

KPI Comparative Lab Test Report

SEPTEMBER 2018

Canon imagePROGRAF TM-200

vs. HP DesignJet T520

Advantage ✓	Canon imagePROGRAF TM-200	HP DesignJet T520
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 TM-200 and the HP DesignJet T520, and produce a report comparing the relative strengths and weaknesses of the two printers 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

Targeted to small design studios, the 24-inch five-colour Canon imagePROGRAF TM-200 outshone the HP DesignJet T520 in most aspects of Buyers Lab's lab evaluation, with superior image quality, higher productivity, lower ink consumption, and richer device and driver feature sets. The unit's productivity was superb overall, whether printing from a ready state, or printing Buyers Lab's jobstream (which replicates a typical mixed workflow for a large-format unit). Plus, it was capable of printing Buyers Lab's test banner file in its entirety, unlike the HP T520 which could not print the file. Significantly, the Canon unit is capable of handling ink and paper outages without having an impact on user productivity, or causing unnecessary waste. Thanks to its hot-swap ink tank design, inks can be replaced on the fly; when it is out of paper, the Canon unit pauses and alerts the operator, and once a new roll is installed and the paper type is confirmed, the unit continues to print the interrupted page in full followed by all successive pages, thus reducing waste. In contrast, when the HP T520 runs out of ink or paper, it stops and cancels the entire job in progress, even if it is in the middle of a large print job. Users are forced to set up the job again once ink or paper is replenished and resume the job from the page on which the job was interrupted, all of which requires additional intervention.

Image quality produced by the two models 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, the Canon TM-200 excelled with a finer level of detail in colour and black photographic images, more natural skin tones, larger colour gamuts, and crisper text and line art output (with no bleed). The HP model delivered darker solids when printing in monochrome but did not have an advantage in any other area. The Canon TM-200 also delivered the lower ink consumption in all three tests.

In terms of device and driver feature sets, the Canon TM-200 offers plenty of advantages over the HP model. It has higher cartridge capacities, higher memory to aid with job processing, smaller ink drop sizes, more media profiles, a unidirectional feature to eliminate banding on image output even when printing in Fast mode, and a flexible layout nesting option to help users save on paper. While the HP model offers a similar nesting feature, jobs are positioned automatically and it doesn't support the same flexibility and control over image placement. Canon users can integrate the imagePROGRAF TM-200 device with a small-format MFP to produce enlarged, poster-size copies via the free Color imageRUNNER Enlargement Copy Mode, a feature not offered by HP. The HP T520 provides strong direct print submission support, not only from the PC desktop with HP Click but also via a mobile print app for iOS and Android mobile platforms, as well as files attached in emails to the printer's email address. The Canon TM-200 offers equally robust direct print support via its enhanced imagePROGRAF Direct Print & Share desktop utility which lets users print files stored on their network or in Google Cloud, as well as create and save job profiles to help streamline common print workflows. Like the HP unit, it also provides additional flexibility for workers who are travelling between sites or working remotely, with support for mobile printing from Android and iOS devices via the Canon Print Inkjet SELPHY mobile app.

In conclusion, with its superior productivity, more efficient use of ink, and excellent overall image quality, the Canon TM-200 is judged to be the stronger performer in Buyers Lab's large-format evaluation.

Colour Image Quality

Advantage ✓	Canon imagePROGRAF TM-200	HP DesignJet T520
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 Photo, 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.
- + In terms of colour optical solid density, the Canon TM-200 had the overall advantage with higher optical densities for all colours in High/Best mode, and higher densities for three colours in both Fast and Standard/Normal modes. The HP T520 produced a higher magenta optical density in Fast mode and a higher composite black density in Standard/Normal mode.
- + In Buyers Lab's colour gamut assessment conducted on plain paper in Fast mode, the Canon TM-200 delivered a fractionally (by 1.8%) larger colour gamut with a CIE volume of 194,005 versus a CIE volume of 190,587 for the HP model.
- + The Canon model produced a 48.3% larger colour gamut when printing on plain paper using Standard/Normal settings—with a CIE volume of 323,403 versus a CIE volume of 218,134 for the HP device.
- + When printing on plain paper in High/Best quality settings, the Canon TM-200 delivered a 36.0% larger colour gamut than the HP T520, with a CIE volume of 322,698 versus a CIE volume of 237,310 for the HP model.
- + In High/Best quality settings using matte coated paper, the Canon model delivered a 25.4% larger colour gamut, with a CIE volume of 413,801 compared with a CIE volume of 329,944 for the HP T520.
- + The Canon TM-200 delivered superior colour text reproduction overall; it produced excellent dark, pin-sharp Arial sans serif text that was legible down to the smallest (3-pt.) type size, with no breakup or ink bleed, in all tested modes. Serif characters, again, displayed no bleed and were legible down to 5-pt. size in Fast mode and 3-pt. size in Standard and High modes. The HP T520 produced serif text that was fully formed and legible down to the 5-pt. level in Fast and Best modes, and 3-pt. level in Normal mode with no overspray and minimal bleed in Normal and Best modes. The HP model's Arial characters were legible at the 3-pt size, with some ink bleed evident on text produced in Normal mode, but otherwise rated very good in Normal mode and excellent in Best mode.

- + Fine lines produced by both devices remained distinct down to the 0.1-pt. level across all modes. Fine lines were rated very good in Fast mode and excellent in Standard and High modes for the Canon TM-200 as they were crisp and clean; fine lines for the HP T520 were rated good in Fast mode and very good in Normal and Best modes, as there was slight ink bleed observed.
- + The Canon model produced 0.1-pt. circles that were smooth and unbroken, and rated very good in Fast mode and excellent in Standard and High modes. Circles produced by the HP T520 model were fully formed at 0.1-pt. size and were very good in all modes.
- Both models delivered very good CMY pixel grids, with consistent dot size and dot laydown.
- 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 TM-200 delivered smooth colour halftone fills in all modes, rated very good in Fast mode and excellent in Standard and High modes; the HP model delivered smooth halftone coverage that was consistently rated very good.
- + When evaluating Architectural, Engineering and Construction (AEC) graphics in Standard/Normal and High/Best modes, both the Canon and HP units' output exhibited an excellent level of detail. The Canon model delivered superb distinct fine lines and clear text formation, and while the HP model delivered very good fine lines and text, there was some evidence of ink bleed on output in Normal mode when viewed under magnification.
- + When evaluating Geographic Information Systems (GIS) graphics in Standard/Normal and High/Best modes, on plain paper, both units delivered very good colours and detail, but the Canon TM-200's output had the overall advantage in High mode as it exhibited excellent depth of field—a critical factor in delivering a realistic three-dimensional rendering of topographical features.
- + Colour business graphics produced by the Canon TM-200 unit exhibited sharper details than did those produced by the HP device.
- + When comparing photographic images in Standard/Normal and High/Best quality modes, the Canon model delivered superior depth of field, superb fine detailing in both dark and light contrast areas, and colours that were much brighter when compared with images produced by the HP unit. There was a lot of banding visible on output produced in Fast mode by the HP unit, and colours appeared quite flat; in Standard mode, colours were brighter but tonal transitions were slightly grainy, while in Best mode there was good detailing in dark and light contrast areas and good tonal transitions.
- + Skin tones produced by the Canon TM-200 were natural-looking, while those produced by the HP model were slightly reddish in comparison.
- + Overall, the Canon TM-200 was the stronger performer in Buyers Lab's assessment of colour image quality. The Canon printer delivered larger colour gamuts overall, superb crisp text and fine lines, smoother circles, and brighter, more saturated colours and natural-looking skin tones. As befitting the needs of their target markets, both models produced distinct fine lines in AEC drawings and an excellent level of detail in GIS graphics, but, again, the advantage lay with the TM-200 with its excellent depth of field, even on plain paper. The HP T520's text and line art suffered from some ink bleed when viewed under magnification, while the Canon unit's output did not, and there was no other aspect where the HP model's output truly stood out.

Black Image Quality

Advantage ✓	Canon imagePROGRAF TM-200	HP DesignJet T520
Text	✓	
Fine Lines	✓	
Halftone Range	=	=
Halftone Fill	✓	
Solid density		✓
AEC Graphics	✓	
Business Graphics	✓	
Photographic Images	✓	

- Overall, the HP model delivered darker solids when printing in monochrome than did the Canon unit, producing higher optical densities in Standard/Normal and High/Best modes, while black optical density was comparable in Fast mode.
- + Black serif text produced by the Canon TM-200 unit displayed clear character definition and was legible down to the 4-pt. size in Fast mode and 5-pt size in Standard mode with no breakup or ink bleed; in High quality mode, Times characters were crisp and legible down to the 3-pt. size. Sans serif text was crisp, dark and legible down to the 3-pt. level for all modes. Serif and sans serif fonts produced by the HP T520 were legible down to the 5-pt. and 3-pt level for all modes, respectively; however, character definition was far less distinct, suffering from some ink bleed in all modes.
- + In Buyers Lab's line art reproduction test, both models' fine lines remained distinct at the 0.1-pt. level in all modes. However, the Canon TM-200 delivered better quality overall, with crisp and distinct fine lines in Standard and High modes, which were rated very good and excellent, respectively. Fine lines were judged very good in all modes for the HP T520 as there was slight bleed under magnification. White-on-black fine lines produced by both models remained distinct at the 0.25-pt. level in all quality modes and were rated very good in Fast and excellent in Standard and High modes for the Canon TM-200, but rated only good for the HP T520, except in Best mode where its white-on-black lines were very good as they were more distinct.
- + Although circles produced by both models were fully formed at 0.1pt, those produced by the Canon TM-200 were smoother than those produced by the HP unit, and were rated as very good in Fast and Standard modes and excellent in High quality mode, as opposed to a good rating for the HP T520 in Fast mode and very good in Normal and Best modes.
- Both models delivered black halftone output across the full range—from the 10% to the 100% dot-fill levels—with distinct transitions between all levels.
- + The Canon model delivered smooth greyscale coverage that was rated very good in Fast mode and excellent in Standard and Best modes. Halftone fill coverage was slightly grainy in the 30% to 60% fill areas in all print modes for the HP device and rated only good.

- + When evaluating AEC graphics in Standard/Normal and High/Best quality modes in black, both models delivered detailed and distinct fine lines, but the Canon TM-200 delivered crisper text and better closely spaced fine lines.
- + 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.
- + The Canon TM-200 produced smooth greyscale photographic images on plain paper in all modes, which showed very good depth and fine detailing, and rated excellent in Standard and High modes, although in Fast mode its output exhibited minimal banding. In contrast, monochrome images produced by the HP T520 were slightly grainy in all print modes. In addition, images in Best mode were overly dark and as a consequence lacked fine detailing in dark contrast areas, although detailing was held well in lighter areas. Some banding was evident in Fast mode.
- + In Buyers Lab's monochrome image quality assessment, the Canon TM-200 produced superior quality, delivering crisper text and fine lines (with no ink bleed), sharper business graphics, smoother greyscale coverage and better depth of field and detailing in photographic images. The HP T520 produced higher black optical densities in two of the three tested modes as well as a full halftone range.

Print Productivity

Advantage ✓	Canon imagePROGRAF TM-200	HP DesignJet T520
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	✓	

- + The Canon TM-200 delivered a 7.0% faster first-page-out time of 103.78 seconds after a weekend of non-use, compared with 111.64 seconds for the HP T520 device. Start-up time before printing commenced was slower for the Canon model at 54.00 seconds, compared with 26.68 seconds for the HP unit.
- + The Canon device delivered a 31.8% faster first-page-out time of 69.36 seconds from its ready state, compared with 101.64 seconds for the HP T520. Start-up time before printing commenced was slightly slower for the Canon model—24.26 seconds for the Canon model versus 21.47 seconds for the HP model.
- + When printing Buyers Lab's job stream, designed to simulate a typical mixed workflow for a large-format unit, the Canon TM-200 was 65.2% faster than the HP model in Fast mode, 55.5% faster in Standard/Normal mode, and 68.5% faster in High/Best mode.
- + When printing Buyers Lab's 12-page DWF test file in colour, the Canon TM-200 was faster than the HP unit in all modes tested; it was 38.0% faster in Fast mode; 55.9% faster in Standard/Normal mode; and 79.8% faster in High/Best mode.

- + Similarly, when printing Buyers Lab's 12-page DWF test file in monochrome, the Canon model was more productive across the board; it was 37.8% faster in Fast mode; 5.4% faster in Standard/Normal mode and 79.8% faster in High/Best mode than the HP unit.
- + The Canon model's unique sub ink tank system provides a further boost to productivity. When ink needs replacing on the Canon model it will continue to print, drawing ink from its sub tank while the cartridge is being replaced on the fly, so there's no operator downtime. For added convenience, the control panel alerts users to replace ink and also provides purchasing information. In contrast, when the HP T520 model runs out of ink, printing must stop for the cartridge to be replaced, which leads to operator downtime. Moreover, the job that was printing will be cancelled automatically. Once the ink cartridge is replaced, the job must be resent from the workstation, likely requiring more ink and paper to be used as a consequence.
- + Both the Canon and HP models will pause and alert the operator when they run out of paper. After a new roll is installed, the Canon 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. As with ink replacement on the HP T520, the current print job is cancelled automatically when a roll is depleted, which means the operator must resubmit the job again from the workstation, and thus may incur additional waste if the job is printed from the start.

Banner Printing

Advantage ✓	Canon imagePROGRAF TM-200	HP DesignJet T520
Image Quality	✓	
Productivity	✓	

The Canon TM-200 successfully printed Buyers Lab's 20" x 70" banner (a 4,955-KB PDF file) in Fast mode, taking 6.87 seconds to generate a preview at the desktop, and an additional 1 minute, 9.61 seconds from preview to final paper cut. In contrast, the HP T520 doesn't offer a preview and it was unable to print any portion of the banner, with a message appearing on the display requesting users to resubmit the file as a bitmap.

Poster Printing

Advantage ✓	Canon imagePROGRAF TM-200	HP DesignJet T520
Image Quality	✓	
Productivity (Fast mode)	✓	
Productivity (Standard/Normal mode)	✓	
Productivity (High/Best mode)	✓	

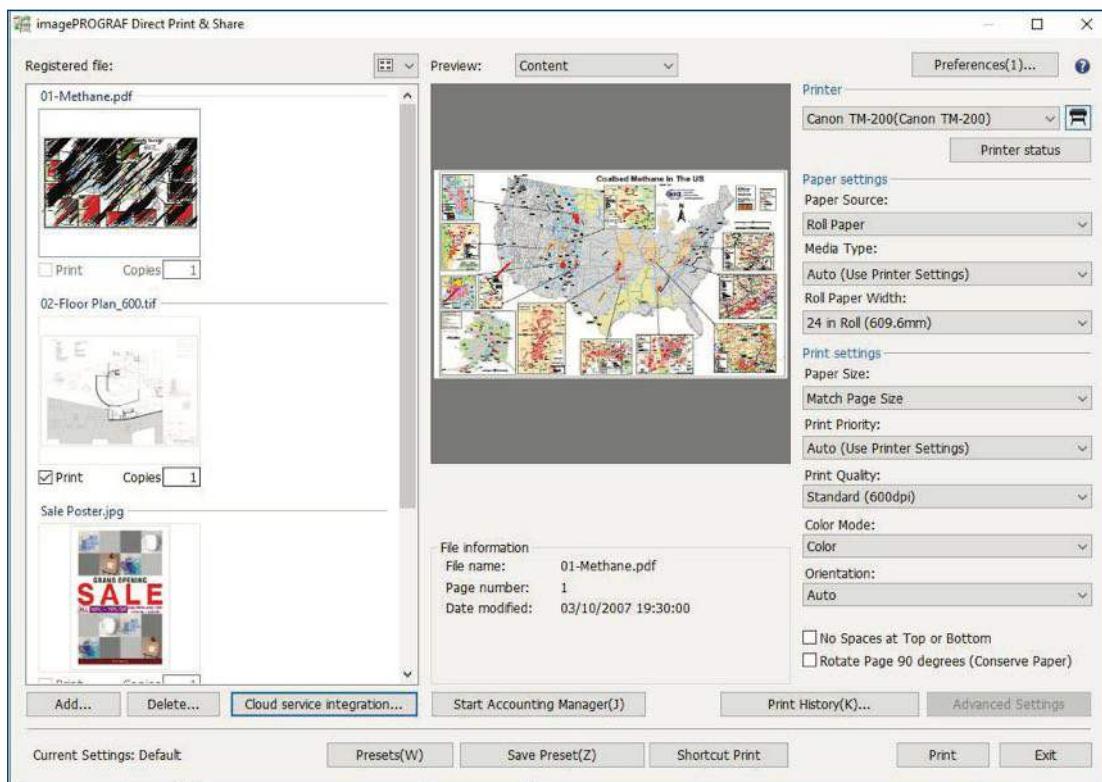
- + When printing Buyers Lab's Poster test target in Fast mode at 300 dpi, the Canon TM-200 took 41.03 seconds to complete the job, while the HP T520 took 64.81 seconds.

- + In terms of image quality, some banding was evident in Fast mode on output produced by both models (across the whole image with the HP unit, but only in dark areas with the Canon model). Colours on the HP poster were slightly paler compared with the much brighter colours in the poster produced by the Canon model. When unidirectional printing was selected in the Canon print driver, banding was eliminated and the time to print the banner increased to 60.53 seconds, which is still faster than the HP model.
- + The Canon model took 1 minute, 15.21 seconds to print the poster in Standard mode at 600 dpi, while the HP T520 took 1 minute, 28.70 seconds in Normal mode.
- + In Standard/Normal mode, the Canon poster showed slight banding in one dark area of the image and colours were vibrant with good detailing, whereas the HP unit's poster still exhibited some banding in dark areas. Although colour vibrancy improved, it was still not as bright as the poster printed by the Canon model.
- + When printing the poster in High quality (600 dpi) mode, the Canon model took 1 minute, 56.74 seconds, which is 68.6% faster than the HP unit's 6 minutes, 11.78 seconds result when printing in Best mode.
- At the High/Best quality settings, there was no observable banding and definition of fine details and bright colours were equally good on output from both models.

Direct Print Submission Functionality

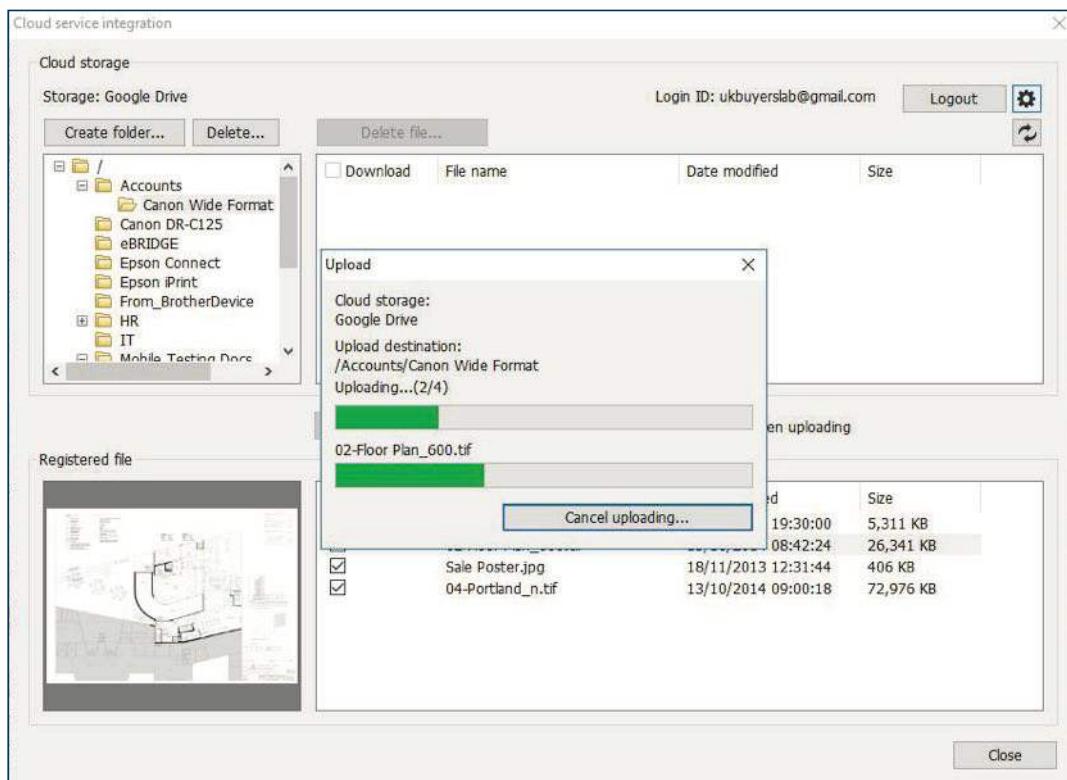
Advantage ✓	Canon imagePROGRAF TM-200	HP DesignJet T520
Ease of Use	=	=
Direct Print Submission Functionality	=	=
Mobile App Integration	=	=

- Available as a free download from Canon's website, the newly enhanced 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, the utility provides thumbnail previews of multiple print jobs and users can modify and print multiple files simultaneously.

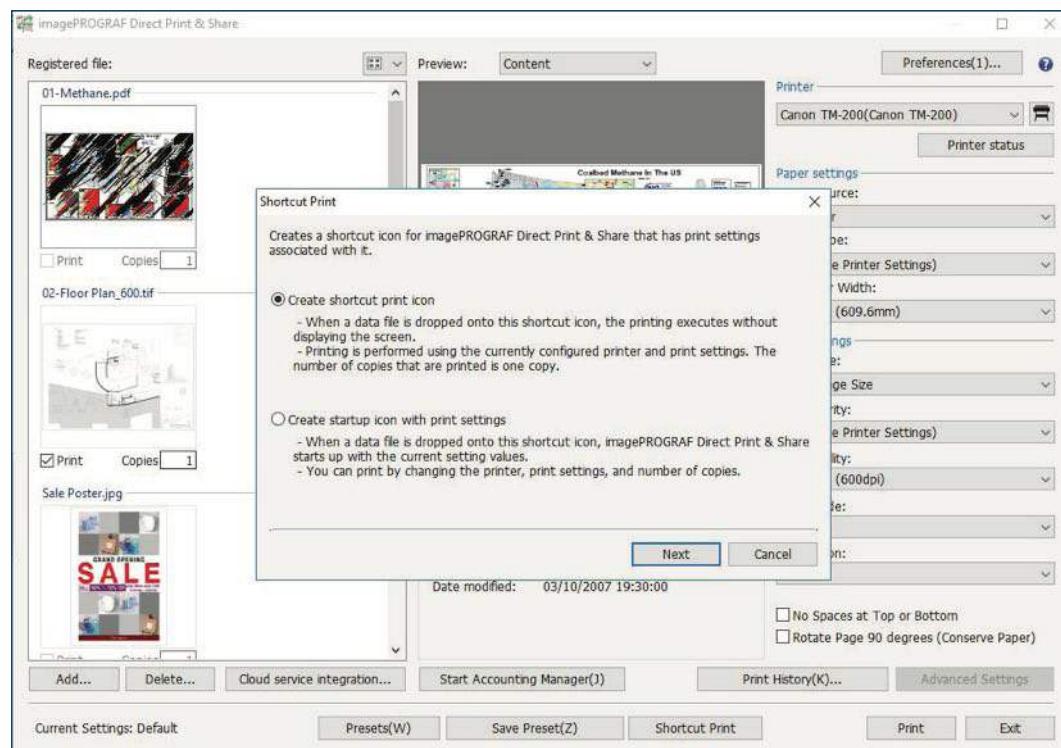


Canon's imagePROGRAF Direct Print & Share utility provides users with an image preview. Users can maximize the utility's window to obtain a larger preview, which enhances usability.

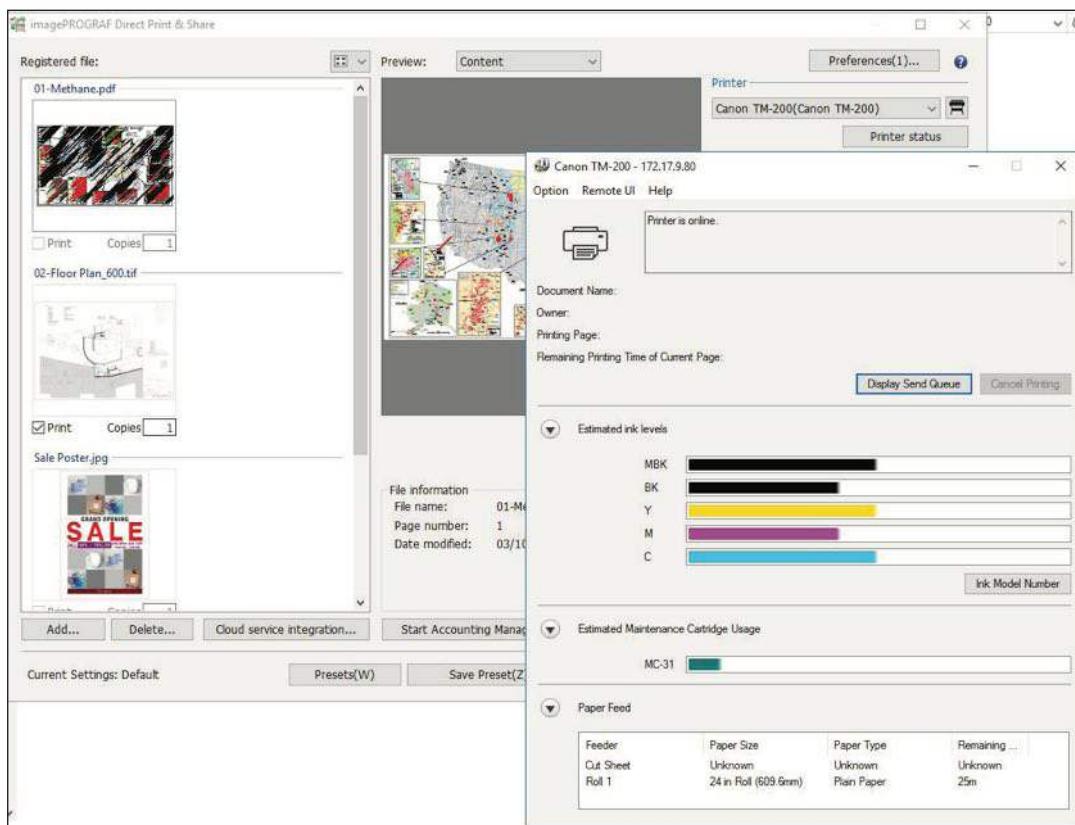
- The imagePROGRAF Direct Print & Share utility supports “Shortcut Print” functionality, enabling users to create a desktop shortcut that includes commonly used print settings, including output printer, print quality, paper type and paper size. Akin to a hot folder workflow, files are automatically printed 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. In addition, users can register and save new job presets in the utility to expedite daily routine workflows.



imagePROGRAF Direct Print & Share lets users retrieve files from as well as upload files to Google Cloud for easier collaboration.

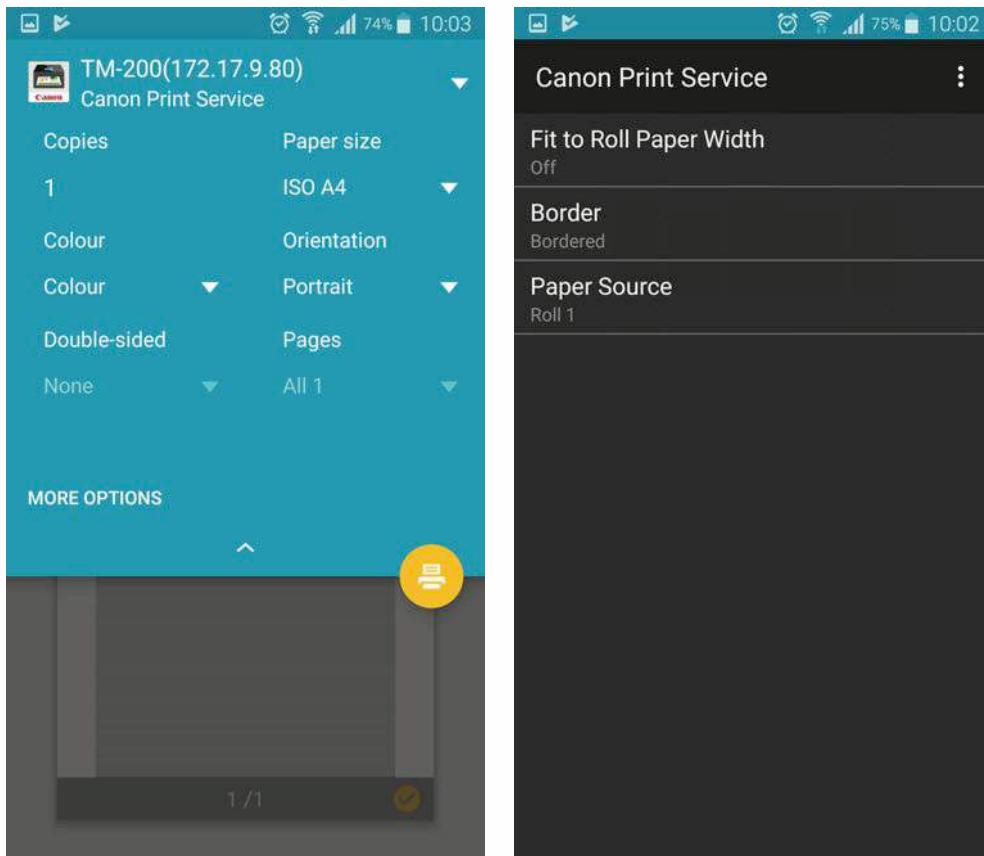


To help standardize and streamline common print workflows, users can register and save job profiles in the utility as well as create desktop shortcuts that allow drag and drop automatic file printing with predefined print settings.



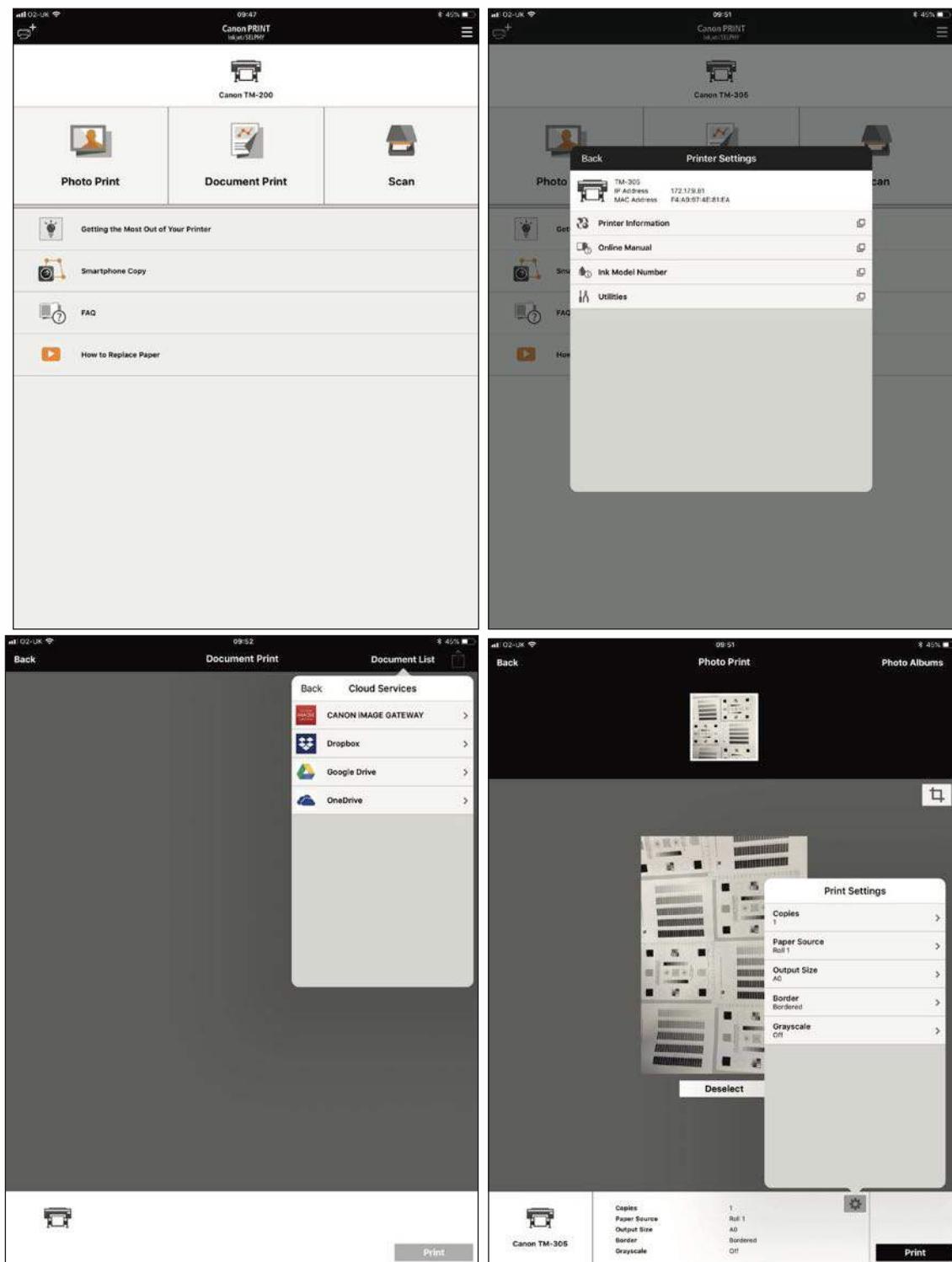
Conveniently, users can view device and consumables status via the utility before sending jobs to print.

- Users can download stored files from Google Drive and AutoCAD 360 cloud storage services for printing via the imagePROGRAF Direct Print & Share utility. Files can be uploaded directly to cloud storage as well. For added convenience and collaboration, the utility offers the option to share 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.
- Additional benefits provided by imagePROGRAF Direct Print & Share include quick and easy printing of jobs selected from the print history log using the same settings as before; the ability to view device and consumables status via a link to Status Monitor; and the option to insert a divider sheet in between jobs when outputting multiple files simultaneously for easier identification.
- The free Canon Print Service (CPS) mobile print plugin lets Android users print wirelessly to the TM-200 and other compatible Canon printers on the same WiFi network. The service automatically detects compatible Canon printers, offers a broad range of print settings, and is very straightforward to use.



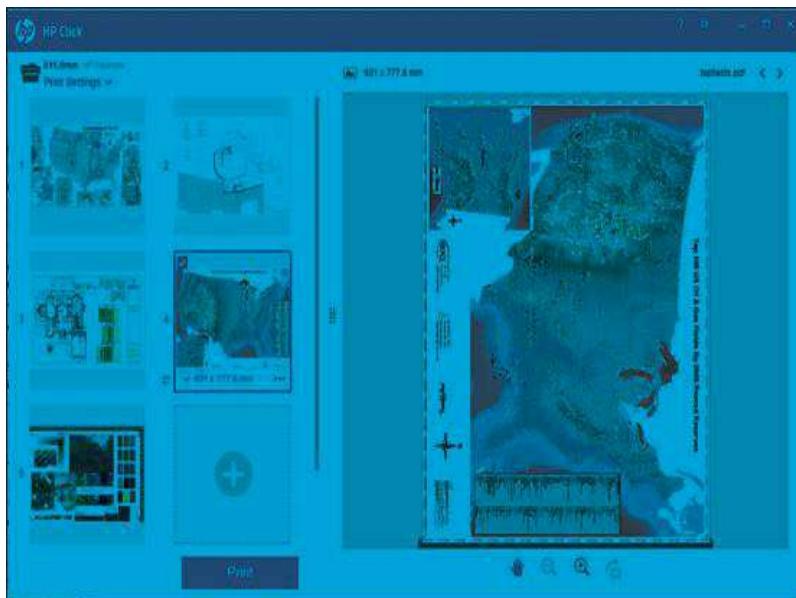
The Canon Print Service mobile print plugin is an easy way for Android users print to the TM-200, and it offers a broad range of print settings, including colour, orientation, and borderless printing.

- Canon's TM large-format series also supports the versatile Canon Print Inkjet SELPHY app, which can be downloaded for free on Apple iOS and Android mobile devices. This mobile printing app lets users print PDFs, Microsoft Office documents and JPEG images, access and print files stored in cloud services, view device and consumables status via a link to the device's embedded web page, and stay informed when their jobs have been printed (or not) via push notification alerts. The app's user-friendly interface offers a broad range of print settings, as well as the ability to print multiple files at once.



Canon's imagePROGRAF TM series supports mobile printing via the Canon Print Inkjet SELPHY app. Android and iOS users can easily preview and print documents (including Microsoft Office files), and images stored on their mobile devices or from cloud accounts such as Dropbox or OneDrive, as well as view printer status, and select basic print settings.

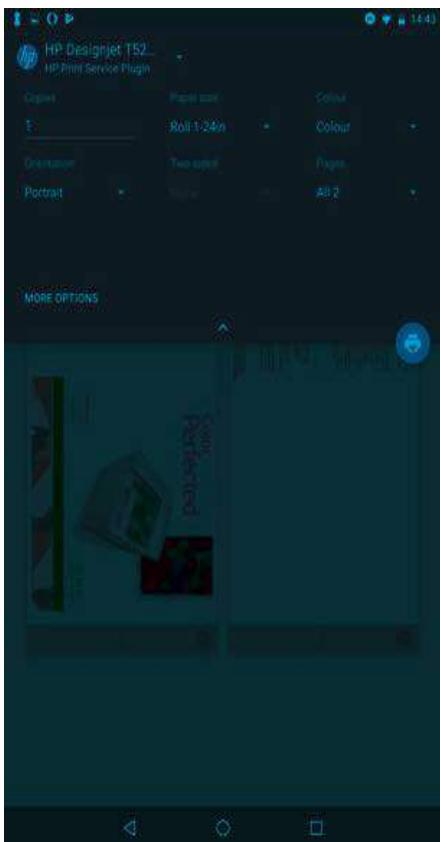
- Similar to Canon's utility, HP Click printing software, which is also available as a free download, enables direct printing of PDF, JPEG, TIFF and HPGL/2 files from the PC desktop, without the need for native applications or print drivers. Here, users can preview, resize and align images without the need to open up the driver properties. The utility also has an automatic nesting feature to reduce waste, and with select printers, users can access printer and print job status information via a link to the printer's embedded web server.



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

- The HP Mobile Printing service allows users to print directly from an iOS or Android smart device to a compatible HP large-format device. Unlike the previous version (ePrint & Share), users do not need to create an account in order to access direct print functionality. Instead, the mobile device quickly pairs with the printer via a wireless network connection or by Wi-Fi Direct for direct job submission. Android users have an added step, however, of downloading and enabling the free HP Print Service Plugin app, which is available from Google Play, before

being able to access the HP Printing service. Users can print a wide selection of file formats such as Microsoft Office documents, as well as PDF, JPEG and TIFF files. Whether a file is stored locally on the device, in a cloud service account, or sent as an email attachment, the user just needs to open the file and select the Share option, which then allows them to send the job to their preferred HP printer.



The HP Mobile Printing service enables Android (shown left) and iOS mobile devices to pair with the HP T520 and other compatible HP devices easily. Users can retrieve files from cloud storage, preview images, and perform image adjustments.

- Users also have the option of printing from their Apple iOS and Android smartphones and tablets via the HP Smart mobile app (formerly known as HP All-in-One Printer Remote app). This free mobile printing app lets users 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 the printer status. A broad range of document editing options are available through the Preview function, as are a multitude of print settings.



The HP Smart App (formerly known as HP All-in-One Printer Remote app) is a free mobile printing app that allows users to print, scan, share and store documents from their device to compatible HP output devices.

- In addition, the HP T520 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.

Ink Consumption

Overall Weight of Ink Used (in Grams)

	Canon imagePROGRAF TM-200	HP DesignJet T520
Cottage Architectural Plan	18.7	22.0
ISO Poster	40.4	54.3
GIS Map	29.5	54.2

Results are averaged across three sets of 50-page A1 printing in Standard/Normal mode.

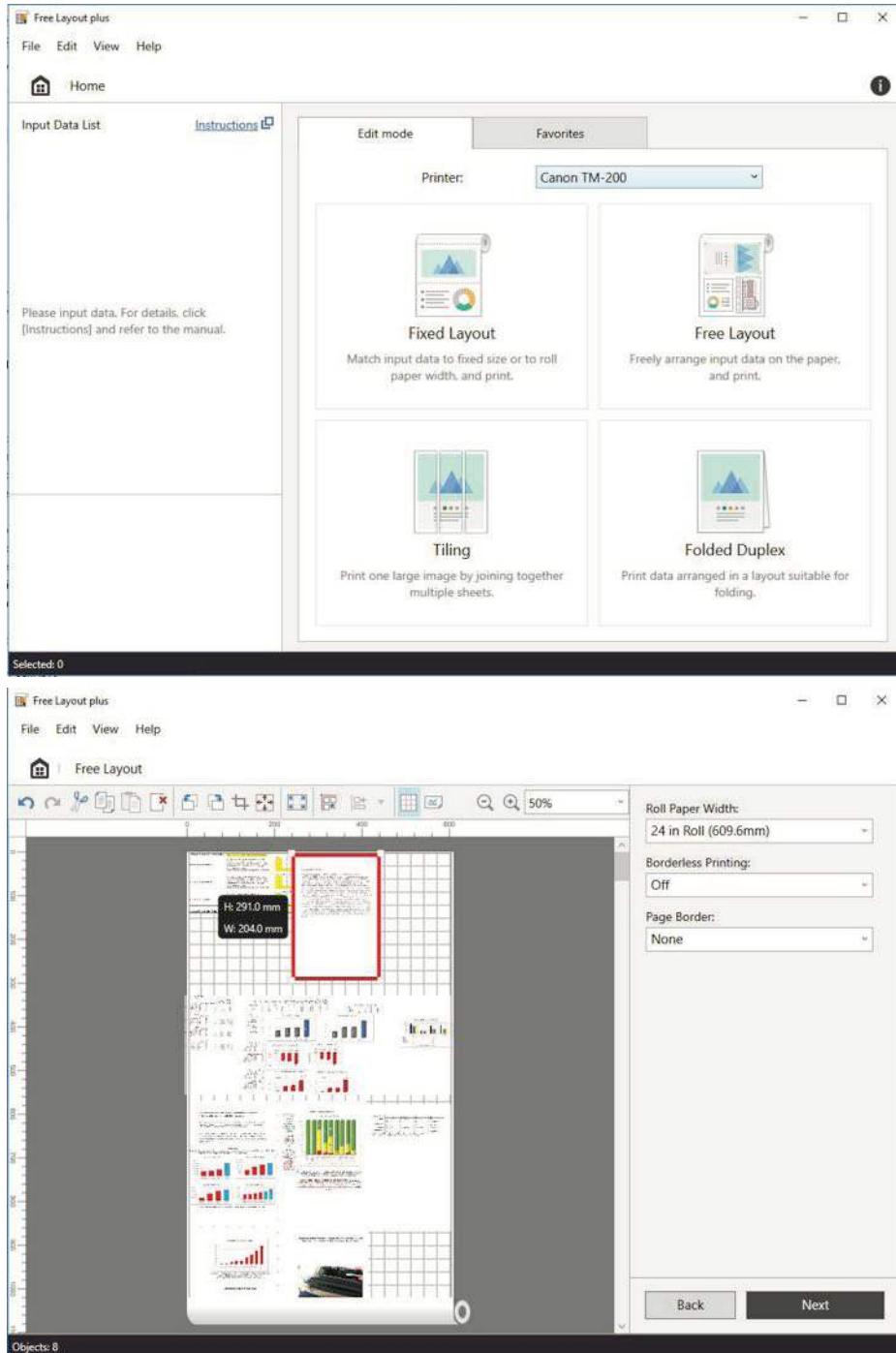
- + When producing 50 prints of a Cottage Architectural Plan in Standard/Normal mode, the Canon unit used 15.0% less ink than the HP T520.
- + When printing an ISO Poster in Standard/Normal mode, the Canon unit used 25.6% less ink than the HP T520.
- + When printing a GIS Map in Standard/Normal mode, the Canon TM-200 used 45.6% less ink than the HP device did.

Device Feature Set

- + The total capacity of the Canon TM-200's starter ink cartridges is 490 ml, which is higher than the 125 ml total starter ink volume available with the HP model.
- + Canon's replacement ink cartridge capacities are 130 ml and 300 ml for all colours, whereas the HP model offers 29 ml for CMY, and 38 ml or 80 ml for Black. As a consequence, the Canon cartridges will need replacing less frequently.
- + While Canon's ink cartridges are replaceable during operation, which helps reduce downtime, the HP unit must stop before a cartridge can be replaced.
- + If the Canon device detects that printhead nozzles are becoming clogged, it automatically starts a cleaning routine when there are no more nozzles available to compensate for the clogged ones. This task would have to be done manually with the HP unit, although Buyers Lab technicians did not encounter any nozzle clogging issues with either model during testing.
- O Both units utilize a single user-replaceable printhead, taking less than five minutes to replace on both models.
- + The Canon model offers a standard, non-upgradable RAM capacity of 2 GB, while the HP unit has a standard non-upgradable RAM capacity of 1 GB.
- O Both models do not support a hard drive, even as an option.
- + The Canon TM-200 supports borderless printing regardless of what roll media type is being used, whilst the HP T520 doesn't support borderless printing.
- + The Canon TM-200 supports up to 0.8 mm media thickness for roll paper and 150 mm as the outside diameter of the roll, while the HP T520 supports up to 0.3 mm in thickness and 99 mm in diameter.
- O Both models offer easy and quick roll paper loading with auto paper feed—once the user loads paper on the device, alignment and width adjustments are automatically carried out without further user intervention.
- O The output catch baskets of both models are very simple designs which collect output from media rolls in a random order.
- O The catch trays of both models enable most printed sheets to be stacked neatly. However, when media rolls approached their end, the tightly curled output had a tendency to spill out of both trays.
- + The Canon TM-200 comes with strong security features, including protocol locking to prevent unauthorised access to the device; it also supports SNMP v3 (secure network protocol) and IPsec which provides further security by authenticating and encrypting data over the network. The HP T520 has more limited security features; it does not support IPsec, 802.11, or PIN printing; security (to prevent unauthorized access to the web server) and email alert settings can be configured in the unit's embedded web page.
- The Canon model is heavier (69 kg versus 34 kg), and less compact than the HP unit.
- O Both models offer a colour touchscreen user interface, both of which are similarly responsive and intuitive to navigate.
- The Canon TM-200's power consumption while active is higher—69 watts versus 35 watts—than that of the HP model.
- + Rated noise emissions are lower for the Canon model (44 dB) compared to the HP device (48 dB) while the devices are printing.
- However, rated noise emissions in standby mode are much lower for the HP model (16 dB versus 35 dB for the Canon unit).

Print Driver Feature Set

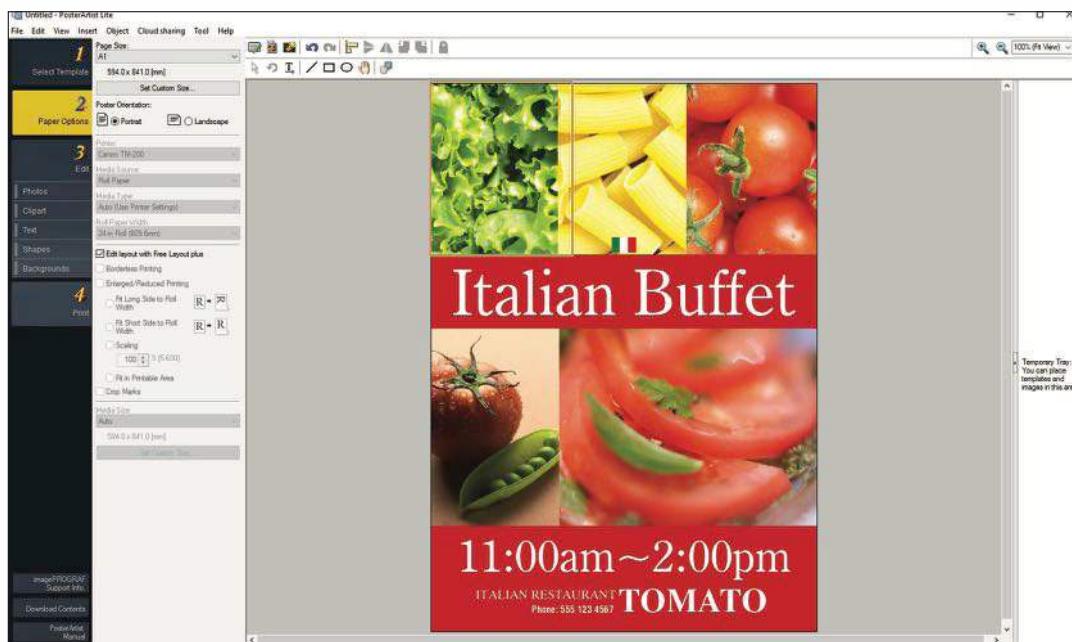
- + The Canon TM-200 has five speed settings (Fast 300, Standard 600, Fast 600, High 600 and High 1200), although not all speed settings are available with all media types. In contrast, the HP device has three settings (Fast, Normal and Best).
- Both the Canon imagePROGRAF Printer Driver and the HPGL/2 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 and offers a 2 by 2 poster mode, whereas the HP driver does not support either of these features.
- + The Canon driver offers page stamping (Date, Time, Name and Page Number), which is not available with the HP driver.
- + The Canon imagePROGRAF Printer Driver offers a broad range of built-in adjustments for CMY balance, brightness and contrast, while the HP T520's HPGL/2 driver does not offer the same adjustment settings, which are typically available with other HP DesignJet large-format printers. The Canon driver contains advanced colour-matching capabilities that include the ability to match ICC profiles and select the rendering intent based on different elements in the document. HP provides 24 media ICC profiles for nearly all the media types that are compatible with the HP T520; these are automatically installed on to a workstation during the driver installation process for use with software application programs.
- + The Canon driver offers the option of unidirectional printing, even in Fast mode, which helps to eliminate banding across output because the printhead travels in only one direction to create the desired image. The HP driver does not offer this feature.
- + The Canon driver includes the Color imageRUNNER Enlargement Copy Mode utility, which is standard with the 32-bit version of the driver and available as a download for the 64-bit version of the driver via the Printer Driver Extra Kit. It enables users to integrate a Canon small-format MFP device with the TM-200, whereby documents scanned at the MFP are automatically routed to a hot folder that is monitored by the TM-200 driver. The image is then resized and printed, offering a fast, easy-to-use poster creation tool for office users.
- + 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, 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 they were submitted or in 'optimized' layout order.



Canon's Free Layout plus allows users to arrange documents from different applications on a page so as to use paper more efficiently. Within the utility, any two pages can be arranged on the layout so that they can be back-to-back when folded over after printing.

- + The Canon model also offers a plug-in for printing from Microsoft Office applications, which includes useful tools for automatic media resizing, nesting and borderless printing. No such plug-in is available to HP users.

- The Canon model includes PosterArtist Lite, Canon's software for creating posters and signage in simple steps. The full version of Canon PosterArtist, available as an option, offers more advanced features such as auto design, variable data printing, in-application editing features, plus additional templates, photos and clip art. HP users can create posters via a redesigned poster application in the HP Applications Center (which also includes creative tools such as Adobe Stock, Unsplash, Vecteezy, and Pattern Design) and print them via HP Click.



Canon's PosterArtist Lite is an easy-to-use poster creation tool; newly-enhanced, it provides additional templates to create multi-language versions of a poster, 900 common expressions in 10 languages and a wide range of pictographic icons.

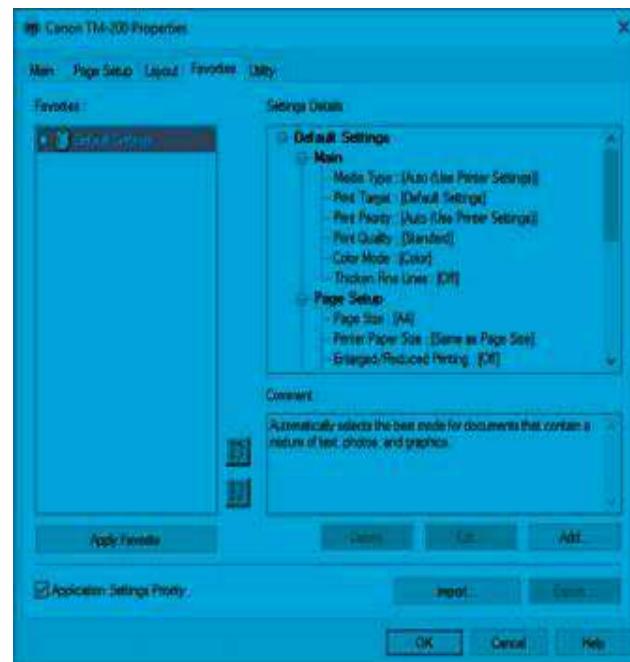
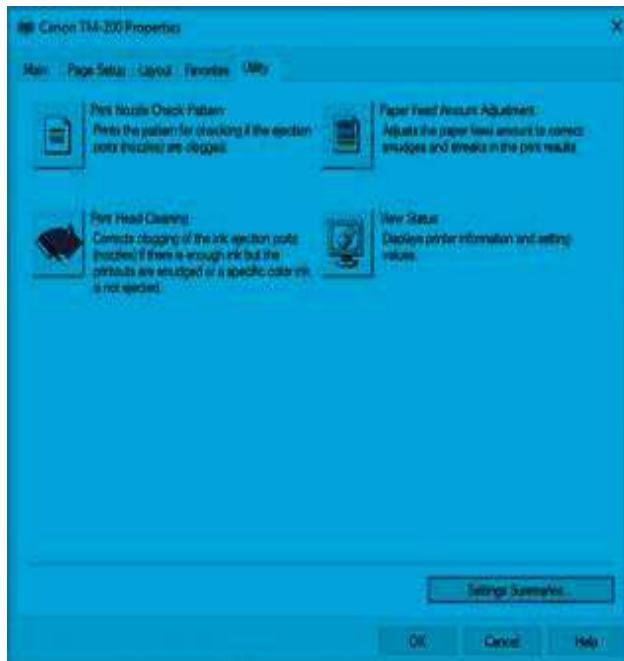
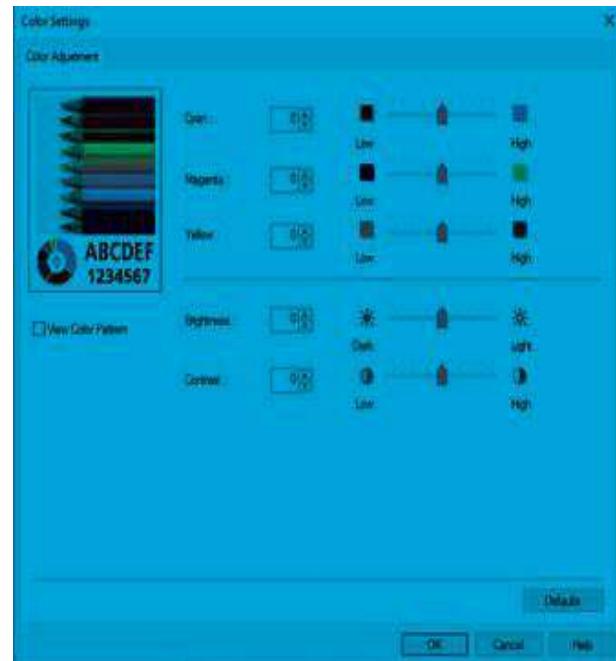
- + Available for the TM series, Canon's Accounting Manager can be downloaded for free from Canon's website and offers comprehensive accounting management for all print jobs. Users enter the actual costs for individual inks and media types, and the cost per job is calculated automatically and displayed. 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. There's no equivalent software available with the HP T520.

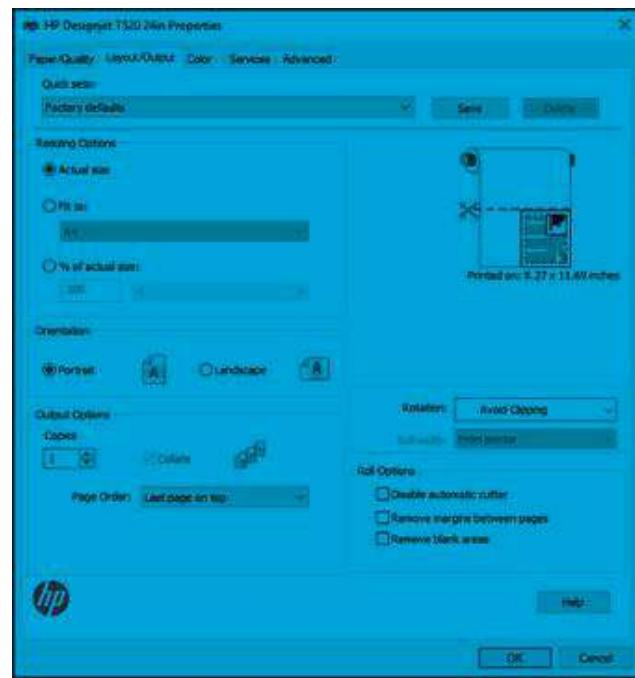
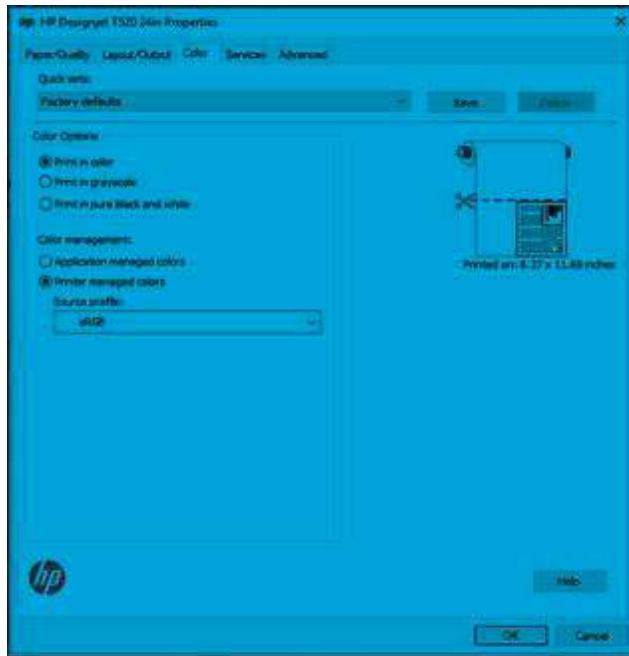
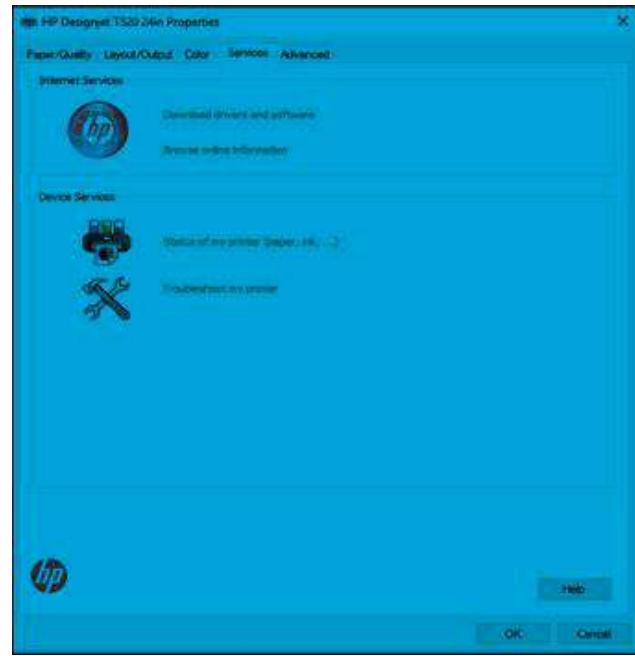


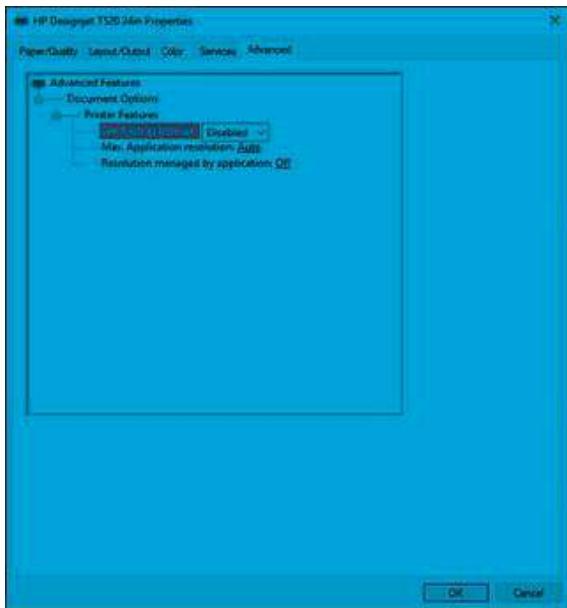
Canon Accounting Manager tool; users can double click on a job to view a breakdown of the individual costs.

Test Models' Print Driver Screenshots




Canon imagePROGRAF TM-200 Layout Tab

Canon imagePROGRAF TM-200 Favourites Tab

Canon imagePROGRAF TM-200 Utility Tab

Canon imagePROGRAF TM-200 Colour Adjustment Settings


HP DesignJet T520 Paper/Quality Tab

HP DesignJet T520 Layout/Output Tab

HP DesignJet T520 Colour Tab

HP DesignJet T520 Services Tab


HP DesignJet T520 Advanced Tab

SUPPORTING TEST DATA

Productivity

Job Stream Productivity (in Seconds)

Mixed File Types, Same Size

Canon imagePROGRAF TM-200			HP DesignJet T520		
Fast	Standard	High	Fast	Normal	Best
639.40	1,036.97	1,810.41	1,839.37	2,332.62	5,739.56

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 610-mm rolls, with each file set to auto-rotate to save media.

Colour Productivity (in Seconds)

Canon imagePROGRAF TM-200			HP DesignJet T520		
Fast	Standard	High	Fast	Normal	Best
409.77	641.58	1,090.25	660.44	1,456.46	5,407.58

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

Monochrome Productivity (in Seconds)

Canon imagePROGRAF TM-200			HP DesignJet T520		
Fast	Standard	High	Fast	Normal	Best
409.50	632.28	1,080.76	658.84	668.16	5,344.89

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

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

Canon imagePROGRAF TM-200		HP DesignJet T520
Time Before Printing Commences	54.00	26.68
First Page Out	103.78	111.64

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

Canon imagePROGRAF TM-200		HP DesignJet T520
Time Before Printing Commences	24.26	21.47
First Page Out	69.36	101.64

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 610-mm rolls.

Colour Print Quality

Colour Optical Density Evaluation

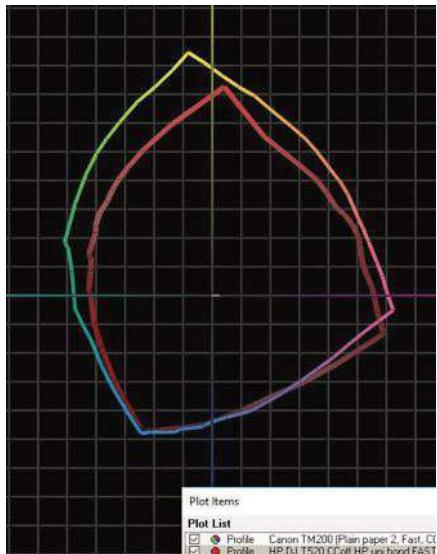
Canon imagePROGRAF TM-200						
	Fast	Standard	High			
50%	100%	50%	100%	50%	100%	
Cyan	0.45	1.05	0.52	1.30	0.53	1.34
Magenta	0.37	0.86	0.43	1.18	0.43	1.22
Yellow	0.39	0.85	0.44	1.04	0.44	1.06
Black	0.46	1.53	0.54	1.49	0.55	1.48

HP DesignJet T520						
	Fast	Normal	Best			
50%	100%	50%	100%	50%	100%	
Cyan	0.72	0.96	0.78	1.08	0.78	1.14
Magenta	0.70	0.96	0.77	1.07	0.80	1.16
Yellow	0.56	0.78	0.60	0.87	0.67	0.94
Black	0.67	1.49	0.71	1.52	0.67	1.44

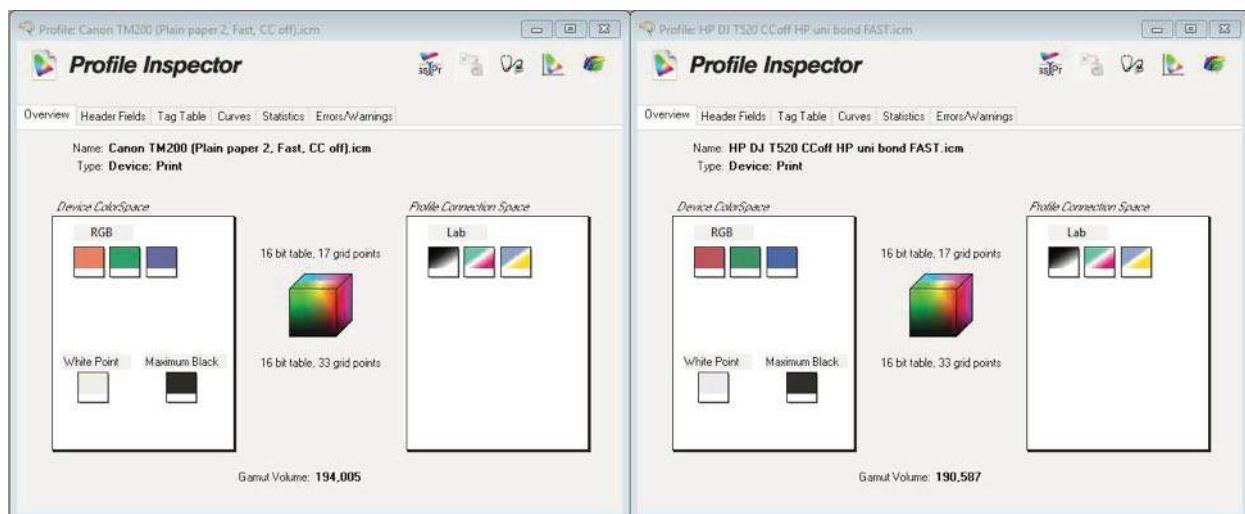
Note: Colour density readings were assessed by printing a Buyers Lab proprietary PDF test target file on plain paper in default colour settings at all quality settings available and measuring the density of 100% dot fill and 50% dot fill using an X-Rite exact^{XP} densitometer.

Media Type/Settings	Canon imagePROGRAF TM-200	HP DesignJet T520
Plain Paper Fast	194,005	190,587
Plain Paper Standard/Normal	323,403	218,134
Plain Paper High/Best	322,698	237,310
Matte Coated High/Best	413,801	329,944

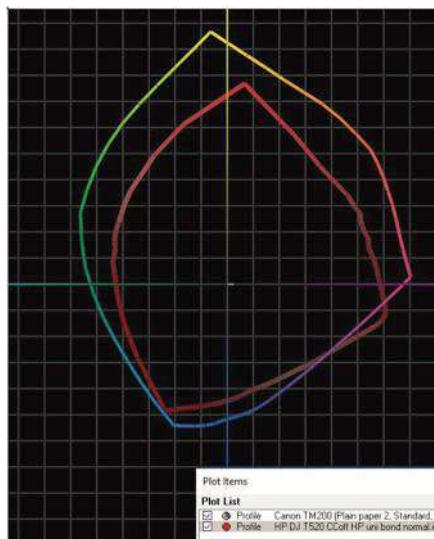
Colour Gamut Comparison



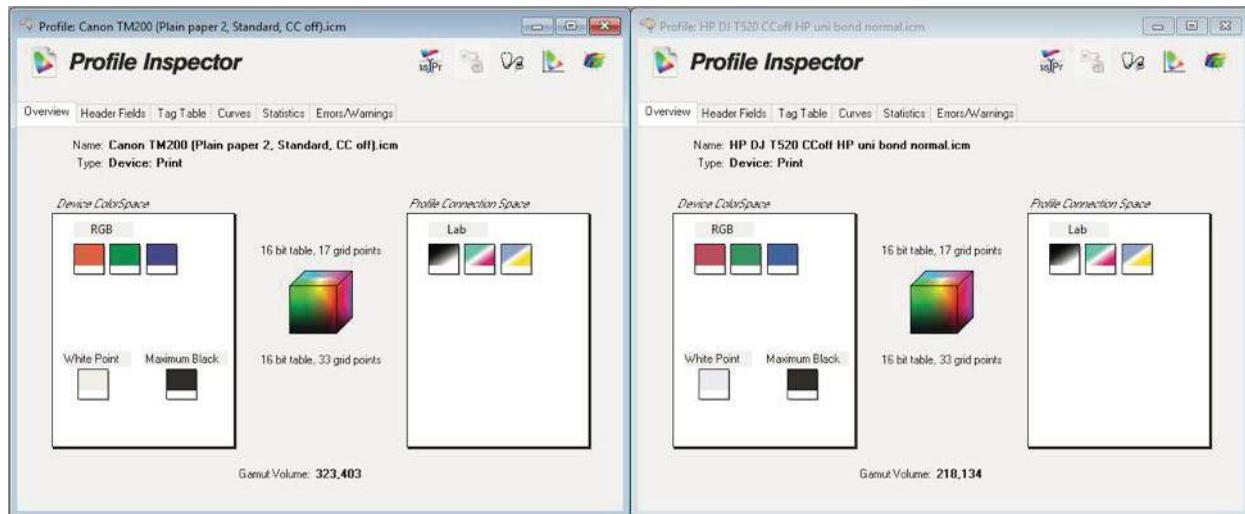
Canon imagePROGRAF TM-200 colour gamut on plain paper in Fast settings (shown chromatically) versus HP DesignJet T520 colour gamut (shown in red) on plain paper in Fast settings.



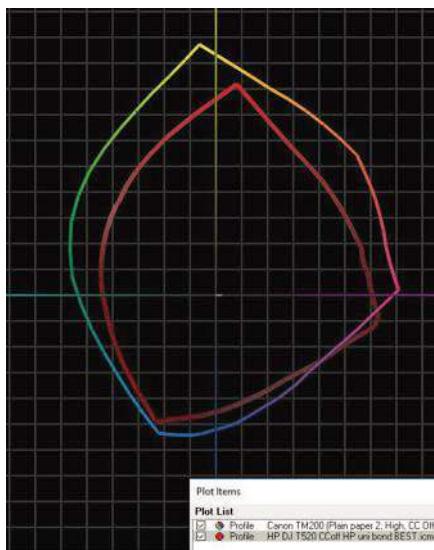
Colour gamut profile for Canon imagePROGRAF TM-200 (left) and HP DesignJet T520 (right) on plain paper in Fast mode.



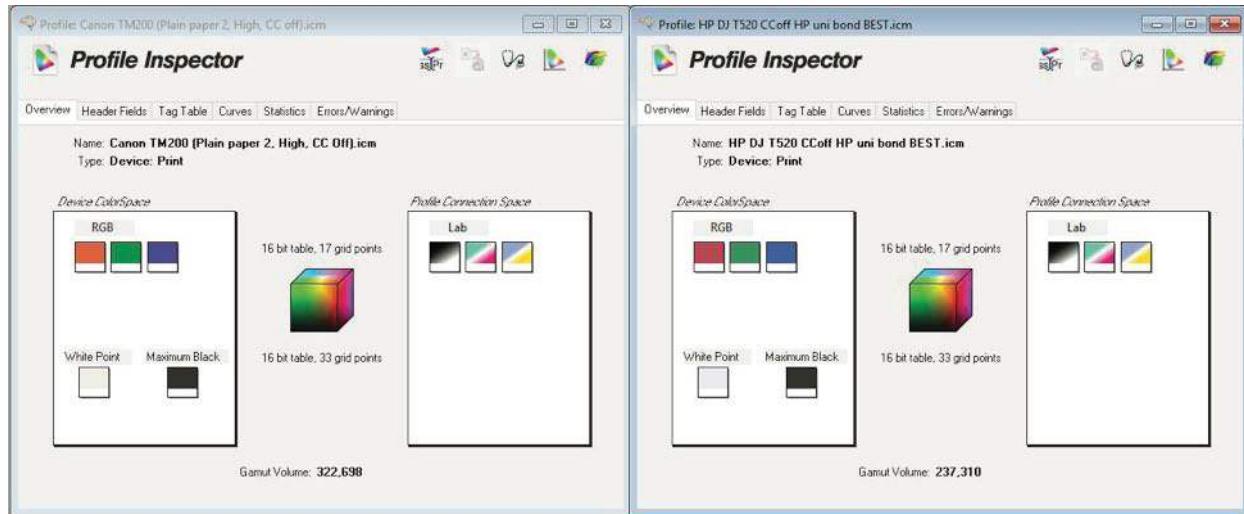
Canon imagePROGRAF TM-200 colour gamut on plain paper in Standard settings (shown chromatically) versus HP DesignJet T520 colour gamut (shown in red) on plain paper in Normal settings.



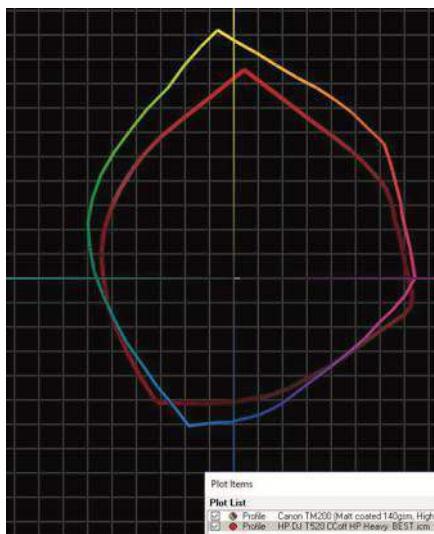
Colour gamut profile for Canon imagePROGRAF TM-200 (left) and HP DesignJet T520 (right) on plain paper in Standard/Normal modes.



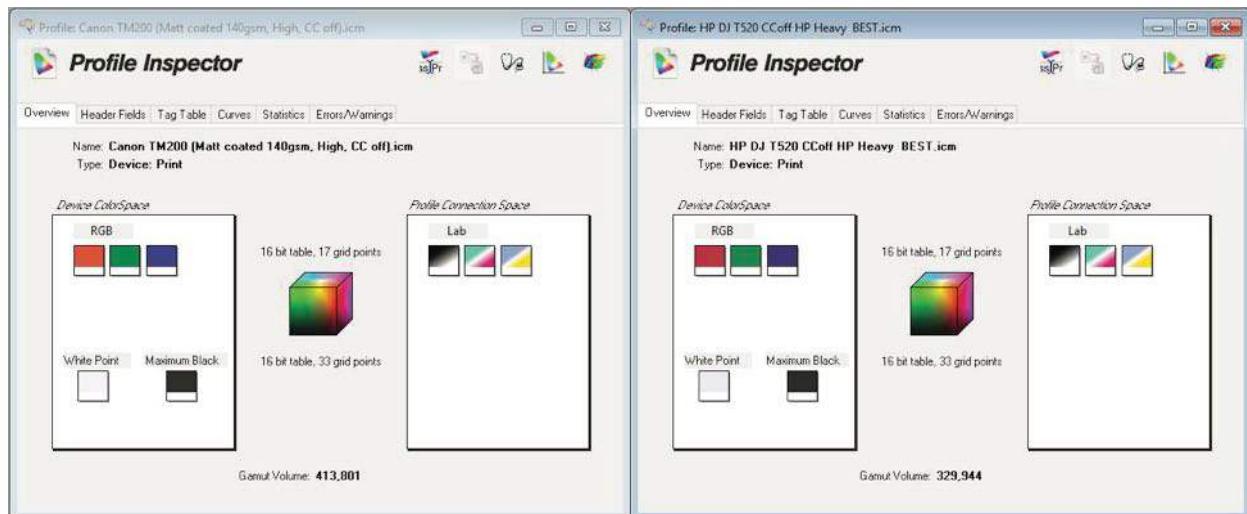
Canon imagePROGRAF TM-200 colour gamut on plain paper in High settings (shown chromatically) versus HP DesignJet T520 colour gamut (shown in red) on plain paper in Best settings.



Colour gamut profile for Canon imagePROGRAF TM-200 (left) and HP DesignJet T520 (right) on plain paper in High/Best quality modes.



Canon imagePROGRAF TM-200 colour gamut on matte coated paper in High quality settings (shown chromatically) versus HP DesignJet T520 colour gamut (shown in red) on photo paper in Best settings.



Colour gamut profile for Canon imagePROGRAF TM-200 (left) and HP DesignJet T520 (right) on matte coated paper in High/Best quality modes.

Black Print Quality

Black Optical Density Evaluation

Canon imagePROGRAF TM-200				HP DesignJet T520		
Density Block						
	Fast	Standard	High	Fast	Normal	Best
1	1.53	1.47	1.46	1.53	1.54	1.47
2	1.55	1.49	1.44	1.51	1.57	1.46
3	1.47	1.50	1.42	1.52	1.54	1.46
4	1.52	1.51	1.43	1.53	1.55	1.47

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 TM-200	Advantage	HP DesignJet T520
Max. image resolution	2400 x 1200 dpi		2400 x 1200 dpi
Number of inks	5	✓	4
Ink tanks replaceable during operation	Yes	✓	No
Ink-drop size	5 picoliter	✓	5.5 picoliter (CMY); 12 picoliter (K)
Starter ink cartridge capacity	490 ml total (130 ml MBk; 90 ml CMYK)	✓	125 ml total (29 ml CMY; 38 ml K)
Ink cartridge capacity	130 ml and 300 ml (all colours)	✓	29 ml (CMY); 38/80 ml (K)
Number of nozzles	MBk: 5,120 nozzles; other colours: 2,560 nozzles each; 15,360 nozzles in total	✓	5,504 in total (1,376 per colour)
Number of printheads	1 (User-replaceable)		1 (User-replaceable)
Line accuracy	+/-0.1% or less		+/-0.1%
Minimum line width	INA		0.02 mm
Minimum print margins	Roll paper: Borderless or 3 mm (all sides); Cut sheet: 3 mm (Top, Side), 20 mm (Bottom); Cut sheet for Apple AirPrint Only: Top: 3 mm, Bottom: 12.7 mm, Side: 3 mm		5 mm
Borderless (0 mm) printing	Yes (Roll paper)	✓	No
Maximum outside diameter of roll paper	150 mm	✓	99 mm
Maximum printable paper roll length	18 m (varies according to the OS and application)		INA
Maximum cut-sheet media length	1.6 m		INA
Maximum media thickness for roll paper	0.8 mm	✓	0.3 mm
Maximum media width	610 mm (24 inches)		610 mm (24 inches)

		Canon imagePROGRAF TM-200	Advantage	HP DesignJet T520
Media loading	Top			Top
Optional media handling	Roll holder set (supports 2" and 3" media cores)			Roll spindle adaptor (supports 2" and 3" media cores)
Standard RAM	2 GB	✓		1 GB
Hard drive capacity	Not supported			Not supported
Interface	10/100/1000Base-T Ethernet, USB Built-in High Speed, USB Memory Direct, Wireless LAN	✓		10/100Base-TX, 802.11b/g/n
PDL	SG Raster (Swift Graphic Raster), HPGL/2, HP RTL, JPEG (Ver. JFIF 1.02)			HP-GL/2, HP-RTL, JPEG, CALS G4, HP-PCL3 GUI
Net weight (unpacked)	69 kg		✓	34 kg
Power consumption when in standby	INA			0.3 W
Power consumption when active	69 W		✓	35 W
Acoustic pressure	Operation: 44 dB (A) or less; Standby: 35 dB (A) or less			Operation: 48 dB (A); Standby: 16 dB (A)
Acoustic power	Operation: 6.0 Bels or less; Standby: INA			Operation: 6.5 Bels; Ready: 3.4 B(A)

INA – Information not available

Driver Feature Set

		Canon imagePROGRAF TM-200	Advantage	HP DesignJet T520
Speed settings	5 (Fast 300, Fast 600, Standard 600, High 600 and 1200)	✓		3 (Fast, Normal and Best)
Economy mode	Yes (Fast setting)			Yes (in Fast mode)
Predefined profiles	6 (Default, Photo (colour), Poster, CAD (colour line drawing), CAD (mono line drawing) and Perspective GIS)	✓		5 (Default, CAD, GIS, Photo, and Black and White Photo)
Overview of profile settings provided	Yes			Yes
Media profiles	50 + 10 user customizable special options	✓		25
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	✓		No
Multi-up printing	Yes, 2 to 16	✓		No
Poster print mode	Yes (2 by 2)	✓		No
Page stamping	Yes (Date, Time, Name, Page Number)	✓		No

	Canon imagePROGRAF TM-200	Advantage	HP DesignJet T520
Image rotation	Yes, 90 degrees and 180 degrees	✓	Yes, auto 90 degrees
Option to preview before print	Yes	✓	No
CMYK balance adjustment	Yes (CMY only)	✓	No
Brightness adjustment	Yes	✓	No
Contrast adjustment	Yes	✓	No
Saturation adjustment	No		No
Advanced colour management options	Yes		Yes (2 RGB Source Profiles)
Enlargement Copy Mode	Yes	✓	No
Free Layout Capability	Yes (flexible placement)	✓	Yes (automatic placement)
MS Office Plug-in	Yes	✓	No
Accounting capability	Yes	✓	No
Disable automatic cutter	Yes		Yes
Unidirectional printing selection option	Yes	✓	No
Integration with MFP	Yes	✓	No

The Canon imagePROGRAF TM-200 also comes bundled with PosterArtist Lite.

Ink Consumption

Table 1: Amount of Ink in each Canon imagePROGRAF TM-200 Cartridge (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Weight of cartridge prior to installation	395.2	391.7	389.9	395.4	388.0
Weight of cartridge at end of life	74.3	74.3	74.3	74.3	74.3
Net weight of ink	320.9	317.4	315.6	321.1	313.7
Total ink weight across five cartridges					1,588.7

Table 2: Amount of Ink in each HP DesignJet T520 Cartridge (in Grams)

	Yellow	Magenta	Cyan	Black
Weight of cartridge prior to installation	57.2	57.1	57.1	131.6
Weight of cartridge at end of life	27.2	27.2	27.2	48.5
Net weight of ink	30.0	29.9	29.8	83.1
Total ink weight across four cartridges				172.8

Table 3: Ink Used in Three 50-Page Runs of Cottage Architectural Plan Test Document (Standard Mode) on the Canon imagePROGRAF TM-200 (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	11.2	1.4	1.9	2.3	2.1
Test Run 2 Net weight of ink used	10.1	1.1	1.5	2.4	2.3
Test Run 3 Net weight of ink used	11.3	1.6	1.7	2.7	2.1
Average amount of ink used across three runs	10.9	1.4	1.7	2.5	2.2
Total ink weight across five cartridges (based on averages)					18.7

Table 4: Ink Used in Three 50-Page Runs of Cottage Architectural Plan Test Document (Normal Mode) on the HP DesignJet T520 (in Grams)

	Yellow	Magenta	Cyan	Black
Test Run 1 Net weight of ink used	1.4	3.3	6.8	12.4
Test Run 2 Net weight of ink used	0.7	2.5	6.0	11.8
Test Run 3 Net weight of ink used	0.8	2.7	6.1	11.5
Average amount of ink used across three runs	1.0	2.8	6.3	11.9
Total ink weight across four cartridges for 50-page run (based on averages)				22.0

Table 5: Ink Used in Three 50-Page Runs of ISO Poster Test Document (Standard Mode) on the Canon imagePROGRAF TM-200 (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	9.1	1.3	1.9	9.3	17.6
Test Run 2 Net weight of ink used	9.5	0.7	1.6	10.6	18.2
Test Run 3 Net weight of ink used	9.8	1.1	1.8	10.8	18.0
Average amount of ink used across three runs	9.5	1.0	1.8	10.2	17.9
Total ink weight across five cartridges (based on averages)					40.4

Table 6: Ink Used in Three 50-Page Runs of ISO Poster Test Document (Normal Mode) on the HP DesignJet T520 (in Grams)

	Yellow	Magenta	Cyan	Black
Test Run 1 Net weight of ink used	4.5	12.6	28.0	9.8
Test Run 2 Net weight of ink used	4.0	12.4	27.7	9.4
Test Run 3 Net weight of ink used	4.3	12.5	27.8	9.9
Average amount of ink used across three runs	4.3	12.5	27.8	9.7
Total ink weight across four cartridges for 50-page run (based on averages)				54.3

Table 7: Ink Used in Three 50-Page Runs of GIS Map Test Document (Standard Mode) on the Canon imagePROGRAF TM-200 (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Test Run 1 Net weight of ink used	10.4	1.5	3.2	4.9	8.1
Test Run 2 Net weight of ink used	9.0	1.3	4.1	6.0	9.0
Test Run 3 Net weight of ink used	9.3	1.2	4.2	6.5	9.9
Average amount of ink used across three runs	9.6	1.3	3.8	5.8	9.0
Total ink weight across five cartridges for 50-page run (based on averages)					29.5

Table 8: Ink Used in Three 50-page Runs of GIS Map Test Document (Normal Mode) on the HP DesignJet T520 (in Grams)

	Yellow	Magenta	Cyan	Black
Test Run 1 Net weight of ink used	16.3	12.8	19.7	5.7
Test Run 2 Net weight of ink used	15.9	12.9	19.2	5.8
Test Run 3 Net weight of ink used	16.0	12.7	19.2	6.1
Average amount of ink used across three runs	16.1	12.8	19.4	5.9
Total ink weight across four cartridges for 50-page run (based on averages)				54.2

Ink Consumption Test Methodology Overview

Buyers Lab's ink consumption analysis was conducted using three document types (Cottage Architectural Plan, ISO Office Poster and a GIS map). The Cottage Architectural Plan was formatted as a DWG TrueView Drawing, the ISO Office Poster was formatted as a TIFF and the GIS Map was formatted as a PDF file, and sized at ISO A1.

The Canon imagePROGRAF TM-200 was installed in Buyers Lab's lab with the latest "01.02" level of firmware (as of July 2018) and connected to a Windows 10 workstation using a 1000BaseT TCP/IP connection. The device was left in default configuration throughout testing. The Canon driver was used for all testing and was left in default colour setting configuration. The ISO Office document was printed on 140gsm matte coated media in Standard mode, and the Cottage Architectural Plan and the GIS map were printed on plain media in Standard mode.

The HP DesignJet T520 was installed in Buyers Lab's lab with the latest "APP2CN1733AR" level of firmware (as of July 2018) 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 the image set to print at actual size. The ISO Office document was printed on heavyweight coated media in Normal mode, and the Cottage Architectural Plan and the GIS map were printed on plain media in Normal mode.

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.

For the Canon model, one cartridge was then run to exhaustion and the weight of the empty cartridge was recorded and used as the empty weight for each colour. The same was done for the HP device's cyan, magenta and yellow cartridges. Since the black cartridge is of a different size and capacity, it was depleted as well and the empty weight was used for black only.

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 Xrite exact^{XP} densitometers.

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.

For more information, please call David Sweetnam at +44 (0) 118 977 2000 or email him at david.sweetnam@keypointintelligence.com