print app for Android and iOS users. It provides an easy way to print wirelessly to the Canon imagePROGRAF TX-4100 on the same WiFi network, which boosts both productivity and flexibility. The Canon PRINT app offers a basic range of print settings, including colour, orientation, and borderless printing and is very straightforward to use. Users can also view printer status and remaining ink levels as well as carry out some maintenance tasks remotely.

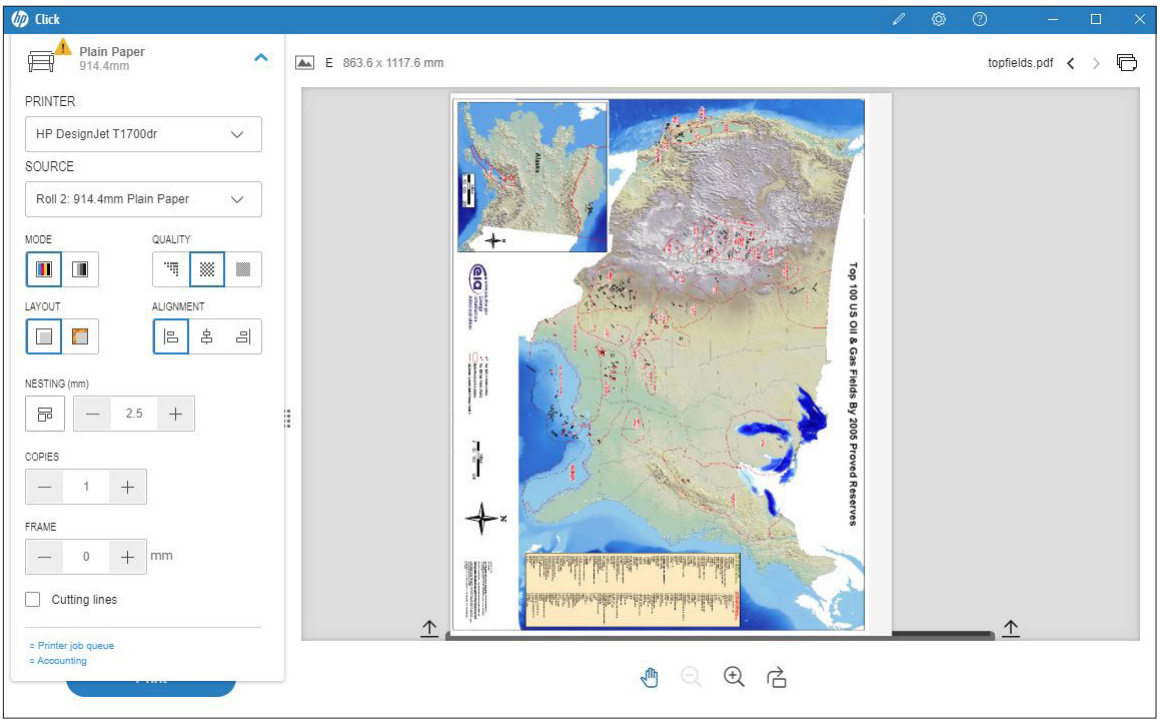


The Canon PRINT App home screen (left); Print Preview screen (centre); Edit Image (Rotate and Crop) screen (right)

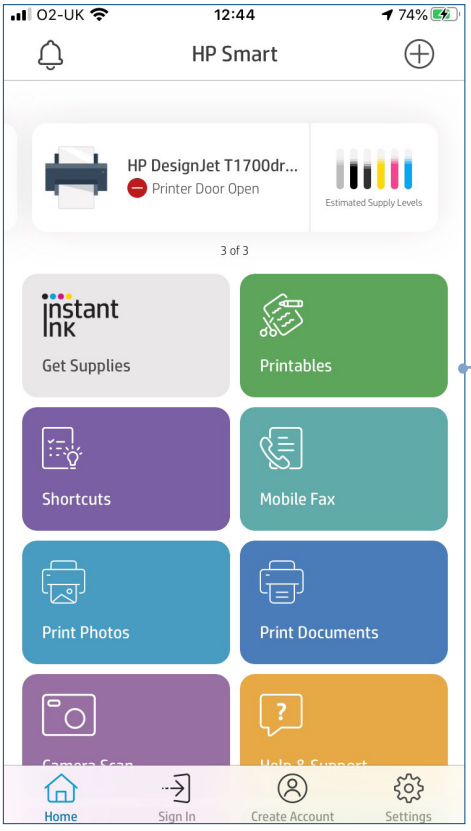


The Canon PRINT App's available print settings (left); Printer status information and online help (right)

- HP's own direct job submission software, HP Click, is free to download and provides direct printing of PDF, JPEG, TIFF, and HPGL/2 files from the PC desktop, without the need for native applications or print drivers. Users are able to select print settings such as colour mode, quality setting, nesting, resize and align image, as well as preview the job file in the centre of the screen.
- In addition, the HP DesignJet T1700dr supports HP ePrint functionality, whereby users can 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.

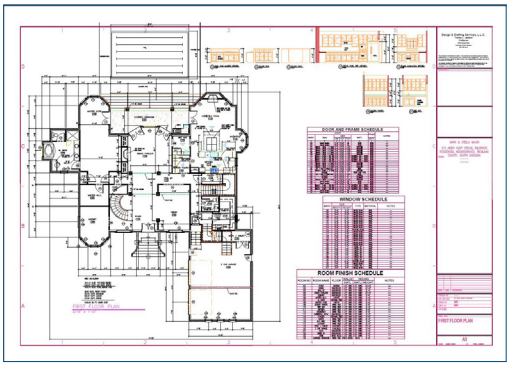


Similar to Canon's utility, HP Click lets users view job history and the status of current jobs in progress via the pages graphic at the top right of the screen. Printer information and consumable status can be obtained by clicking the 'Accounting' link on the bottom left of the screen, which launches the device's embedded web utility.



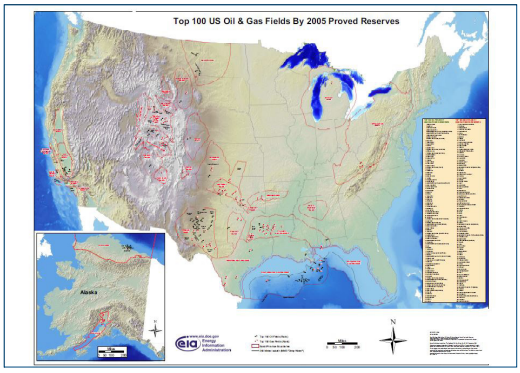
The HP Smart app provides an easy way for users print to the T1700dr from Apple iOS and Android smartphones and tablets. Other features include the ability to scan documents directly to their mobile device; retrieve, print, or upload files to a variety of cloud storage services such as Dropbox, Box, Google Drive and Evernote; and monitor printer status. Document editing options are available through the Preview function.

Ink Consumption



Cottage Architectural Plan

ISO Office Poster



GIS Map

Keypoint Intelligence technicians observed that, owing to the vagaries of inkjet technology (for example, head flushing and calibration routines can occur at any time during testing), the same test can produce different results at different times. Although Keypoint Intelligence makes every effort to ensure that devices are tested on a level playing field, the test results should be regarded as an indicator of likely performance and not as a prediction of actual ink consumption in a real-world environment.

Overall Weight of Ink Used (in Grams)

	Canon imagePROGRAF TX-4100	HP DesignJet T1700dr
Cottage Architectural Plan	41.9	53.3
ISO Office Poster	97.9	107.5
GIS Map	81.8	122.5

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

+ The Canon TX-4100 device used 21.4% less ink than the HP T1700dr when printing a Cottage Architectural Plan test target in Standard/Normal Mode. For the same print scenario, the Canon TX-4100 used 1.1% of its total available ink, while the HP model used 3.8%.
+ When printing the ISO Poster in Standard/Normal mode on matte coated media, the Canon unit used 8.9% less ink compared with the HP device. For the same print scenario, the Canon TX-4100 used 2.6% of its total available ink, while the HP model used 7.6%.
+ In the GIS Map ink consumption test conducted in Standard/Normal Mode using matte coated media, the Canon TX-4100 used 33.2% less ink compared with the HP device. For the same print scenario, the Canon TX-4100 used 2.2% of its total available ink, while the HP model used 8.7%.

Device Feature Set

+ The 970ml total starter cartridge capacity for the Canon TX-4100 is far higher than the 240 ml total starter ink volume available with the HP T1700dr. Canon offers 160 ml, 330 ml, and 700 ml capacity cartridges for all colours whereas the HP model provides 130 ml and 300 ml for all colours and, consequently, they will need replacing more frequently than with the Canon device.

+ Canon's ink cartridges are replaceable during operation, which helps reduce downtime for Canon users. HP's cartridges cannot be replaced during operation.

O Both units utilize user-replaceable printheads, taking less than five minutes to replace on both models.

O Both also provide easy and quick roll paper loading with auto paper feed. Canon's Intelligent Media Handling feature allows the user to simply slide in the media from the front of the printer with ease. According to Canon, the advanced media sensor system enables the printer to automatically detect media type, width, and length, for simplified user handling. Similarly, once the user loads paper on to the HP device, alignment and width adjustments are automatically carried out without further user intervention.

O For maximum convenience and minimum downtime, both models offer the advantage of a dual-roll design, which gives users added flexibility to switch between different media types or sizes without having to reload the media each time.

O The Canon TX-4100 offers user-friendly media loading options at the front, although the stacker (if attached) will need to be removed first in order to gain access to the rolls. The HP device allows media rolls to be loaded from the top rear and back of the device. Users are advised to leave enough space around the unit when positioned close to a wall, so to avoid paper advance issues (some models come with wall spacers which can be lowered to ensure a minimum distance).

O Both printers offer paper tracking capabilities that, when enabled, will print media information in text and a barcode, with remaining roll length and type of paper on the partially-used roll's edge before its removal from the device.

+ The Canon TX-4100 supports borderless printing regardless of what roll media type is being used, whilst the HP model does not support this feature.

- While both devices support a maximum 1.6 m printable cut sheet media length, the HP unit supports a higher maximum printable paper roll length of 91 m compared with 18 m (depending on OS and application) for the Canon unit.

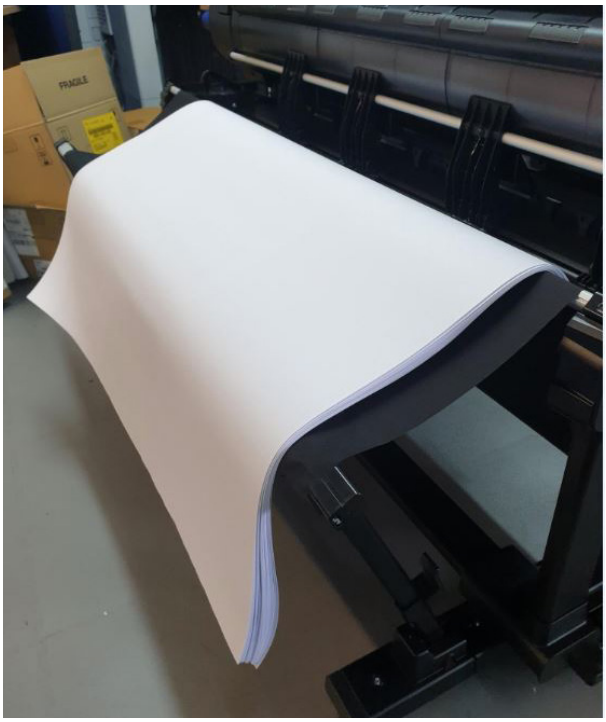
+ Both models support up to 0.8 mm media thickness for roll paper, but the Canon TX-4100 handles 170 mm as the outside diameter of the roll, while the HP T1700dr handles 135 mm in diameter.

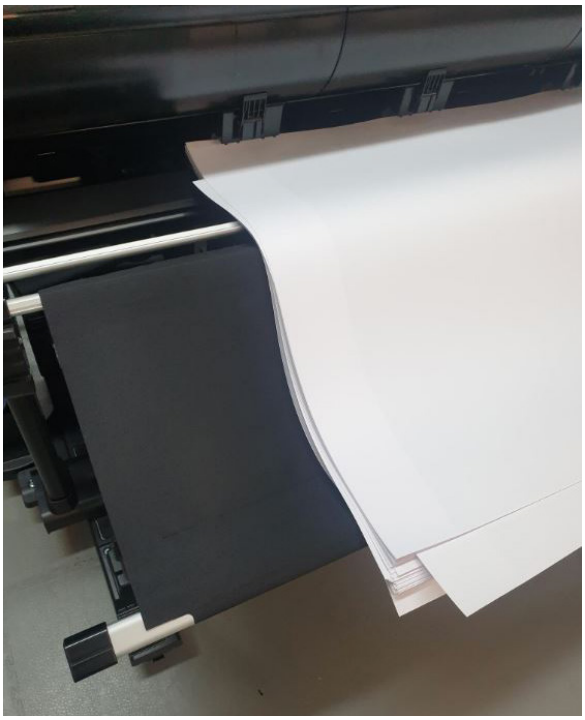
+ The TX-4100's optional Multifunction Roll System can also act as an auto Take-up-Roll unit with bi-directional rewind. Keypoint Intelligence technicians noted this could be an extremely valuable feature in high-volume production environments, enabling large numbers of prints to be stored on a single roll. This option is not available for the HP device.

O Both models come with a simple catch bin/basket to collect output from media rolls. Canon's catch basket can be arranged in different positions to suit the type of paper and quantity being produced.

+ The Canon TX-4100 can be configured with a high-capacity stacker, capable of collating up to 100 A0-sized prints for increased productivity. This feature is not available with the HP unit.

+ Keypoint Intelligence tested the stacking capabilities of the Canon TX-4100 by printing 100 copies of a CAD test document on A1-size media. The test was repeated printing 100 A0-size pages. We noted that the Canon TX-4100 stacked prints well and no manual intervention was required. However, we also noted that occasionally the stacker fell short of accommodating 100 sheets, especially when approaching the end of the media roll. Consequently, a higher number of sheets would stack better and more neatly when a new roll was in use.





Keypoint Intelligence technicians noted the Canon TX-4100's stacker assembly at the front of the device held printed A0 and A1 sheets in good alignment. Left image shows the stacker holding 50 A0 sheets; right image shows 100 A1 sheets.

O A media mismatch option on the Canon unit places jobs that can't be printed due to the required media not being loaded on hold. Jobs that can be completed will automatically print while the queued jobs are printed as soon as the required paper is loaded. The HP embedded web page's "Paper mismatch action" lists three options on how to handle a media mismatch: hold the job in question and continue with printing the next that can be completed without delay; print the job anyway; or enable a warning directly in the print driver to users before the job is submitted, with a control panel warning appearing after it is submitted. The HP control panel allows users either to put the job on hold (and continue printing any job that's slated to use the paper already loaded on the device) or print it.

- The Canon model offers a standard, non-upgradable (virtual) RAM capacity of 128 GB (2 GB physical RAM), while the HP unit has a standard non-upgradable (virtual) RAM capacity of 128 GB (based on 4 GB DDR3 RAM).

O A standard 500-GB encrypted hard drive is built in to both devices, which allows for the storage of documents that are frequently reprinted and aids spooling workflow.

O Both models offer USB 2.0 and Gigabit Ethernet connectivity.

O The Canon TX-4100 comes with robust security features, including secure disk erase 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 T1700dr features a self-encrypting hard drive that is only readable by the printer itself even if removed from the device. For additional device security, HP Secure Boot ensures BIOS protection, while the Whitelisting feature allows only approved firmware to be installed and run on the device; the model is also compatible with HP JetAdvantage Security Manager to further safeguard use.

- The HP model is much lighter with a net weight of 74 kg versus 114 kg for the Canon unit.

O Both models offer a colour touchscreen user interface, which are similarly responsive and intuitive to navigate.

- The Canon TX-4100's power consumption while active is a little higher—116 watts versus 100 watts—than that of the HP model.

- Rated noise emissions are higher for the Canon model (51 dB) compared to the HP device (45 dB) while the devices are printing, and slightly higher again when in standby mode (35 dB versus 32 dB).

Driver Feature Set

O The Canon TX-4100 has five speed settings (Fast 300, Standard 600, Fast 600, High 600 and High 1200), which are matched by similar settings on the HP device (Economode 300, Fast 600, Normal 600, Best 600 and 1200), although not all speed settings are available with all media types on each.

O Both the Canon imagePROGRAF Printer Driver and the 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.

+ There are various features offered by the Canon driver which aren't supported on the HP driver, including multi-up (2 to 16) printing, poster printing (2 by 2), and page stamping.

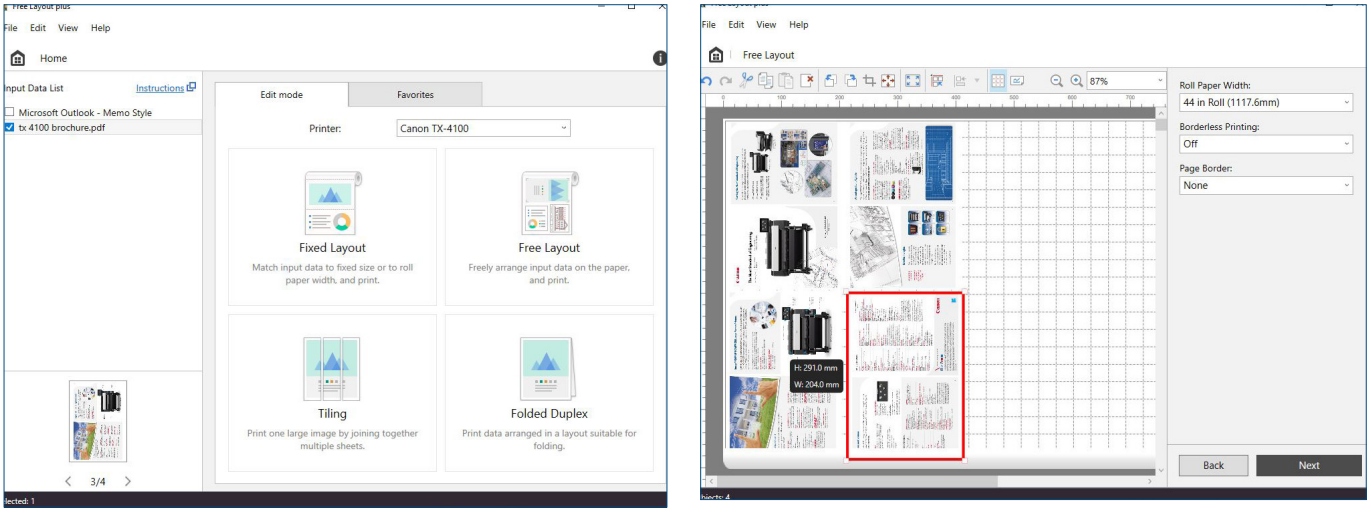
O The Canon imagePROGRAF Printer Driver offers a broad range of built-in adjustments for CMY balance, brightness and contrast, while the HP T1700dr's HPGL/2 driver also offers CMY balance and brightness adjustments. The Canon driver's advanced colour-matching selections include the ability to match ICC profiles and select the rendering intent based on different elements in the document.

- 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.

+ The Canon driver offers the option of 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.

+ 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-4100, whereby documents scanned at the MFP are automatically routed to a hot folder that is monitored by the TX-4100 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.

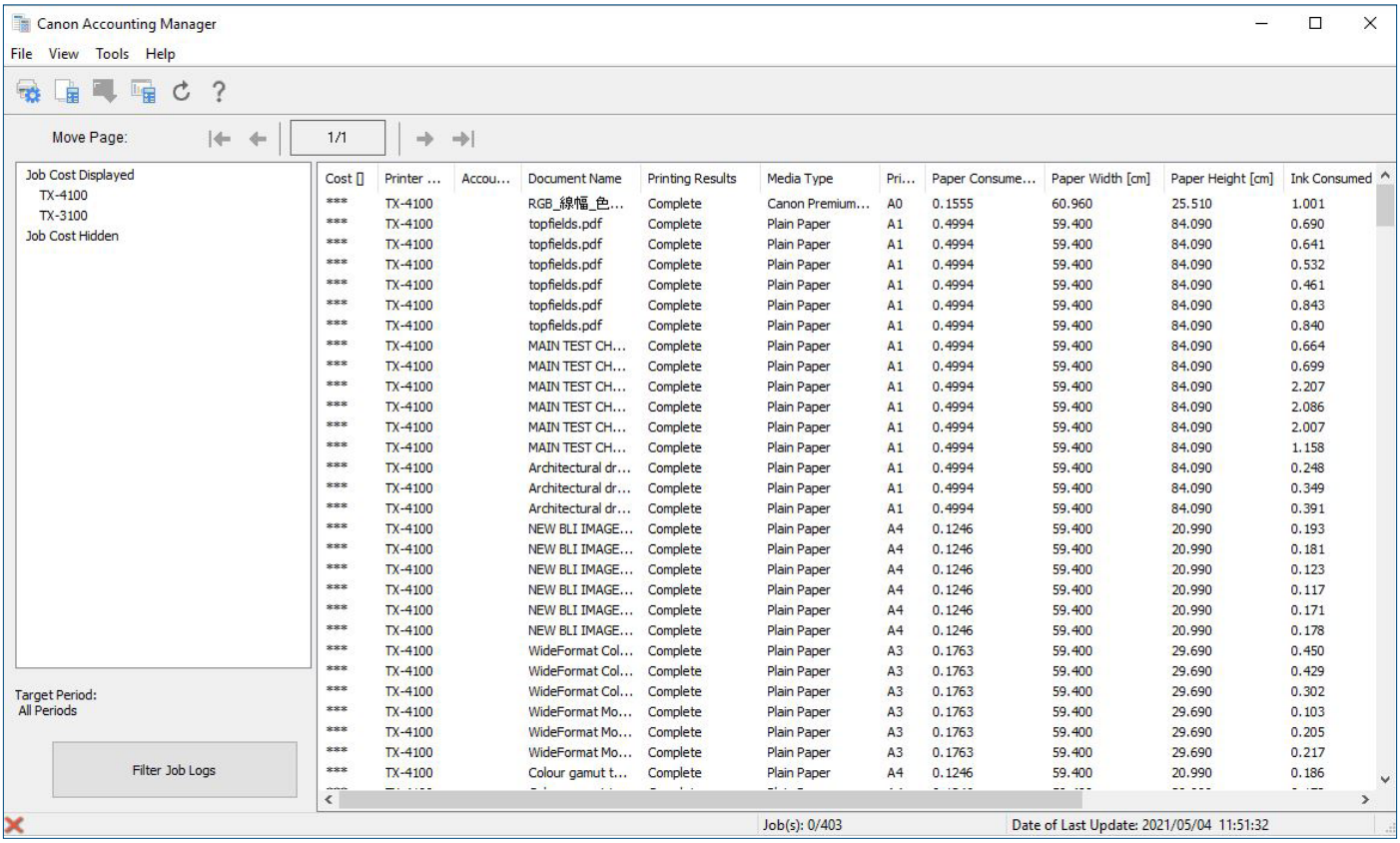
+ Canon's Free Layout plus software enables files—even those created with different applications—to be scaled, resized, or grouped together as a single job from the printer driver. Images can be dragged and dropped to the desired locations and printed together on a single page, helping to save on paper. The HP unit offers a similar nesting feature, which can be activated directly on the control panel or from the print driver utility, or when using HP Click. However, unlike the Canon tool, users don't have the same precise control over the positioning of jobs, rather jobs are randomly positioned to print across the width of a page, either in the order they were submitted or in 'optimized' layout order.



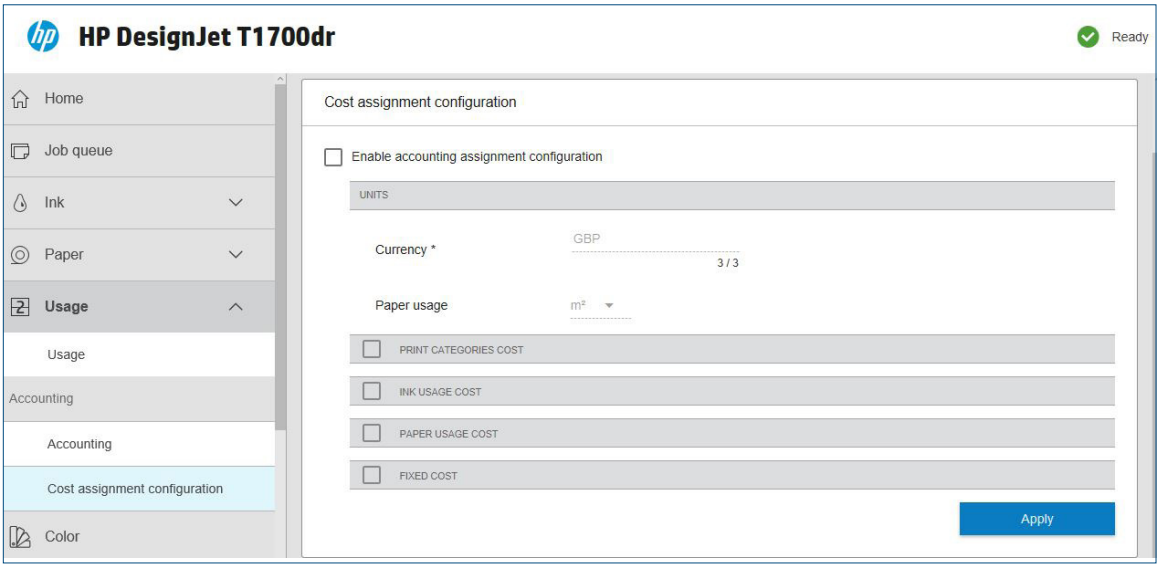
Canon's Free Layout plus enables users to arrange documents from different applications on a page so as to use paper more efficiently.

+ 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.

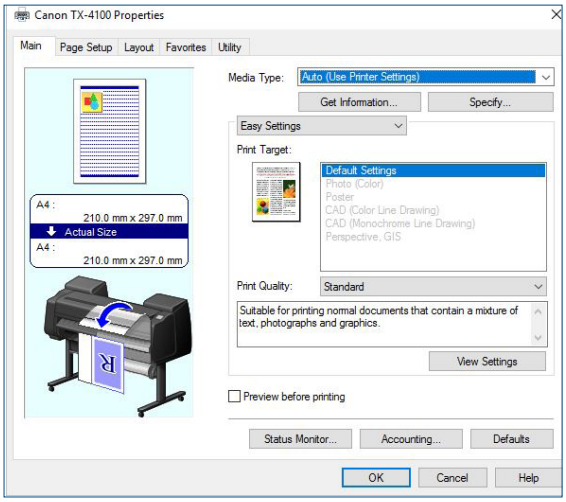


Canon Accounting Manager

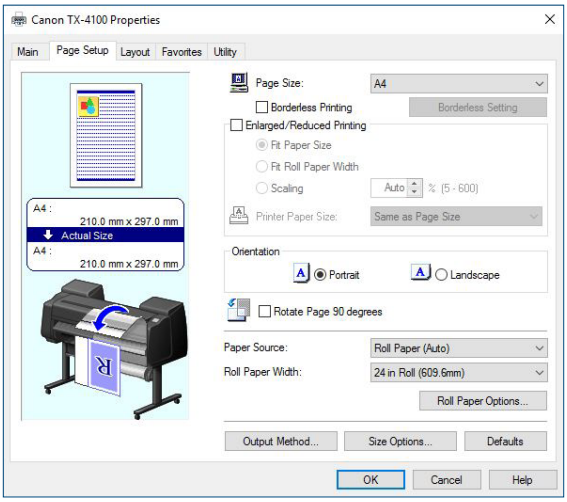


HP users can assign costs against paper, ink, and colour/mono work and export accounting reports as .csv files

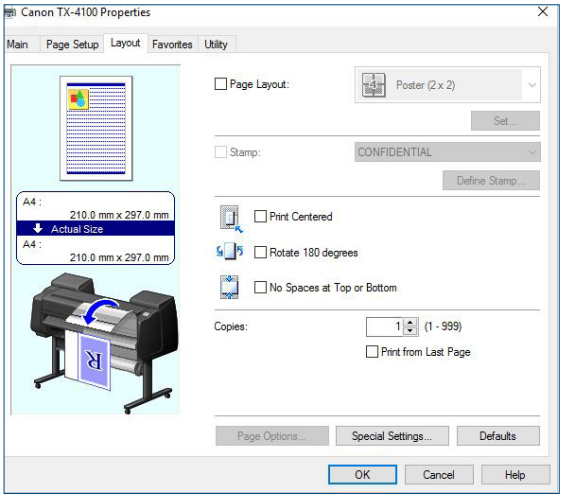
Test Models' Print Driver Screenshots



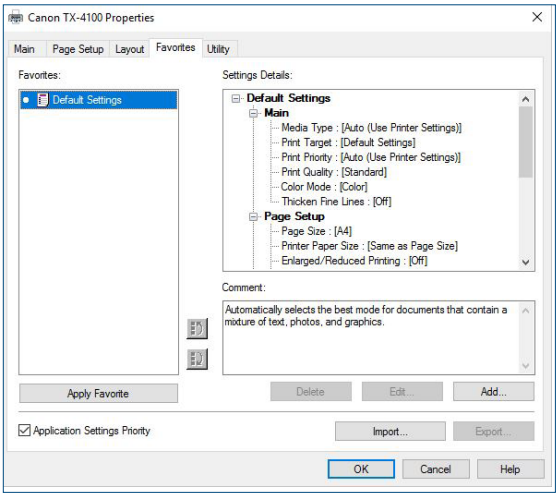
Canon imagePROGRAF TX-4100 Print Driver Main Tab



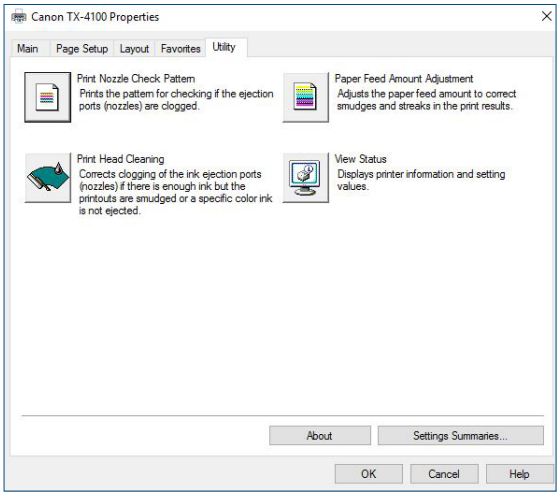
Canon imagePROGRAF TX-4100 Print Driver Page Setup Tab



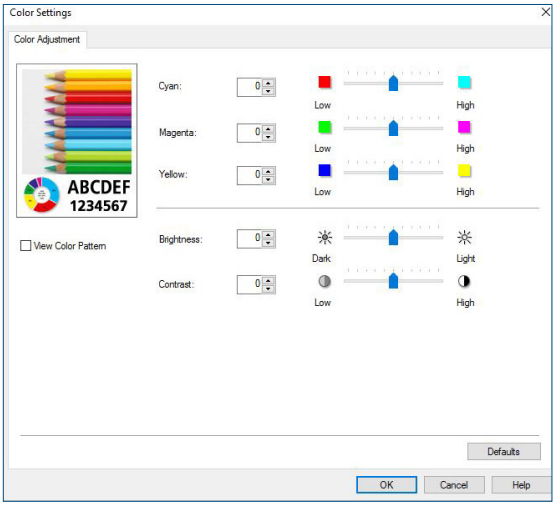
Canon imagePROGRAF TX-4100 Print Driver Layout Tab



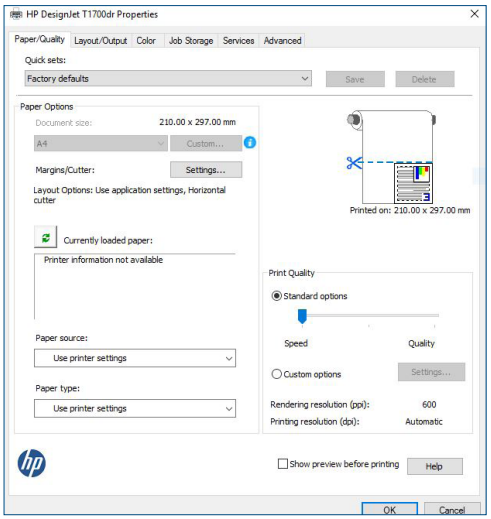
Canon imagePROGRAF TX-4100 Print Driver Favourites Tab



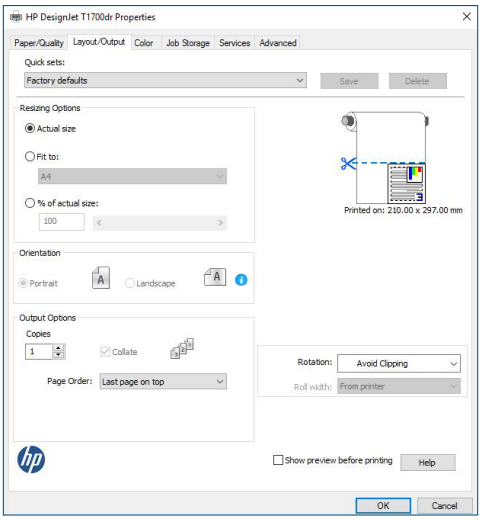
Canon imagePROGRAF TX-4100 Print Driver Utility Tab



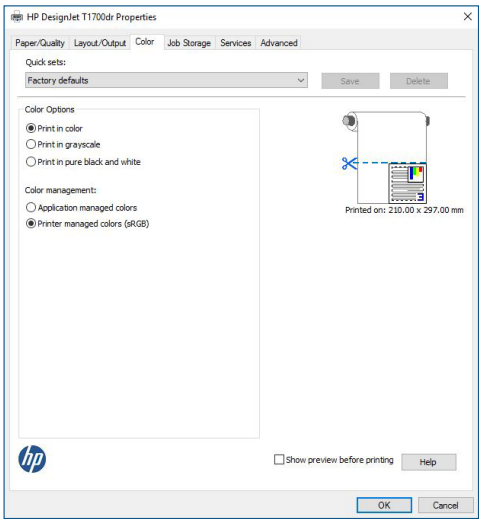
Canon imagePROGRAF TX-4100 Print Driver Colour Adjustment Tab



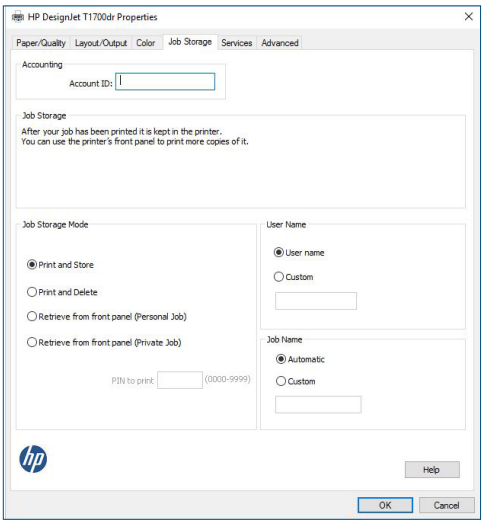
HP DesignJet T1700dr Print Driver Paper/Quality Tab



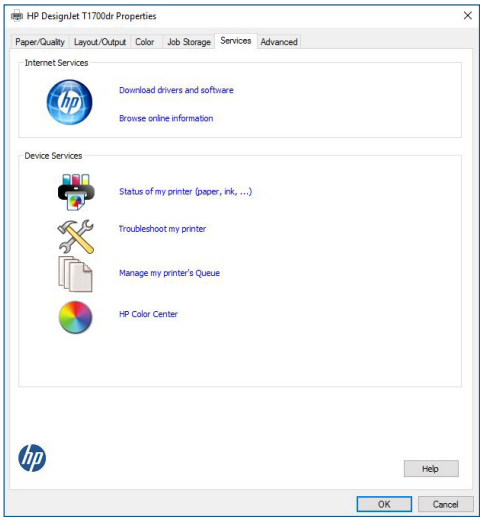
HP DesignJet T1700dr Print Driver Layout/Output Tab



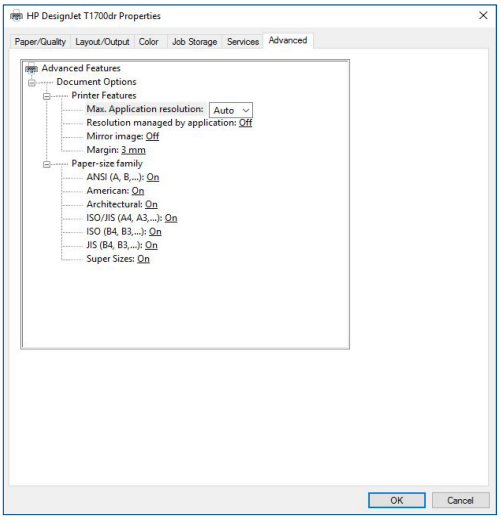
HP DesignJet T1600dr Print Driver Colour Tab



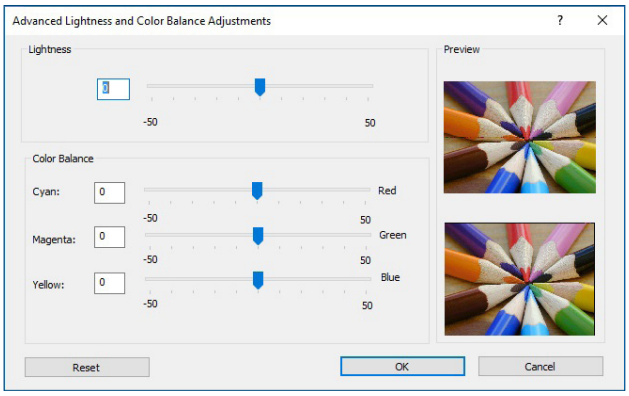
HP DesignJet T1600dr Print Driver Job Storage Tab



HP DesignJet T1700dr Print Driver Services Tab



HP DesignJet T1700dr Print Driver Advanced Tab



HP DesignJet T1700dr 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-4100		HP DesignJet T1700dr	
Fast	473.47	Fast	864.53
Standard	856.51	Normal	1,837.69
High	1,920.52	Best	5,280.40

Keypoint Intelligence'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 914 mm rolls, with each file set to auto-rotate to save media.

Mixed File Types, Same Size, Dual Roll

Canon imagePROGRAF TX-4100		HP DesignJet T1700dr	
Fast	758.34	Fast	1,003.72

Keypoint Intelligence's dual-roll 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, sending alternate jobs to different rolls, 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.

Colour Productivity (in Seconds)

Canon imagePROGRAF TX-4100		HP DesignJet T1700dr	
Fast	311.09	Fast	566.12
Standard	584.84	Normal	1,137.81
High	1,217.06	Best	3,445.08

The 12-page DWF test file was printed using the device driver set to the plain paper/colour setting. Both devices were loaded with 914-mm rolls. 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-4100		HP DesignJet T1700dr	
Fast	309.52	Fast	566.84
Standard	583.16	Normal	1,136.27
High	1,213.50	Best	3,431.69

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. 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-4100	HP DesignJet T1700dr
Time Before Printing Commences	55.32	149.06
First Page Out	97.20	215.28

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

	Canon imagePROGRAF TX-4100	HP DesignJet T1700dr
Time Before Printing Commences	18.12	33.91
First Page Out	58.88	102.44

First-page-out times are achieved by sending an Arch D-size PDF file to print in Fast mode, 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.

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

	Canon imagePROGRAF TX-4100	HP DesignJet T1700dr
First Page Out	85.04	135.69
Five Pages Out	432.07	772.63

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 five pages of the test document to the collection bin.

Colour Print Quality

Colour Optical Density Evaluation

Canon imagePROGRAF TX-4100						
	Fast		Standard		High	
	50%	100%	50%	100%	50%	100%
Cyan	0.49	1.00	0.57	1.24	0.58	1.30
Magenta	0.42	0.85	0.47	1.16	0.51	1.21
Yellow	0.44	0.84	0.50	1.03	0.52	1.06
Black	0.50	1.50	0.59	1.56	0.60	1.58

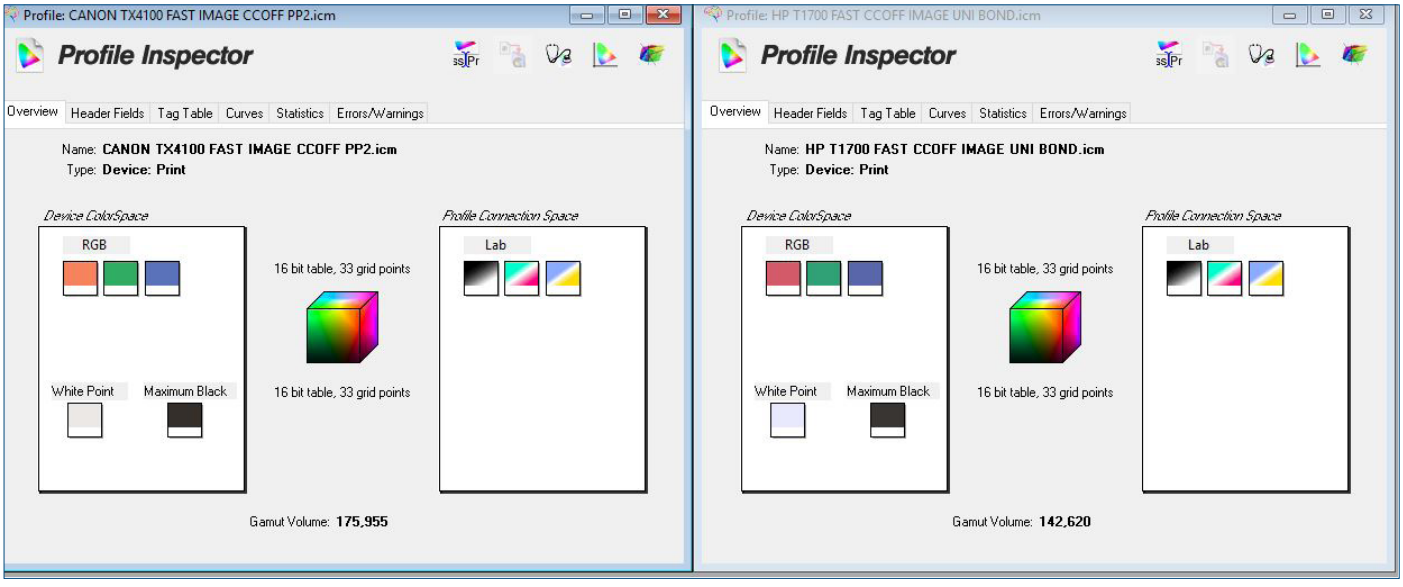
HP DesignJet T1700dr						
	Fast		Normal		Best	
	50%	100%	50%	100%	50%	100%
Cyan	0.62	1.01	0.58	1.02	0.58	1.03
Magenta	0.49	0.93	0.45	0.93	0.45	0.96
Yellow	0.34	0.79	0.36	0.81	0.35	0.84
Black	0.61	1.40	0.52	1.49	0.51	1.50

Note: Colour density readings were assessed by printing a Keypoint Intelligence proprietary PDF 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 and XRite exact^{Xp} densitometer.

Colour Gamut Cubic L*a*b* Unit Volume Comparisons

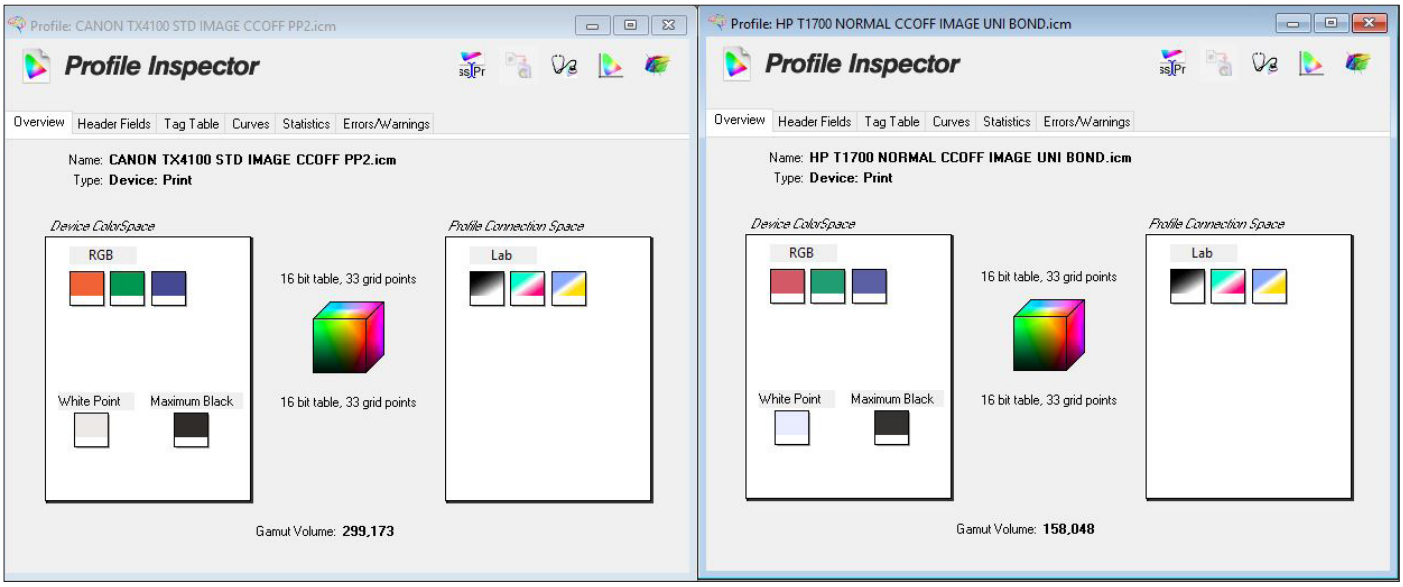
Media Type/Settings	Canon imagePROGRAF TX-4100	HP DesignJet T1700dr
Plain Paper Fast	175,055	142,620
Plain Paper Standard/Normal	299,173	158,048
Plain Paper High/Best	308,086	164,887
Matte Coated High/Best	398,619	396,404

Canon imagePROGRAF TX-4100 colour gamut on plain paper in Fast settings (shown chromatically) versus HP DesignJet T1700dr colour gamut (shown in red) on plain paper in Fast settings.

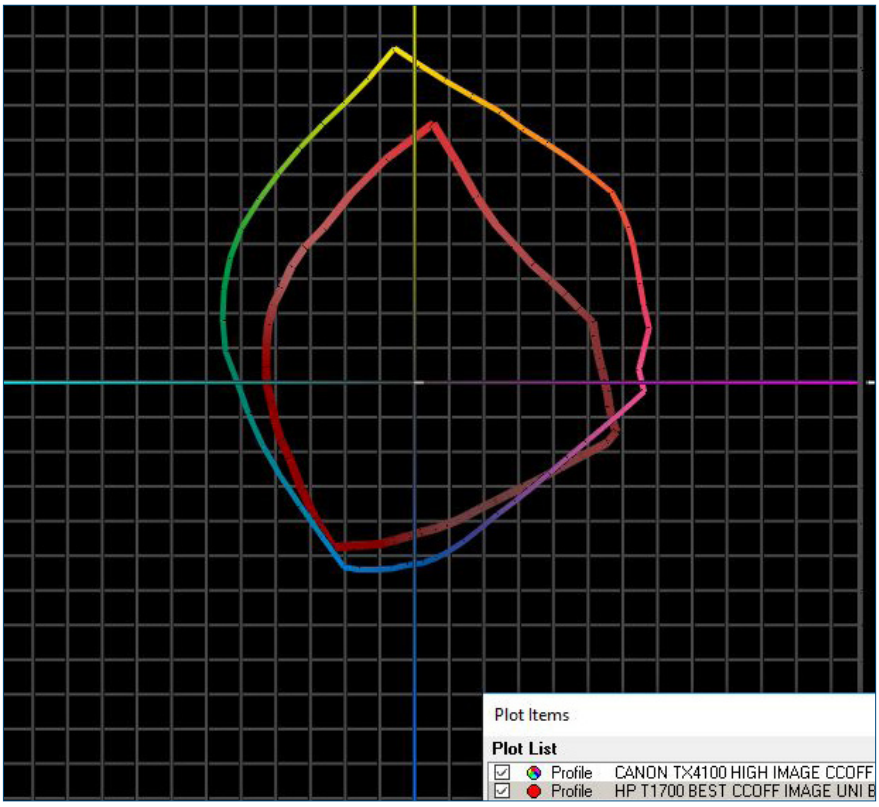


Colour gamut profile for Canon imagePROGRAF TX-4100 (left) and HP DesignJet T1700dr (right) on plain paper in Fast mode.

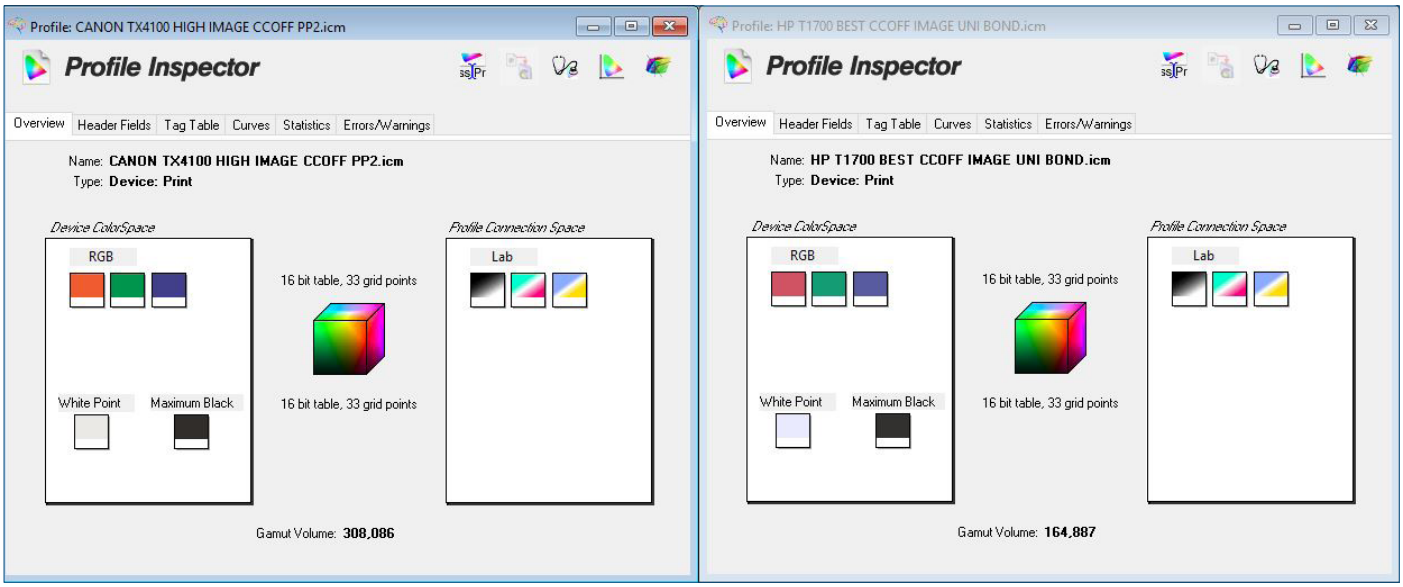
Canon imagePROGRAF TX-4100 colour gamut on plain paper in Standard settings (shown chromatically) versus HP DesignJet T1700dr colour gamut (shown in red) on plain paper in Normal settings.



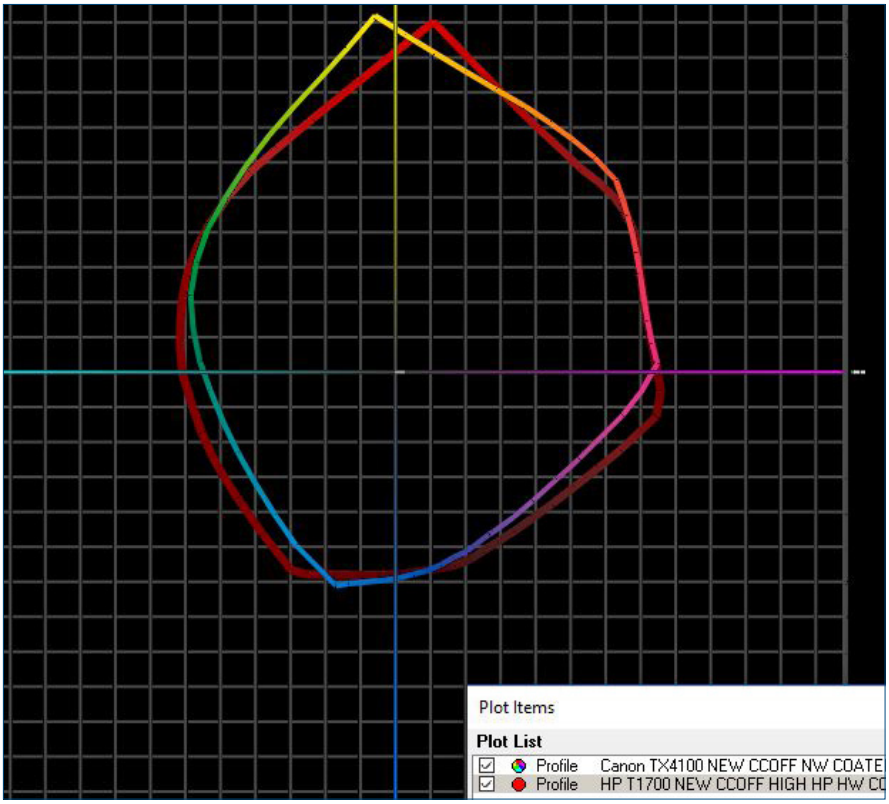
Colour gamut profile for Canon imagePROGRAF TX-4100 (left) and HP DesignJet T1700dr (right) on plain paper in Standard/Normal modes.



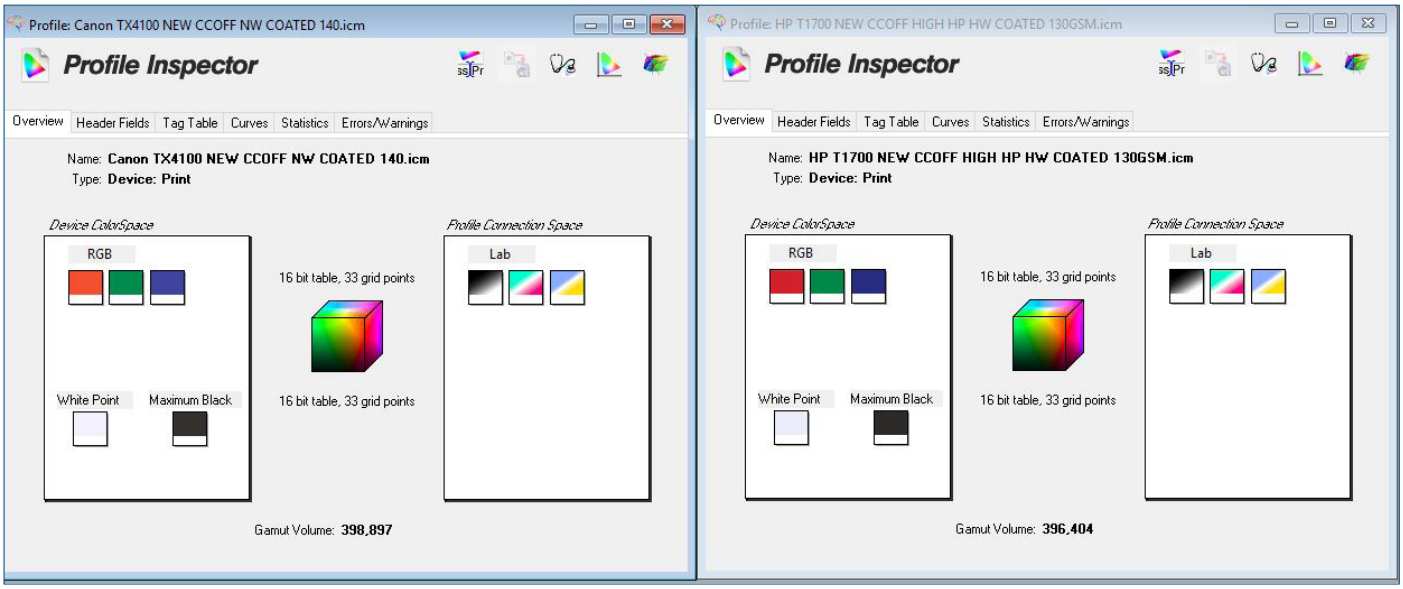
Canon imagePROGRAF TX-4100 colour gamut on plain paper in High settings (shown chromatically) versus HP DesignJet T1700dr colour gamut (shown in red) on plain paper in Best settings.



Colour gamut profile for Canon imagePROGRAF TX-4100 (left) and HP DesignJet T1700dr (right) on plain paper in High/Best Quality modes.



Canon imagePROGRAF TX-4100 colour gamut on matte coated paper in High quality settings (shown chromatically) versus HP DesignJet T1700dr colour gamut (shown in red) on matte coated paper in Best settings.



Colour gamut profile for Canon imagePROGRAF TX-4100 (left) and HP DesignJet T1700dr (right) on matte coated paper in High/Best Quality modes.

Black Print Quality

Solid Density

	Canon imagePROGRAF TX-4100			HP DesignJet T1700dr		
Density Block						
	Fast	Standard	High	Fast	Normal	Best
1	1.52	1.57	1.59	1.40	1.47	1.48
2	1.53	1.58	1.57	1.42	1.45	1.49
3	1.52	1.57	1.57	1.41	1.46	1.48
4	1.53	1.58	1.59	1.41	1.48	1.47

Note: Solid black density measurements are based on four readings taken from a Keypoint Intelligence 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 and XRite exact^{Xp} densitometer.

Device Feature Set

	Canon imagePROGRAF TX-4100	Advantage ✓		HP DesignJet T1700dr
Max. image resolution	2400 x 1200 dpi			2400 x 1200 dpi
Number of inks	5 (MBK, CMYK)		✓	6 (CMY, G, PBK, MBK)
Ink tanks replaceable during operation	Yes	✓		No
Ink-drop size	5 picoliter	✓		6 picoliter
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 (all colours)	✓		130/300 ml (all colours)
Number of nozzles	MBK: 5,120 nozzles; CMYK: 2,560 nozzles each; 15,360 in total	✓		2,112 nozzles per colour; 12,672 in total
Number of printheads	1 (User-replaceable)			3 (2 colours per printhead; user-replaceable)
Line accuracy	+/-0.1%			+/-0.1%
Minimum line width	0.02 mm			0.02 mm
Minimum print margins	3 mm (Roll); 3 mm Top and Side and 12.7 mm Bottom (Cut sheet)			3 mm (Roll); 3 mm Top and Side and 17 mm Bottom (Cut sheet)
Borderless (0 mm) printing	Yes (Roll only)	✓		No

	Canon imagePROGRAF TX-4100	Advantage ✓		HP DesignJet T1700dr
Maximum outside diameter of roll paper	170 mm	✓		135 mm
Maximum printable paper roll length	18 m (depending on OS and application)		✓	91 m
Maximum cut-sheet media length	1.6 m			1.676 m
Maximum media thickness for roll paper	0.8 mm			0.8 mm
Maximum media width	1,118 mm (44 inches)			1,118 mm (44 inches)
Media loading	Front Loading, Front Output (Roll and Cut Sheet)			Top Rear and Rear
Roll paper	Optional Multifunction Roll System (with auto media take up)	✓		Optional dual
Optional media handling	2/3 inch roll holder set			3 inch roll core adapter
High-capacity stacker assembly	100 sheets	✓		Not supported
Standard/Maximum RAM	128 GB (2 GB physical)		✓	128 GB (4 GB DDR3 RAM physical)
Hard drive	500 GB (Standard Encrypted)			500 GB (Standard Encrypted)
Interface	Hi-Speed USB; 10/100/1000Base-T/TX Ethernet; Wireless LAN; USB 2.0			Gigabit Ethernet, 10/100/1000Base-T Ethernet (802.3, 802.3u, 802.3ab); USB
Type-A host port	HP-GL/2, HP RTL, PDF (Ver.1.7), JPEG (Ver. JFIF 1.02)			HP-GL/2, HP-RTL, TIFF, JPEG, CALS G4 (optional Adobe PostScript 3, Adobe PDF 1.7)
PDL	HP-GL/2, HP RTL, PDF (Ver.1.7), JPEG (Ver. JFIF 1.02)			HP-GL/2, HP-RTL, TIFF, JPEG, URF, CALS G4 (optional Adobe Post-Script 3, Adobe PDF 1.7)
Net weight (unpacked)	114 kg (including Roll Holder Set and Roll unit, excluding ink and printhead)		✓	74 kg (includes roll unit)
Power consumption when in standby	INA			24 W
Power consumption when active	116 W		✓	100 W
Acoustic pressure	Operation: 51 dB (A); Standby: 35 dB (A)		✓	Operation: 45 dB (A); Standby: 32 dB (A)
Acoustic power	Operation: 6.9 Bels			Operation: 6.1 B(A); Ready: 5.0 B(A)

Driver Feature Set

	Canon imagePROGRAF TX-4100	Advantage ✓		HP DesignJet T1700dr
Speed settings	5 (Fast 300, Fast 600, Standard 600, High 600 and 1200)			5 (Economode 300, Fast 600, Normal 600, Best 600 and 1200)
Economy mode	Yes			Yes (Economode)
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	56 + 10 user customizable special options	✓		36
IQ optimized for print profiles	Yes			Yes
Watermark	Yes	✓		No
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 plus the ability to add custom stamps)	✓		Not supported
Image rotation	Yes, 90 degrees and auto 180 degrees			Yes, auto rotate and 90 degrees
Option to preview before print	Yes			Yes
CMYK balance adjustment	Yes (CMY only)			Yes (CMY only)
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
Integration with MFP	Yes	✓		No

The Canon imagePROGRAF TX-4100 comes bundled with PosterArtist Lite.

Ink Consumption

Table 1: Amount of Ink in Each Canon imagePROGRAF TX-4100 Cartridge (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Weight of cartridge prior to installation	951.5	947.5	941.0	952.7	942.1
Weight of cartridge at end of life	205.5	205.5	205.5	205.5	205.5
Net weight of ink	746.0	742.0	735.5	747.2	736.6
Total ink weight across five cartridges					3,707.3

Table 2: Amount of Ink in Each HP DesignJet T1700dr Cartridge (in Grams)

	Grey	Photo Black	Matte Black	Yellow	Magenta	Cyan
Weight of cartridge prior to installation	343.2	340.4	317.6	352.8	355.4	358.1
Weight of cartridge at end of life	109.2	109.2	109.2	109.2	109.2	109.2
Net weight of ink	234.0	231.2	208.4	243.6	246.2	248.9
Total ink weight across six cartridges						1,412.3

Table 3: Ink Used in Three 50-Page Runs of Cottage Architectural Plan Test Document (Standard Mode) on the Canon imagePROGRAF TX-4100 (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	25.9	2.4	4.5	6.1	4.3
Test Run 2 Net weight of ink used	23.8	3.8	4.3	5.8	3.2
Test Run 3 Net weight of ink used	24.4	2.8	3.6	5.1	5.8
Average amount of ink used across three runs	24.7	3.0	4.1	5.7	4.4
Total ink weight across five cartridges					41.9

Table 4: Ink Used in Three 50-Page Runs of Cottage Architectural Plan Test Document (Normal Mode) on the HP DesignJet T1700dr (in Grams)

	Grey	Photo Black	Matte Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	0.7	14.0	21.8	1.8	6.8	7.0
Test Run 2 Net weight of ink used	0.8	15.4	22.4	1.7	6.5	8.1
Test Run 3 Net weight of ink used	0.7	14.5	22.6	1.6	6.4	7.2
Average amount of ink used across three runs	0.7	14.6	22.3	1.7	6.6	7.4
Total ink weight across six cartridges for 50-page run (based on averages)						53.3

Table 5: Ink Used in Three 50-Page Runs of ISO Poster Test Document (Standard Mode) on the Canon imagePROGRAF TX-4100 (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	22.1	3.4	4.4	25.2	40.8
Test Run 2 Net weight of ink used	24.6	3.9	4.5	26.4	40.7
Test Run 3 Net weight of ink used	23.1	3.3	4.6	25.1	41.4
Average amount of ink used across three runs	23.3	3.5	4.5	25.6	41.0
Total ink weight across five cartridges for 50-page run (based on averages)					97.9

Table 6: Ink Used in Three 50-Page Runs of ISO Poster Test Document (Normal Mode) on the HP DesignJet T1700dr (in Grams)

	Grey	Photo Black	Matte Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	3.7	10.2	11.4	6.4	20.5	54.0
Test Run 2 Net weight of ink used	4.7	10.1	11.5	7.2	20.6	54.8
Test Run 3 Net weight of ink used	4.1	10.4	11.3	6.8	20.5	54.5
Average amount of ink used across three runs	4.2	10.2	11.4	6.8	20.5	54.4
Total ink weight across six cartridges for 50-page run (based on averages)						107.5

Table 7: Ink Used in Three 50-Page Runs of GIS Map Test Document (Standard Mode) on the Canon imagePROGRAF TX-4100 (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	25.3	2.8	7.5	23.8	22.3
Test Run 2 Net weight of ink used	26.8	2.8	7.8	23.6	22.1
Test Run 3 Net weight of ink used	25.6	2.4	8.3	22.4	21.7
Average amount of ink used across three runs	25.9	2.7	7.9	23.3	22.0
Total ink weight across five cartridges for 50-page run (based on averages)					81.8

Table 8: Ink Used in Three 50-page Runs of GIS Map Test Document (Normal Mode) on the HP DesignJet T1700dr (in Grams)

	Grey	Photo Black	Matte Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	42.2	7.8	8.4	13.4	15.0	36.9
Test Run 2 Net weight of ink used	41.7	6.5	7.6	13.9	14.3	37.6
Test Run 3 Net weight of ink used	41.9	7.1	8.1	13.6	14.8	37.1
Average amount of ink used across three runs	41.9	7.1	8.0	13.6	14.7	37.2
Total ink weight across six cartridges for 50-page run (based on averages)						122.5

Ink Consumption Test Methodology Overview

Keypoint Intelligence's ink consumption analysis was conducted using three document types (Cottage Architectural Plan, ISO Office Poster and a 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-4100 was installed in Keypoint Intelligence's lab with the latest "01.02" level of firmware (as of March 2021) and connected to a Windows 10 Pro 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 T1700dr was installed in Keypoint Intelligence's lab with the latest "JGRw_07_20_34.1" level of firmware (as of March 2021) 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. All three document types were printed with quality set to Normal mode.

Before installing the ink cartridges, 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 Keypoint Intelligence's environmentally controlled UK test lab, which replicates typical office conditions.

Test Equipment

Keypoint Intelligence's dedicated test network in Europe, consisting of Windows 2012 servers and Windows 10 Professional workstations, 10/100/1000BaseTX network switches and CAT5e/6 cabling.

Test Procedures

The test methods and procedures employed by Keypoint Intelligence in its lab testing include Keypoint Intelligence's proprietary procedures and industry-standard test procedures. In addition to a number of proprietary test documents, BLI uses industry standard files including a Keypoint Intelligence 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 XRite 508 and XRite exact^{Xp} densitometers.

About Keypoint Intelligence

For 60 years, clients in the digital imaging industry have relied on Keypoint Intelligence for independent hands-on testing, lab data, and extensive market research to drive their product and sales success. Keypoint Intelligence has been recognized as the industry's most trusted resource for unbiased information, analysis, and awards due to decades of analyst experience. Customers have harnessed this mission-critical knowledge for strategic decision-making, daily sales enablement, and operational excellence to improve business goals and increase bottom lines. With a central focus on clients, Keypoint Intelligence continues to evolve as the industry changes by expanding offerings and updating methods, while intimately understanding and serving manufacturers', channels', and their customers' transformation in the digital printing and imaging sector.

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