December 2023

Comparative Custom Test Report:

Canon imagePROGRAF TM-350 vs. HP DesignJet T850

Advantage	Canon imagePROGRAF TM-350	HP DesignJet T850
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 36" Canon imagePROGRAF TM-350 and the HP DesignJet T850 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

In Keypoint Intelligence's rigorous wide format evaluation, the Canon imagePROGRAF TM-350 delivered higher productivity in virtually all print tests and superior colour image quality to that of the HP DesignJet T850. Speed-wise, its performance advantage increased at the higher quality settings, and it successfully printed our proprietary banner image, unlike the HP model which was unable to print the file at all. Neither printer had an overall advantage in the ink consumption assessment. The TM-350 showed strengths in many areas including operability and ease of use. For one, Canon's hallmark hot swap ink tanks allow for on-the-fly ink replacement, reducing downtime. Another benefit that boosts workflows is how the TM-350 deals with media out scenarios and, in fact, will pre-empt such situations by alerting the operator when there is not enough media left to complete a job prior to commencing printing so to avoid disruption down the line. In contrast, the HP T850 simply cancels the active job when it runs out of media, requiring the outstanding pages to be resubmitted, which is laborious and time-consuming. Usability on the Canon unit is boosted by a 4.3" colour touchscreen, which is bright and responsive and can be tilted to aid accessibility; an LED light at the top provides user intervention alerts. The HP's 2.7" touchscreen sits flush with the unit's body, which restricts the viewing position and provides more limited information on the smaller display. One beneficial aspect of the HP T850 is its ability to run mixed-media workflows thanks to its higher capacity 50-sheet tray (versus Canon's single-sheet handling); users can switch from roll to cut-sheet media with no manual change required, whereas Canon users will need to remove roll media first to print on cut sheet.

Both devices provide excellent additional flexibility with direct job submission utilities and mobile print support, making it easier for workers to collaborate and send to/print from the devices while on the go. The Canon TM-350 offers further benefits including 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). Increasingly, companies are taking the issue of sustainability seriously and it can affect buyers' criteria. When purchasing printing equipment, businesses may proactively look for a supplier that supports environmental initiatives regarding cartridge return programs, for example. To that end, both Canon and HP offer some key sustainability features. The Canon TM-350 is claimed to be the first large format printer in the market that does not use any polystyrene foam in its packaging, minimizing waste. It also provides an ink tank recycle collection scheme. The HP model is made with at least 35% recycled plastic.

In terms of print quality, output from both models will easily satisfy the expectations of architectural, engineering, CAD, and GIS customers. Both devices produced true neutral greys in black and white images, but the Canon's output was overly dark in Standard and High Quality modes and, hence, fine detailing in dark contrast areas was not as apparent as that on the HP's output, but there was no graininess unlike with the HP. Overall, the Canon TM-350 had the edge, delivering punchier colours, more realistic metallics, smoother tonal gradations, better depth of field, and sharper and crisper text and line art. It also produced the larger colour gamut on matte-coated media, while the HP T850 delivered a larger colour gamut on plain paper in Fast mode.

Image Quality

Advantage	Canon imagePROGRAF TM-350	HP DesignJet T850
Text	✓	
Fine Lines	✓	
Halftone Range	=	=
Halftone Fill	=	=
Solid Density (Colour)	✓	
Solid Density (Black)		✓
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 Quality)	=	=
Colour Gamut (Matte Coated Paper, High/ Best Quality)	✓	

+, –, 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. Text and fine lines were produced with “Line Drawing & Text” selected in the Canon driver and “CAD” in the HP driver; halftones were produced with “Image” selected in the Canon driver and “Photo” in the HP driver.

- Black optical densities produced on plain paper were comparable in Fast and High/Best modes; in Standard/ Normal settings the HP T850 delivered higher, consistent black optical densities compared to the Canon model.

+ The Canon TM-350 produced higher colour densities in all modes, overall.

- When printing on plain media in Fast mode, the Canon TM-350 delivered a 16.4% smaller colour gamut, with a volume of 188,786 versus a volume of 225,928 for the HP model.

+ The Canon device produced a 9.6% larger colour gamut when printing on plain paper using Standard/Normal settings, with a volume of 311,664 versus a volume of 284,491 for the HP model.

○ On plain paper in High/Best settings, the printers' colour gamuts were comparable—316,898 for Canon versus a volume of 323,796 for the HP model.

+ When printing on matte coated paper in highest quality settings, the Canon unit's gamut was 26% larger—385,191 for Canon versus 305,680 for HP.

+ The Canon TM-350 delivered very good colour text, which was legible and fully formed down to the 3-pt. level in all modes, with slight ink bleed evident. Black text was fully formed at the 3-pt. level and was judged excellent due to its distinct and crisp formation. The HP T850 produced colour and black text that was fully formed at the 3-pt. level (except for colour serif text in Fast mode, which was fully formed at 4-pt. level); overall, text was very good with slight ink bleed evident.

+ Fine lines produced by both devices were distinct at the 0.1-pt. level across all modes. The TM-350's output was slender and clean, and judged very good throughout. The HP T850 produced dark 0.1-pt lines that appeared the same as, or even bolder than, the 0.25-pt lines and were rated good.

+ The Canon TM-350 produced very good 1x1 pixel grids in CMYK in most modes, with consistent coverage and uniform dots; the black 1x1 pixel grid in High quality mode was excellent due to its precise dot formation and laydown. The HP model's 1x1 CMY pixel grids were intact and very good but in black, HP's 1x1 pixel grids were virtually indistinguishable from 2x2 pixel grids and—as dot formation was inconsistent—rated good.

+ Circles produced by the Canon unit were smooth and distinct and judged very good at the 0.1-pt. level across all modes. The HP T630 produced bold circles at the 0.1-pt. level which weren't distinguishable from 0.25-pt. circles in Fast and Normal modes and exhibited some jaggedness; in Best quality mode, however, circles were much smoother and rated very good.

○ Colour halftone fills were smooth and very good on both models' output, while greyscale halftone fills were neutral grey throughout. .

○ Both devices delivered 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. In Fast and Standard/Normal modes the Canon TM-350 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. In High/Best quality mode, both models produced comparable quality.

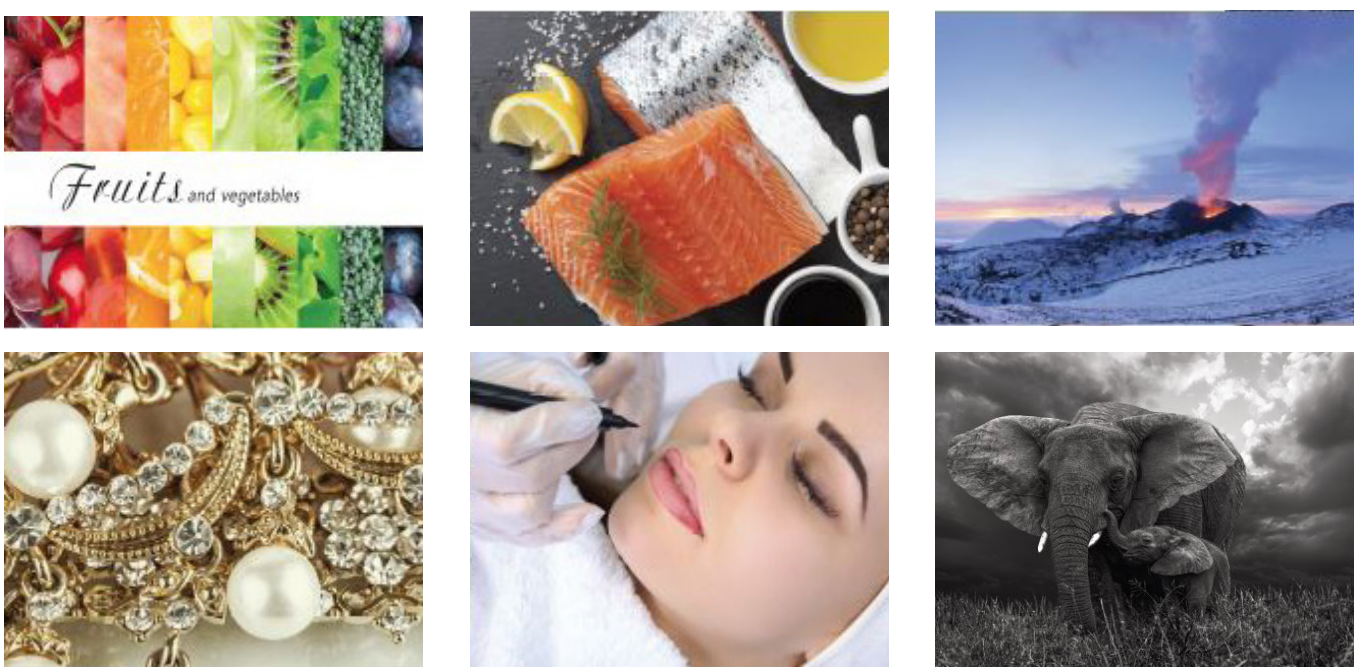
+ Geographic Information Systems (GIS) graphics in Standard/Normal and High/Best modes on plain paper were reproduced to a very high standard on both units, with excellent detailing. However, the Canon TM-350 delivered better contrast and depth of field—a critical factor in delivering a realistic three-dimensional rendering of topographical features.

+ The Canon TM-350 produced very good colour halftone images overall. In Standard and High modes, colours were consistently bright and punchy, metallics exhibited very good contrast (except in Fast mode where metallics were flat compared to the HP output in Fast) and it delivered greater detailing and depth of field in all tested modes. Images produced on the HP T850 lacked vibrancy and appeared flat in all modes, while tonal gradations were slightly grainy.

○ Both models produced black and white images with true neutral grey tones in all modes. The HP T850's greyscale images in Standard/Normal and High/Best modes had better detailing and contrast in light and dark areas but tonal gradations were grainy. The Canon's output was smooth with good detailing in light areas, but overly dark in some areas and hence tended to lose some detailing in dark contrast areas.

○ Skin tones produced by the Canon TM-350 were warm and natural-looking in Fast mode and slightly reddish in Standard and High modes. The HP T850 delivered pale and dull skin tones in Fast and Normal modes but improved natural and smooth skin tones in Best quality mode.

+ Image quality output from the Canon TM-350 was judged stronger by Keypoint Intelligence overall. It delivered crisper and more distinct text and fine lines, punchier colours, and better depth of field. It also produced higher colour optical densities as well as a larger colour gamut on matte coated paper in the highest quality mode. The HP unit produced higher black optical densities and a larger colour gamut on plain paper in Fast and Best quality modes. As with the Canon, it had very good halftone fills, but its text and fine lines output on plain paper suffered from slight ink bleed (under magnification) and the HP unit could not match the Canon's bright and vibrant colours in photographic images.



Keypoint Intelligence's colour and greyscale halftone test targets

Print Productivity

Advantage	Canon imagePROGRAF TM-350	HP DesignJet T850
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	✓	
A0 Throughput Speed (Default mode)	✓	

- After a weekend of non-use, the Canon TM-350's first page out time was 7.4% slower than the HP model's (116.29 seconds versus 108.28 seconds for the HP T850). Start-up time before printing commenced was slower for the Canon model—77.66 seconds versus 41.82 seconds for the HP unit.

+ The Canon device delivered a 39.6% faster first page out time of 56.44 seconds from its ready state, compared with 93.37 seconds for the HP T850. Its start-up time before printing commenced was faster—18.04 seconds compared with 23.77 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 TM-350 was faster than the HP model in all three workflows. In Fast mode, it was 39.6% faster; in Standard/Normal mode it was 55.1% faster; and in High/Best mode, it was 76.7% faster.

+ When printing the 12-page DWF test file in colour, the Canon TM-350 was faster than the HP unit in all three modes tested; it was 42.5% faster in Fast mode; 51.8% faster in Standard/Normal mode; and 77.1% faster in High/Best mode.

+ When printing the 12-page DWF test file in monochrome, the Canon model was faster in all three modes. It was 42.9% faster in Fast mode; 21.2% faster in Standard/Normal mode, and 77.1% faster in High/Best mode than the HP device.

+ When printing Keypoint Intelligence's single-page A0-size test target in Standard/Normal mode, the Canon TM-350's first-page-out time of 91.54 seconds was 47.5% faster than that of the HP unit (174.36 seconds). It was twice as fast as the HP unit when printing five A0-size pages (407.85 seconds versus 839.23 seconds).

Banner Printing

Advantage	Canon imagePROGRAF TM-350	HP DesignJet T850
Image Quality	✓	
Productivity	✓	

+ The Canon imagePROGRAF TM-350 successfully printed Keypoint Intelligence's 36" x 105" banner (a 4,955-KB PDF file) in Fast mode, taking 33.29 seconds to generate a preview at the desktop, and an additional 1 minute, 32.27 seconds from preview to final paper cut. The entire image was printed successfully, with some minimal banding (visible at close range). Although the HP T850 accepted the job, it did not generate a preview. In fact, 105 inches of media were fed through the device with nothing printed.

Poster Printing

Advantage	Canon imagePROGRAF TM-350	HP DesignJet T850
Image Quality	✓	
Productivity (Fast mode)	✓	
Productivity (Standard/Normal mode)	✓	
Productivity (High/Best Quality mode)	✓	

+ In Fast mode at 300 dpi, the Canon TM-350 printed Keypoint Intelligence's A1-sized Poster test target faster than the HP model, taking 43.15 seconds versus 52.20 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 the unidirectional printing was selected in the Canon print driver (not available with the HP), banding was eliminated with an increased print time of 44.41 seconds, which was still faster than the HP.

+ The Canon model took 44.91 seconds to print the poster in Standard mode at 600 dpi, besting the HP unit's 1 minute, 38.54 seconds in Normal mode.

+ In Standard/Normal mode, the Canon poster showed slight banding in a selected (grey) area only while HP's poster exhibited minimal banding in all areas/colours.

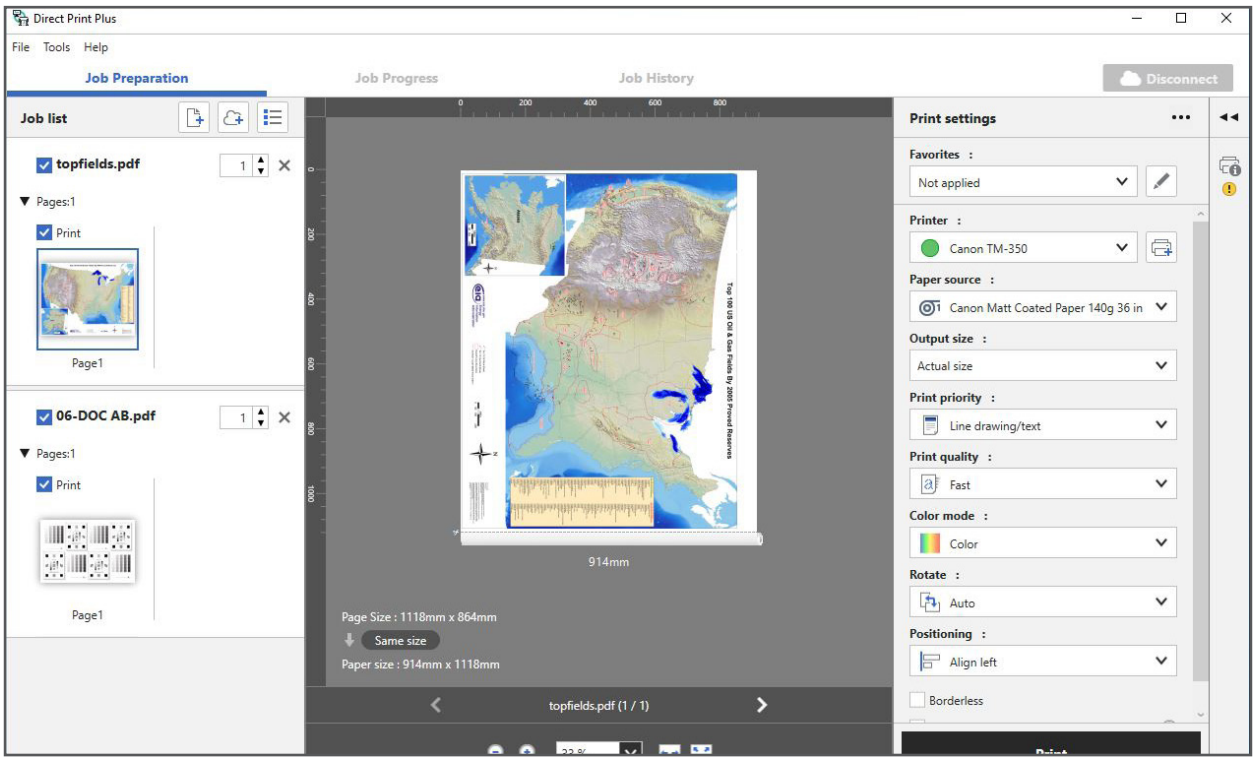
+ When printing the poster in High/Best mode, the Canon model took 2 minutes, 4.99 seconds, 60.9% faster than the HP unit's 5 minutes, 19.34 seconds result when printing in Best mode.

○ 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 TM-350	HP DesignJet T850
Direct Print Submission Functionality	=	=
Mobile App Integration	=	=

○ Canon's Direct Print Plus offers a clean and appealing interface for user-friendly operation and—with a PDF engine developed by Canon—it 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—for easy and quick access to job settings, thumbnail previews and at-a-glance printer and consumable status information, without the need to link to the Status Monitor. The bi-communication between the utility and the printer means there's less chance of media mismatch.

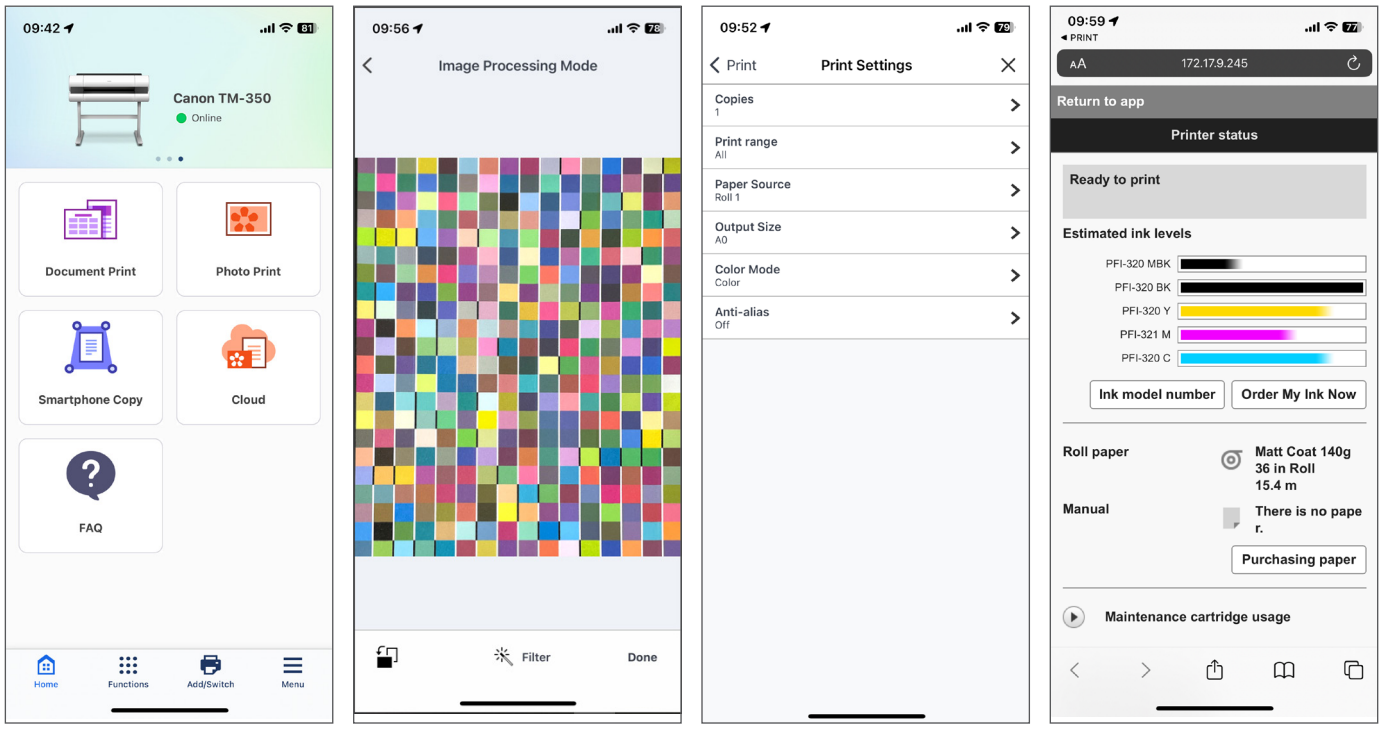


Direct Print Plus job submission software enables the direct printing of PDF, JPEG, TIFF, and HPGL/2 files without the need for native applications or print drivers. From the Job History tab, users can select and reprint jobs using the same settings as when last printed. Job progress indicates how many pages have been printed so far to provide operators with better visibility over the progress of a print job.

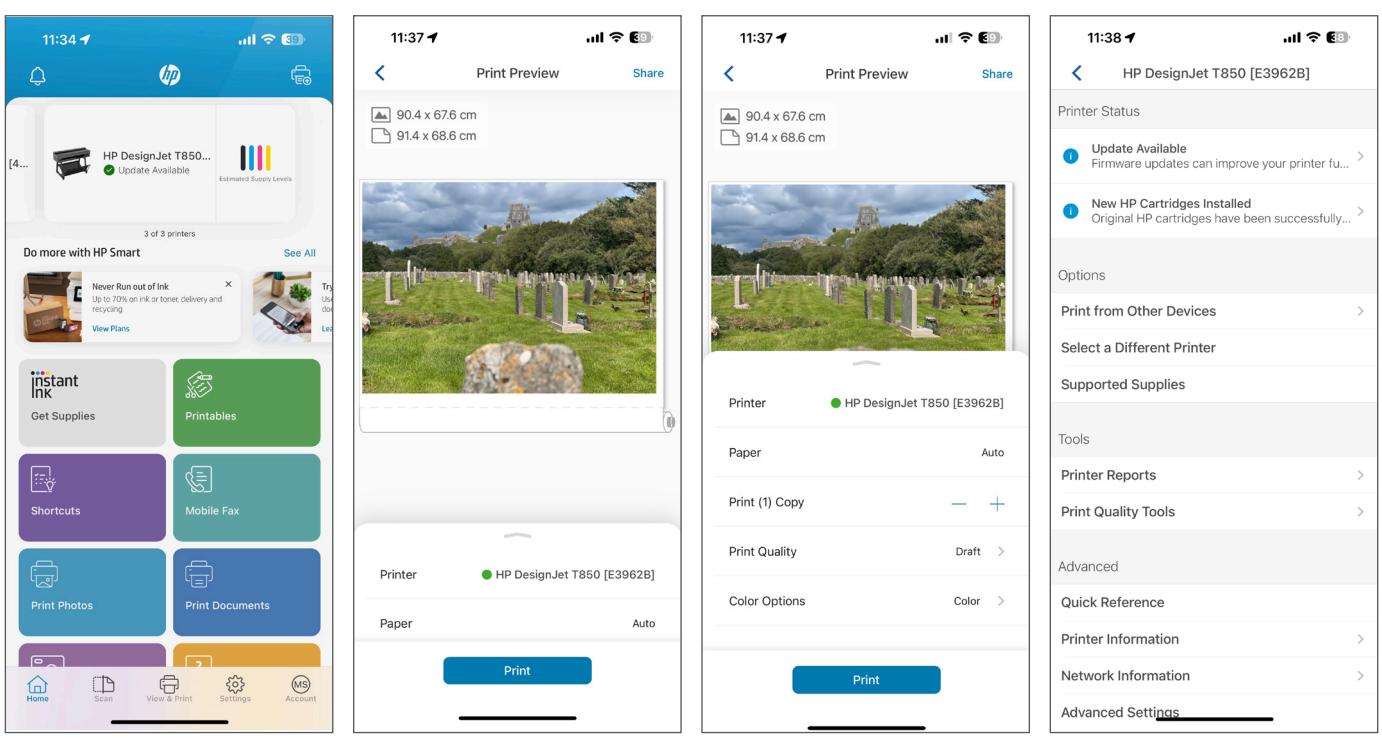
- Direct Print Plus supports “Shortcut Print” functionality which helps streamline print workflows. Akin to a hot folder workflow, users can create desktop shortcuts that allow drag and drop automatic file printing with predefined print settings. Multiple desktop icons can be created containing different print settings or combinations of print settings.

- Canon’s free PRINT mobile app for Android and iOS users provides an easy way for them to print wirelessly to the Canon TM-350 on the same WiFi network, boosting 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.

- Similarly intuitive and feature-packed, the HP Smart app provides an easy way for users print to the T850 from their smartphones and tablets. Features include the ability to scan documents directly to mobile devices, retrieve, print, or upload files to a variety of cloud storage services and monitor printer status. Document editing options are available through the Preview function.

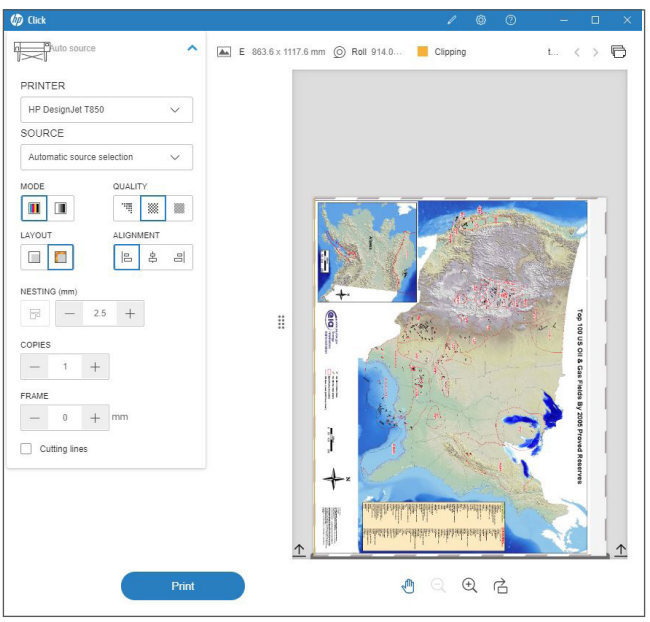


The Canon PRINT app has a clean and bright home screen and offers a wide range of print settings, as well as the ability to preview jobs. Printer, media, and consumable status and the ability to perform basic maintenance (nozzle check and printhead alignment amongst others) are relevant tools for ensuring print jobs run smoothly.



HP Smart app offers a clean and bright interface for viewing documents and making setting adjustments. It provides a similar set of features and tools as available with the Canon PRINT app.

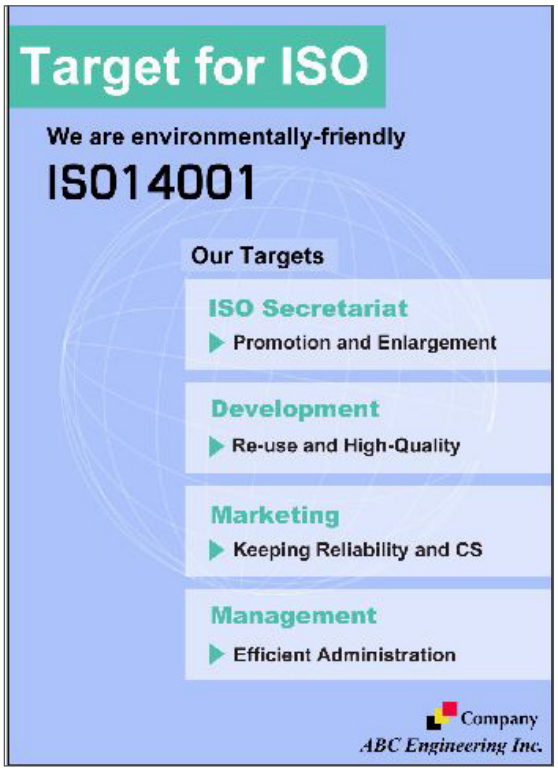
- HP's own direct job submission software, HP Click, is free to download and provides direct printing of PDF, JPEG, TIFF, and HPGL/2 files from the PC desktop, without the need for native applications or print drivers. Users can select print settings such as colour mode, quality setting, nesting, resize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



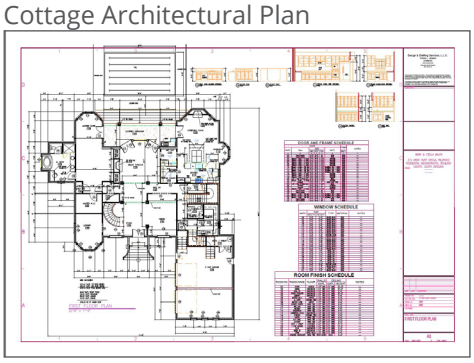
Similar to Canon's utility, HP Click lets users view job history and the status of current jobs in progress via the "pages" graphic at the top right of the screen. Printer information and consumable status can be obtained via an "Accounting" link which launches the device's embedded web utility (not supported on the HP DesignJet T850 printer).

Ink Consumption

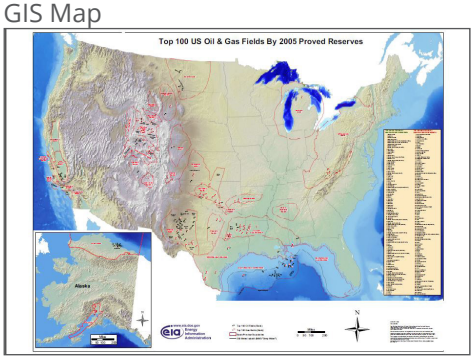
ISO Office Poster



Cottage Architectural Plan



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 TM-350	HP DesignJet T850
Cottage Architectural Plan	37.8	36.6
ISO Office Poster	122.5	115.8
GIS Map	100.9	109.2

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

- Both devices used a comparable amount of ink—37.8 g for the Canon and 36.6 g for the HP— when printing the Cottage Architectural Plan test target in Standard/Normal Mode. For the same print scenario, the Canon TM-350 used 2.5% of its total available ink, while the HP model used 2.9%.

- When printing the ISO Poster in Standard/Normal mode on matte coated media, the Canon unit used 5.8% more ink compared with the HP device. For the same print scenario, the Canon TM-350 used 8.0% of its total available ink, while the HP model used 9.3%.

+ In the GIS Map ink consumption test conducted in Standard/Normal Mode using matte coated media, the Canon TM-350 used 7.6% less ink compared with the HP device. For the same print scenario, the Canon TM-350 used 6.6% of its total available ink, while the HP model used 8.7%.

Device Feature Set

○ Both units' ink cartridges are available in two capacities—130 ml and 300 ml.

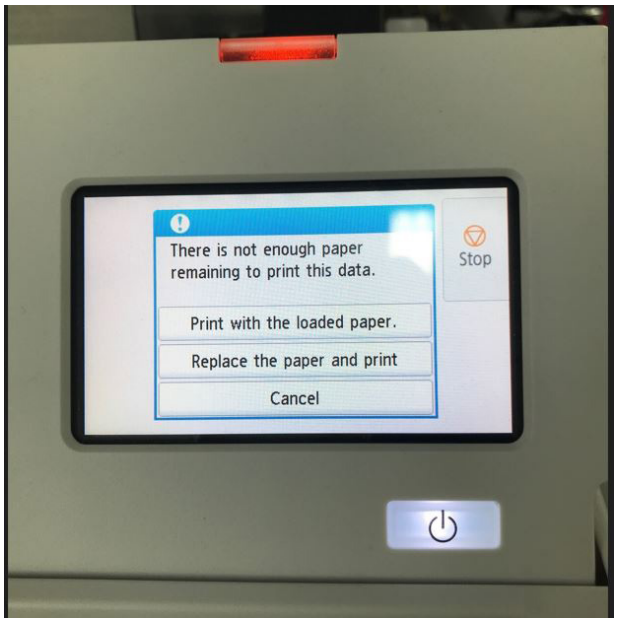
+ One advantage for Canon users, ink cartridges are replaceable during operation, which helps reduce downtime. HP's cartridges cannot be replaced during operation.

○ The Canon TM-350 and HP T850 utilize a single user-replaceable printhead, which takes under five minutes to replace on each.

○ Both printers provide quick and easy roll paper loading with auto paper feed. Canon users must feed the media into the device until the printer registers the media. It auto detects the media 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.

+ Media handling on the Canon is boosted by its auto media type detection function. When changing to a different media, the device will select the right media type that is loaded (but the operator may need to ensure the correct weight is selected). The media type can be changed once the roll is loaded, which is a fast and simple operation conducted on the touchscreen. Since it's not automated, HP operators must choose media type and weight, which is a slower process overall.

+ One notable advantage for Canon users is the unit's media remaining detection capabilities. The device will alert operators if there is not enough media left to complete a print job prior to commencing. Users are asked whether they wish to continue with the job or load a new media roll, which helps minimize disruption. The HP model will accept and print a job even if it is low on media. If it runs out of media before completing the job, the unit cancels the job and alerts the user to replace the media. The user then must determine what point the job was at in order to resubmit the remaining pages, which is more time-consuming and unhelpful.



Canon imagePROGRAF TM-350's media remaining alert.

- Cut sheet media is supported on both devices. While the Canon model handles one sheet at a time (and the roll media must be removed first), multiple sheets can be loaded on the HP device simultaneous to roll load.

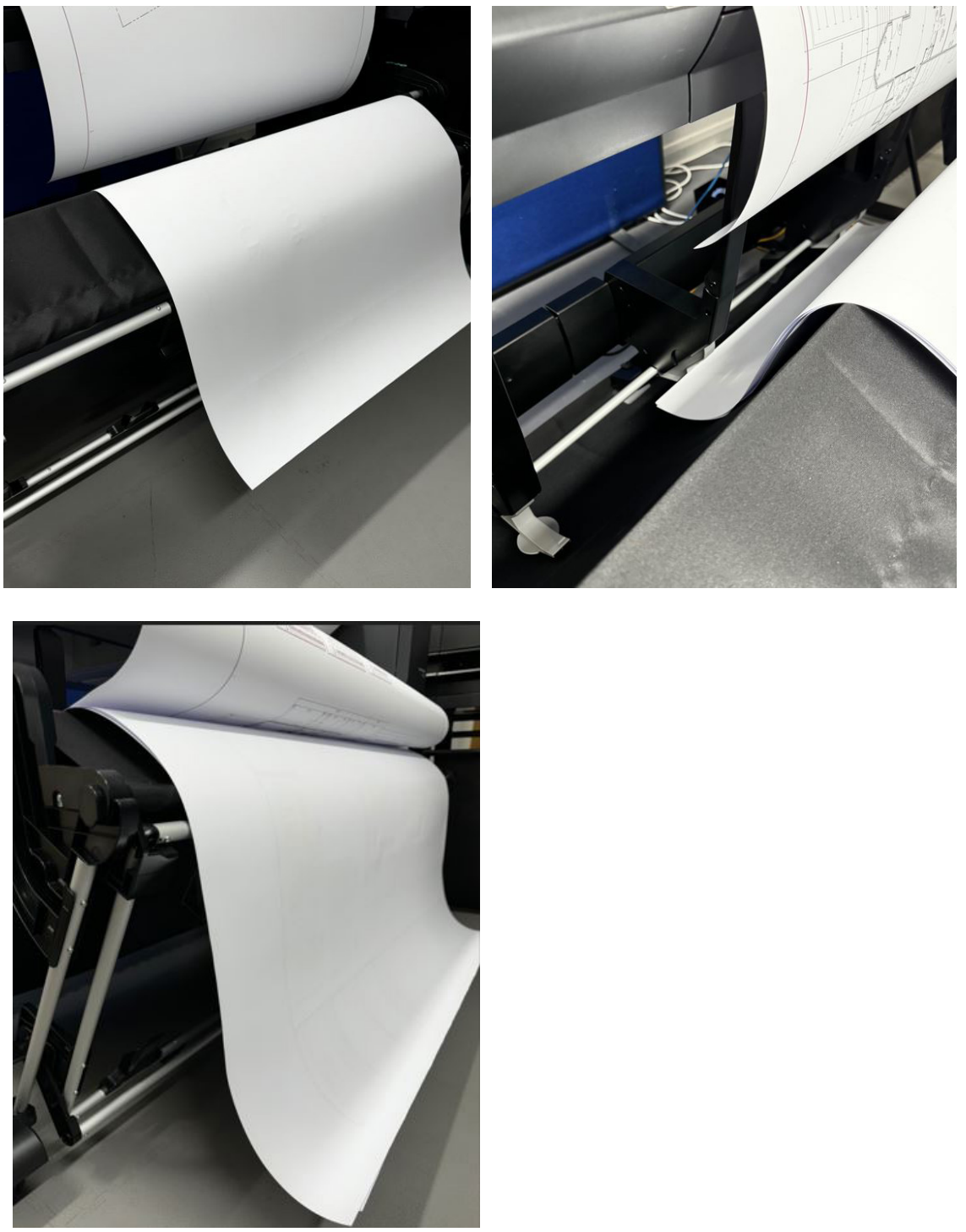
- In addition, the HP T850 offers one click multi-size printing workflow capabilities; users can switch from roll to cut sheet with no need for a manual change or to remove and reload media meaning there's less operator intervention needed.

+ The Canon TM-350 supports borderless printing regardless of what roll media type is being used, whilst the HP model does not support this feature.

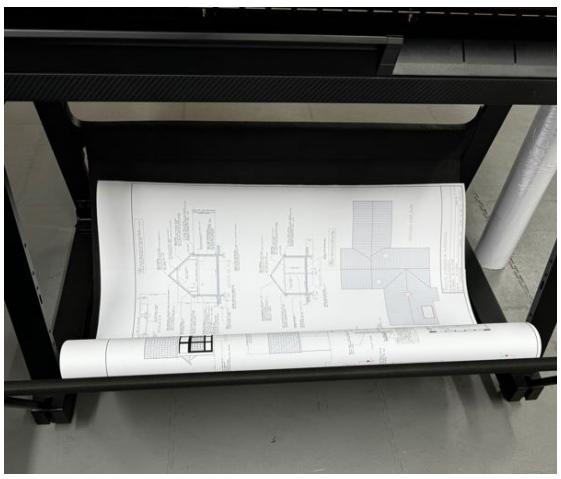
○ Both units support a maximum 1.6 m printable cut sheet media length.

+ The Canon TM-350 supports up to 0.8 mm media thickness and handles 150 mm as the outside diameter for roll paper, compared to HP's 0.3 mm and 100 mm in diameter.

○ Both models come with a simple catch bin/basket to collect output from media rolls. The Canon TM-350 catch basket can be arranged in different formations including a horizonal catch shelf with the aim to hold prints in an orderly way, although when the roll is near the end, prints tend to curl. Overall, both units' baskets held prints in a similar way.



Canon imagePROGRAF TM-350's catch basket holding A1-size prints (top) and A0-size prints (bottom).




HP DesignJet T850's catch basket.

+ The Canon model offers a standard, non-upgradable 2 GB physical RAM, while the HP unit supports 1 GB.

○ Neither device offers a hard drive (not even as an option), which would allow for the storage of documents that require reprinting and would aid spooling workflow.

- The HP model is lighter with a net weight of 47 kg versus 63.8 kg for the Canon unit.

+ Both models offer a colour touchscreen user interface, which are easy to use. Canon has a larger touchscreen (4.3") that can be tilted, which boosts ease of use, whereas the smaller (2.7") HP control panel is set flush with the device so the operator must stand over it. The Canon control panel also has an alert LED that turns red when the printer requires operator attention, a feature not available on the HP unit.

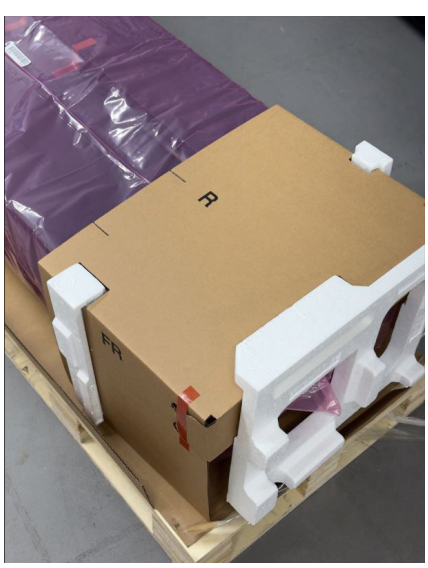
Canon's touchscreen is tiltable (left); HP's control panel sits flush with the printer (right).

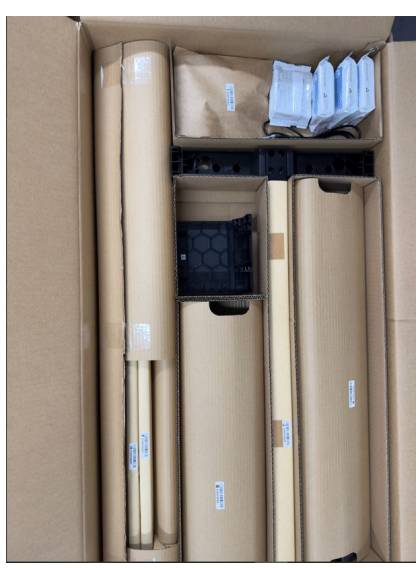
- The Canon TM-350's power consumption while active is a higher—65 watts versus 35 watts—than that of the HP model.

○ Rated noise emissions during operation are comparable—41 dB for the Canon model and 42 dB for the HP device.

○ The Canon TM-350 does not feature any polystyrene in its packaging, making it the first large format printer in the market to do so, according to Canon. HP offers a free program whereby the HP T850's ink cartridges and printhead can be returned for recycling; Canon's ink tanks are recyclable, too. The HP T850 is made with at least 35% recycled plastic.

The Canon TM-350's packaging contains no polystyrene.





The HP T850 comes with polystyrene although limited, and as with the Canon device, parts and supplies are packaged in cardboard and paper.

Device Feature Set

○ The Canon TM-350 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.

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

+ Seven predefined profiles are available with the Canon driver, while the HP driver offers five.

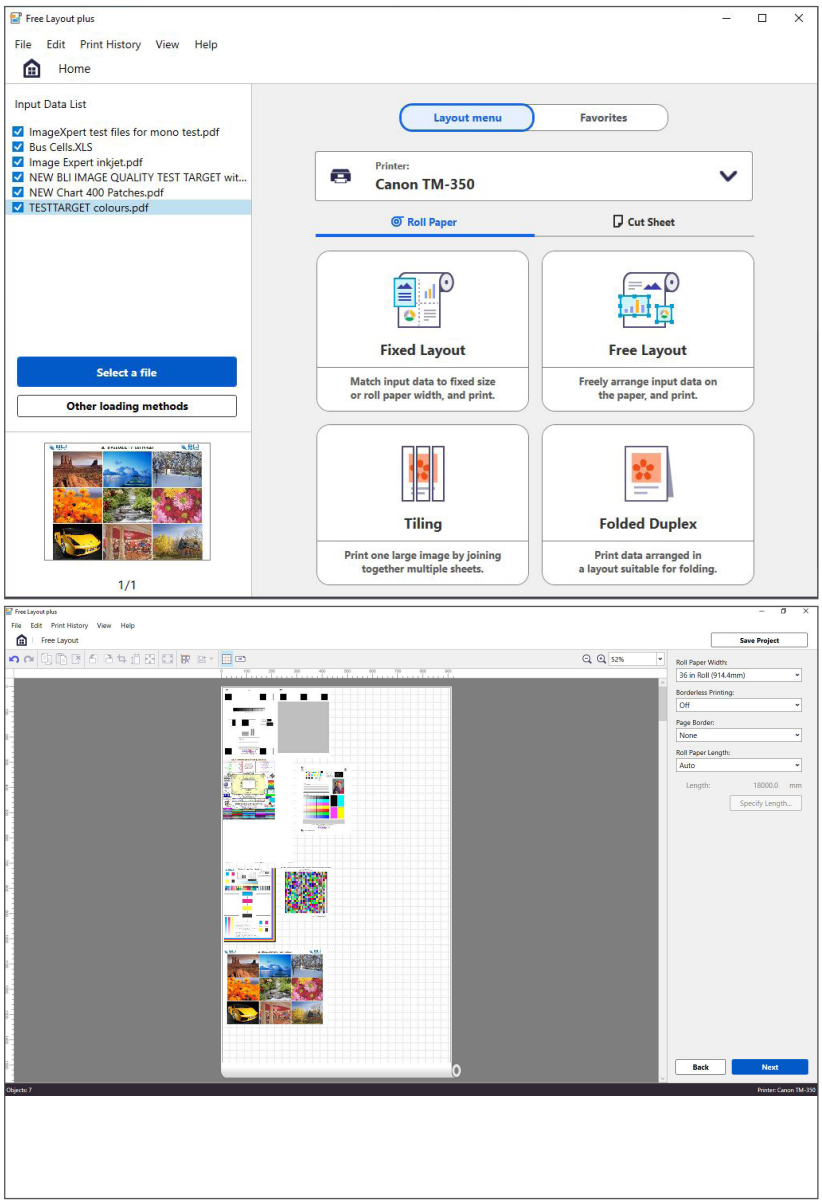
+ There are various features offered by the Canon driver which aren't supported on the HP driver, including multi-up (2 to 16) printing, poster printing (2 by 2), and page stamping.

+ The Canon imagePROGRAF Printer Driver offers a broad range of built-in adjustments for CMY balance, brightness, and contrast, which aren't available with the HP T850's HP-GL/2 driver. 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 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. 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 integration between a Canon small-format MFP device and the TM-350, whereby documents scanned at the MFP are automatically routed to a hot folder that is monitored by the TM-350 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.

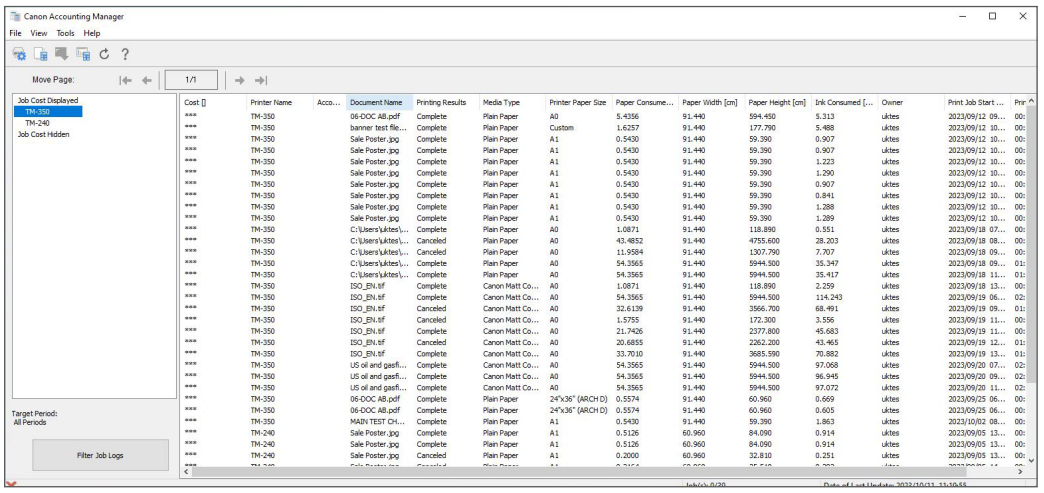
+ Canon's Free Layout plus software enables files—even those created with different applications—to be scaled, resized, or grouped together as a single job from the printer driver. Images can be dragged and dropped to the desired locations and printed together on a single page, helping to save on media. 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 enabling efficient use of media.

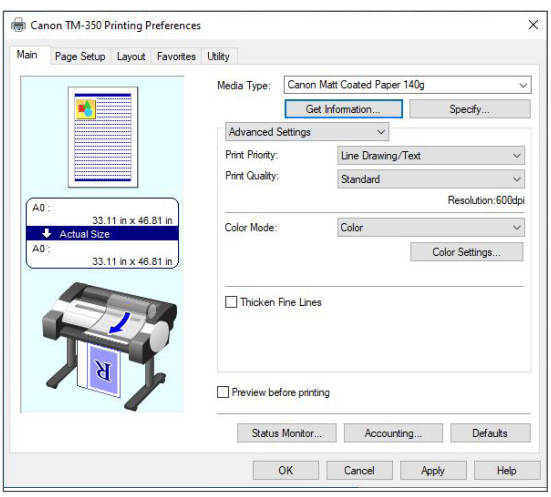
+ The Canon model also offers a plug-in for printing from Microsoft Office applications, which includes useful tools for borderless printing, amongst others. HP offers no equivalent software.

+ Canon's Accounting Manager, accessed via the Status Monitor, offers comprehensive accounting management for all print jobs. Once the costs for individual inks and media types are entered, the total cost per job is calculated automatically after printing. 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. We could not find any similar accounting support utilities offered on the HP T850.

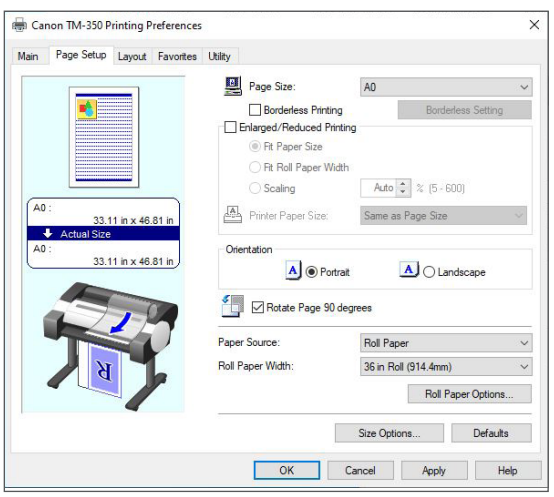


Canon Accounting Manager

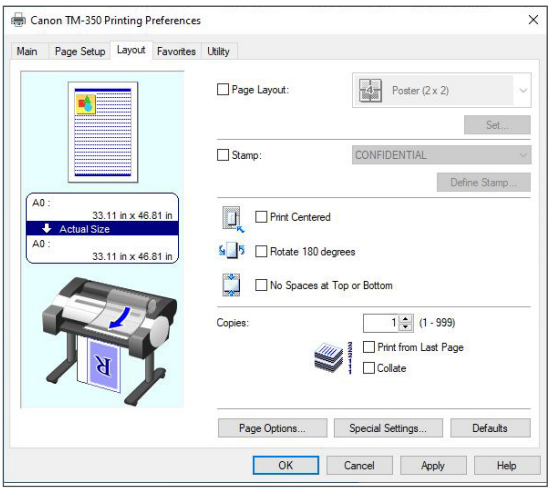
Print Drivers



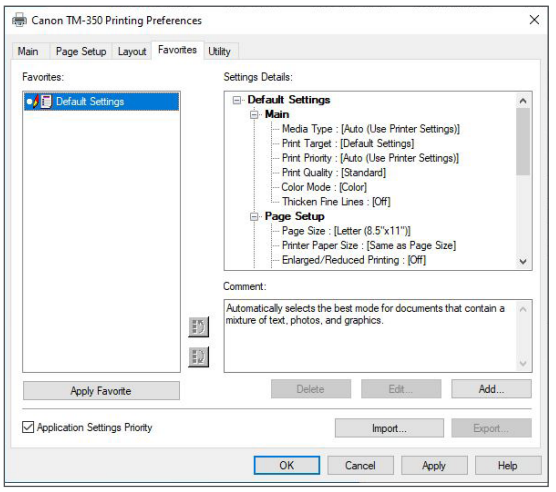
Canon imagePROGRAF TM-350 Print Driver Main Tab



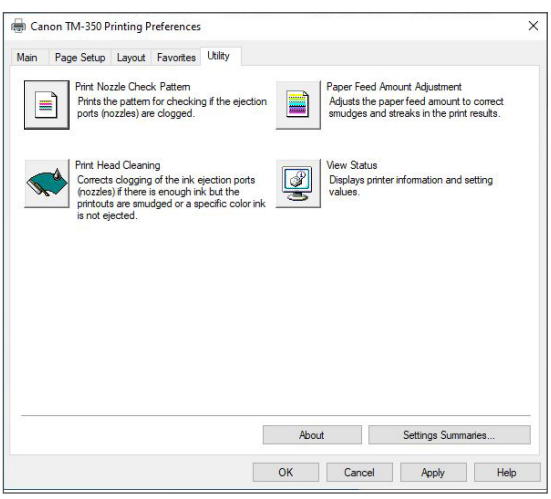
Canon imagePROGRAF TM-350 Print Driver Page Setup Tab



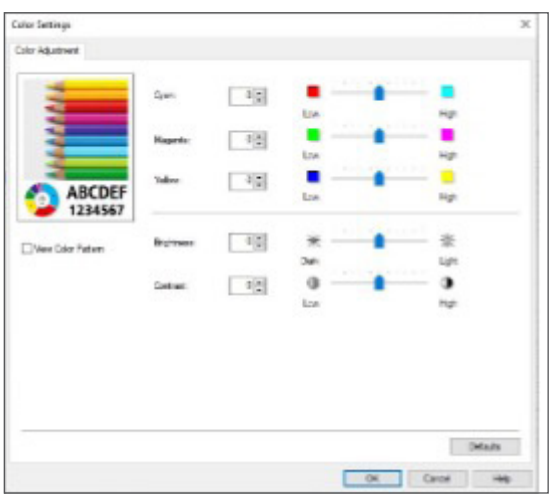
Canon imagePROGRAF TM-350 Print Driver Layout Tab



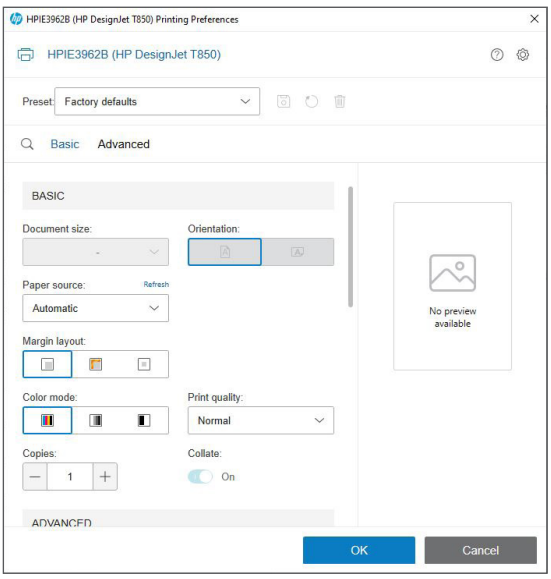
Canon imagePROGRAF TM-350 Print Driver Layout Tab



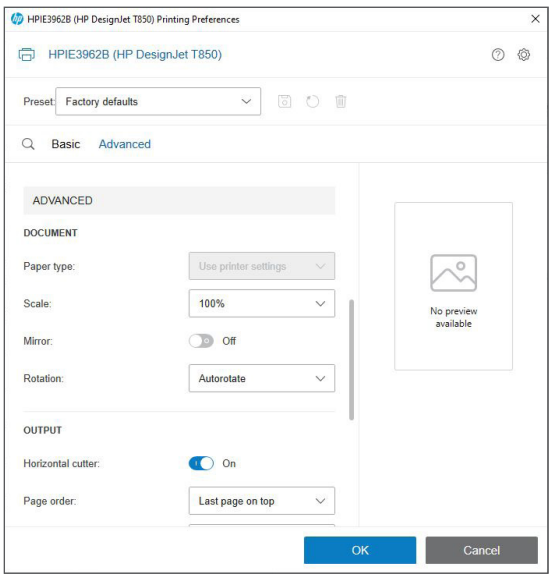
Canon imagePROGRAF TM-350 Print Driver Utility Tab



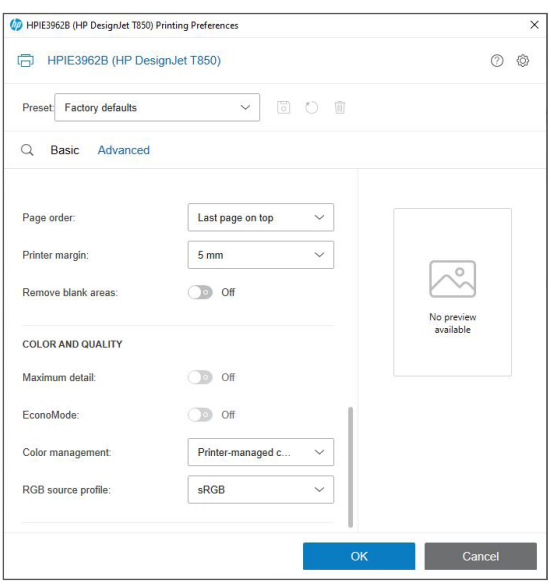
Canon imagePROGRAF TM-350 Print Driver Colour Adjustment Tabv



HP DesignJet T850 Print Driver Basic Tab



HP DesignJet T850 Advanced Tab-1



HP DesignJet T850 Advanced Tab-2

Supporting Test Data

Print Productivity

Job Stream Productivity (in Seconds)			
Mixed File Types, Same Size			
Canon imagePROGRAF TM-350		HP DesignJet T850	
Fast	525.98	Fast	870.83
Standard	831.53	Normal	1,852.91
High	1,690.31	Best	7,249.71

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 files are submitted to the controller in a specific order and sent to the printer as a group, at which time the stopwatch begins; timing ends when the last page of the last file exits the device. Both devices were loaded with 914-mm rolls, with each file set to auto-rotate to save media.

Colour Productivity (in Seconds)

Canon imagePROGRAF TM-350		HP DesignJet T850	
Fast	297.02	Fast	516.30
Standard	497.72	Normal	1,032.99
High	911.65	Best	3,983.74

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 TM-350		HP DesignJet T850	
Fast	290.75	Fast	509.08
Standard	497.91	Normal	631.48
High	908.20	Best	3,964.50

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 TM-350	HP DesignJet T850
Time Before Printing Commences	77.66	41.82
First-Page-Out Time	116.29	108.28

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

	Canon imagePROGRAF TM-350	HP DesignJet T850
Time Before Printing Commences	18.04	23.77
First-Page-Out Time	56.44	93.37

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 TM-350	HP DesignJet T850
First-Page-Out Time	91.54	174.36
Five-Pages-Out Time	407.85	839.23

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

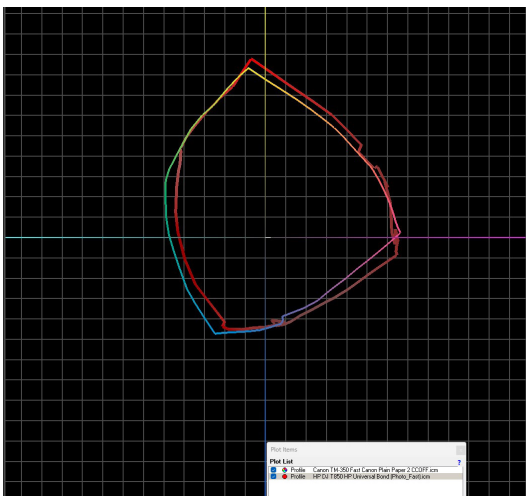
Colour Optical Density Evaluation						
Canon imagePROGRAF TM-350						
	Fast		Standard		High	
	50%	100%	50%	100%	50%	100%
Cyan	0.46	1.05	0.55	1.32	0.56	1.34
Magenta	0.47	1.00	0.56	1.33	0.58	1.33
Yellow	0.43	0.85	0.50	1.04	0.51	1.07
Black	0.48	1.52	0.69	1.56	0.72	1.55

HP DesignJet T850						
	Fast		Normal		Best	
	50%	100%	50%	100%	50%	100%
Cyan	0.44	0.68	0.47	0.68	0.52	0.79
Magenta	0.53	0.80	0.52	0.68	0.57	0.94
Yellow	0.52	0.74	0.61	0.80	0.61	0.91
Black	0.60	1.43	0.62	1.55	0.61	1.43

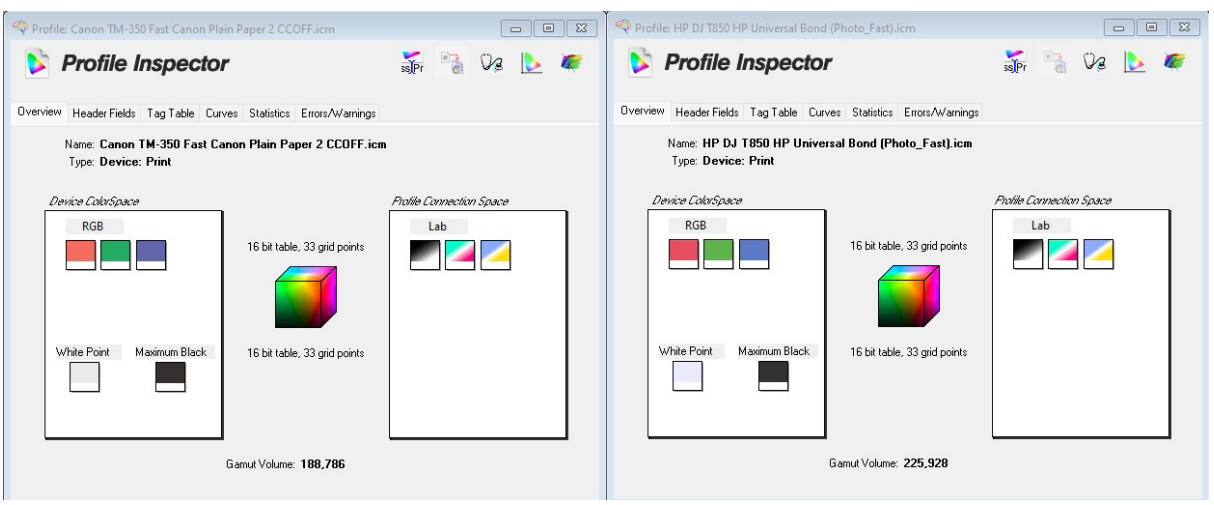
Colour density readings were assessed by printing a Keypoint Intelligence proprietary PDF test target file on plain paper in default colour settings at all quality settings available and measuring the density of 100% dot fill and 50% dot fill using an XRite 508 densitometer and XRite exact^{Xp} densitometer.

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

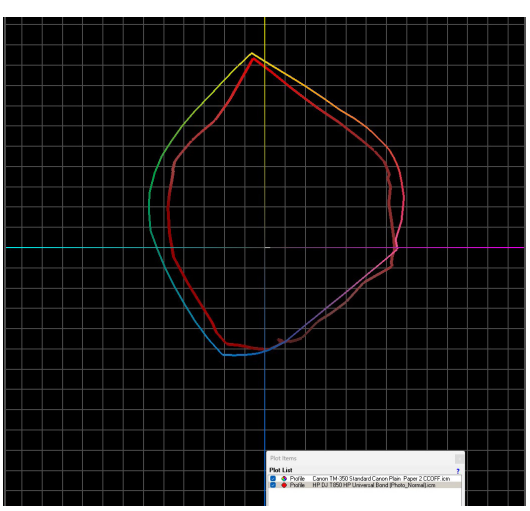
Media Type/Settings	Canon imagePROGRAF TM-350	HP DesignJet T850
Plain Paper Fast	188,786	225,928
Plain Paper Standard/Normal	311,664	284,491
Plain Paper High/Best	316,898	323,796
Matte Coated High/Best	385,191	305,680



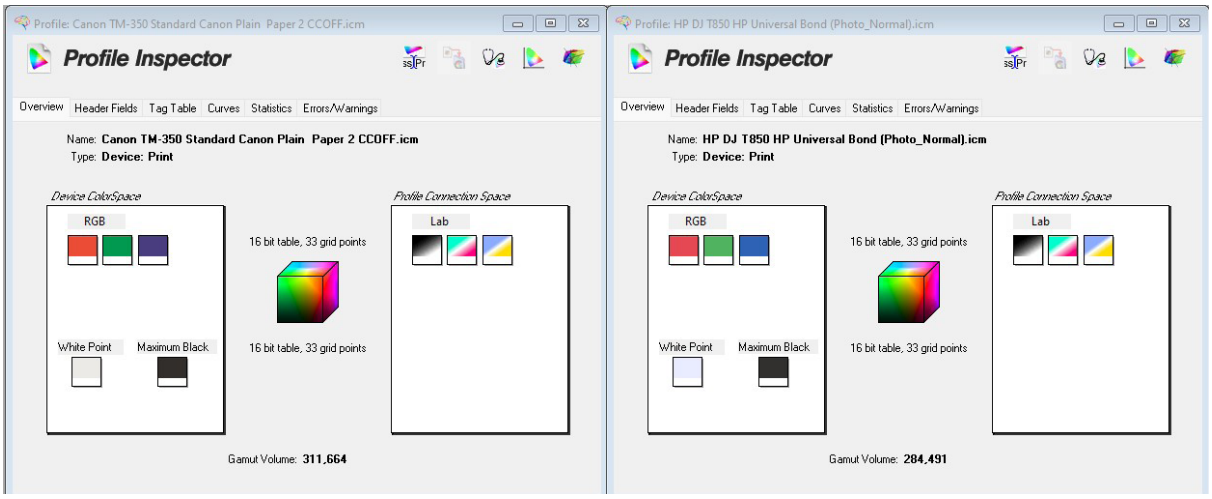
Canon imagePROGRAF TM-350 colour gamut on plain paper in Fast settings (shown chromatically) versus HP DesignJet T850 colour gamut (shown in red) on plain paper in Fast settings.



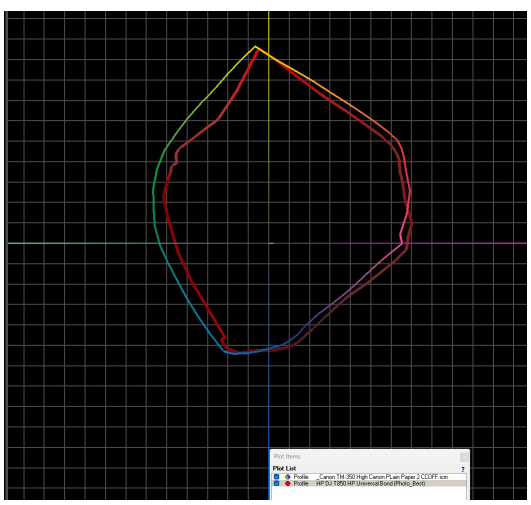
Colour gamut profile for Canon imagePROGRAF TM-350 (left) and HP DesignJet T850 (right) on plain paper in Fast mode.



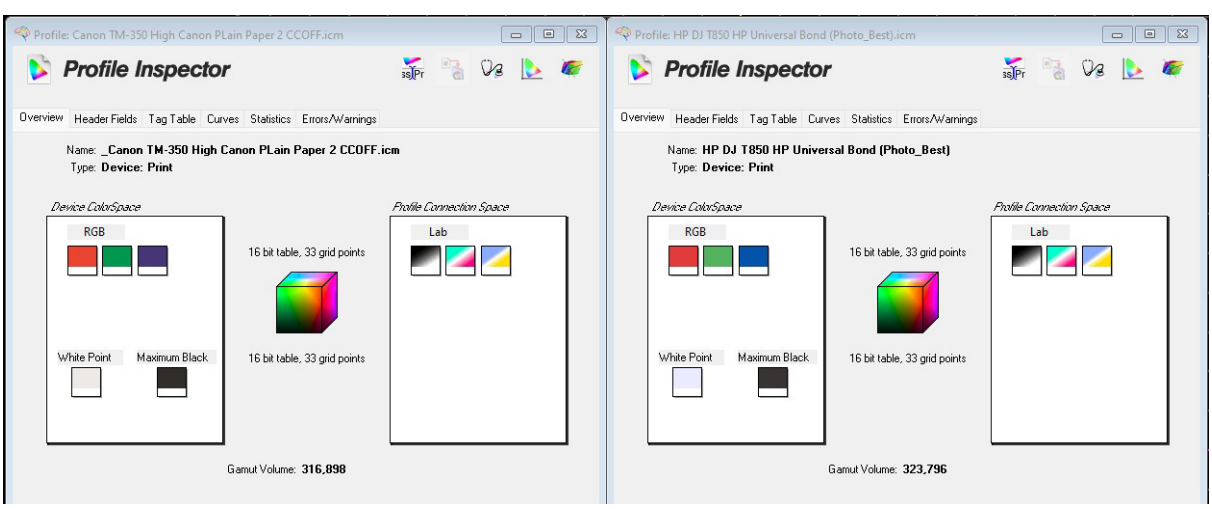
Canon imagePROGRAF TM-350 colour gamut on plain paper in Standard settings (shown chromatically) versus HP DesignJet T850 colour gamut (shown in red) on plain paper in Normal settings.



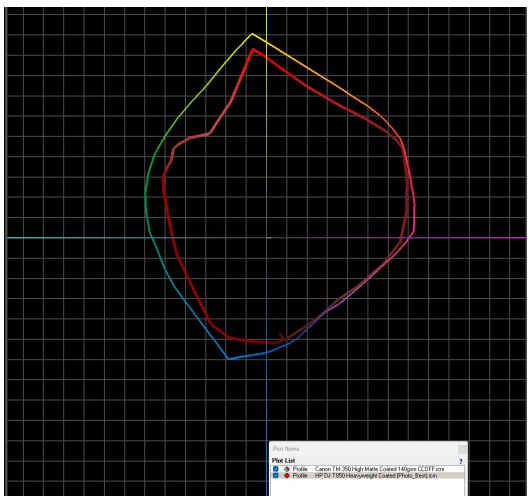
Colour gamut profile for Canon imagePROGRAF TM-350 (left) and HP DesignJet T850 (right) on plain paper in Standard/Normal modes.



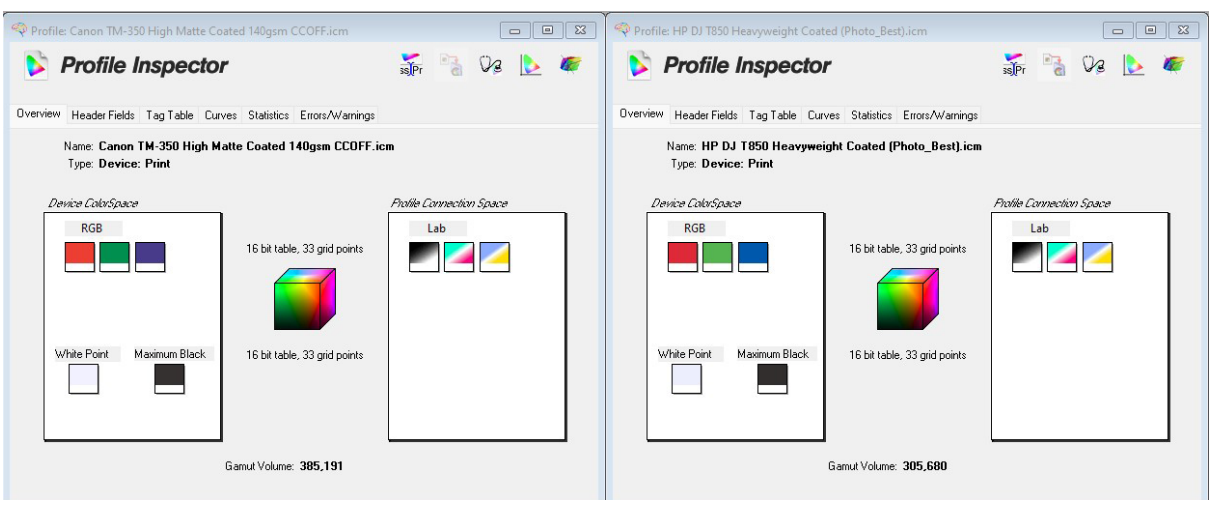
Canon imagePROGRAF TM-350 colour gamut on plain paper in High settings (shown chromatically) versus HP DesignJet T850 colour gamut (shown in red) on plain paper in Best settings.



Colour gamut profile for Canon imagePROGRAF TM-350 (left) and HP DesignJet T850 (right) on plain paper in High/Best Quality modes.



Canon TM-350 colour gamut on matte coated paper in High quality settings (shown chromatically) versus HP DesignJet T850 colour gamut (shown in red) on matte coated paper in Best settings.



Colour gamut profile for Canon imagePROGRAF TM-350 (left) and HP DesignJet T850 (right) on matte coated paper in High/Best Quality modes.

Black Print Quality

Solid Density

	Canon imagePROGRAF TM-350			HP DesignJet T850		
Density Block						
	Fast	Standard	High	Fast	Normal	Best
1	1.51	1.48	1.42	1.52	1.51	1.42
2	1.50	1.50	1.42	1.52	1.51	1.42
3	1.51	1.51	1.44	1.51	1.51	1.41
4	1.51	1.49	1.45	1.51	1.51	1.42

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 TM-350	Advantage		HP DesignJet T850
Maximum Image Resolution	2400 x 1200 dpi			2400 x 1200 dpi
Number of Inks	5 (MBk, CMYK)	✓		4 (CMY,mk)
Ink Tanks Replaceable During Operation	Yes	✓		No
Ink Drop Size	5 picoliter	✓		6 picoliter (CMY); 12.6 picoliter (mK)
Ink Cartridge Capacity	130/300 ml (all colours)			130/300 ml (all colours)
Number of Nozzles	MBK: 5,120 nozzles; CMYK: 2,560 nozzles each; 15,360 in total	✓		5,504 in total (1,376 per colour)
Number of Printheads	1 (User-replaceable)			1 (User-replaceable)
Line Accuracy	+/-0.1%			+/-0.1%
Minimum Line Width	0.02 mm			0.02 mm
Minimum Print Margins	20 mm Top and 3 mm Bottom and Side (Roll); 20 mm Top and Bottom, 3 mm Side (Cut sheet)		✓	5 mm (Roll and Cut sheet input tray); 5 mm Top and Side and 17 mm Bottom (Cut sheet manual)
Borderless (0 mm) Printing	Yes (Roll only)	✓		No
Maximum outside diameter of roll paper	150 mm	✓		100 mm
Maximum Printable Paper Roll Length	18 m (depending on OS and application)			INA
Maximum Cut-Sheet Media Length	1.6 m			1.6 m

Maximum Media Thickness for Roll Paper	0.07-0.8 mm	✓		0.3 mm
Maximum Media Width	914 mm (36 inches)			914 mm (36 inches)
Media Loading	Top loading			Top loading
Optional Media Handling	2″/3″ roll holder set	✓		3″ core adapter
Standard/Maximum RAM	2 GB physical	✓		1 GB
Hard Drive	NA			NA
Interface	Hi-Speed USB; 10/100/1000Base-T/TX Ethernet; Wireless LAN 802.11			Gigabit Ethernet (1000Base-T), Hi-Speed USB 2.0, Wi-Fi 802.11
PDL	SGRaster, HP-GL/2, HP RTL, JPEG (Ver. JFIF 1.02), CALS G4			HP-GL/2, HP-RTL, CALS G4, JPEG, URF
Net Weight (unpacked)	63.8 kg (including Roll Holder Set, Stand and Basket; excluding ink and printhead)		✓	47 kg
Power Consumption in Standby Mode	INA			< 0.2 W
Power Consumption when Active	65 W (approximately)		✓	< 35 W
Acoustic Pressure	Operation: 41 dB (A); Standby: <35 dB (A)			Operation: 42 dB (A); Standby: < 16 dB (A)
Acoustic Power	Operation: 6.2 Bels			Operation: 5.8 B(A); Standby: < 3.4 B(A)

Driver Feature Set

	Canon imagePROGRAF TM-350	Advantage	HP DesignJet T850
Speed Settings	Fast 300, Standard 600, Fast 600, High 600, and High 1200		Economode 300, Fast 600, Normal 600, Best 600 and 1200
Economy Mode	Yes		Yes (Economode)
Predefined Profiles	7 (Default, Photo colour, Poster, CAD colour line drawing, CAD mono line drawing, and Perspective, GIS, Custom)	✓	5 (Default, CAD, GIS, Photo and B/W Photo)
Overview of Profile Settings Provided	Yes		Yes
Media Profiles	53 + 10 user customizable special options	✓	34

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, 180, or 270 degrees
Option to Preview Before Print	Yes			Yes
CMYK Balance Adjustment	Yes (CMY only)	✓		No
Brightness Adjustment	Yes	✓		No
Contrast Adjustment	Yes	✓		No
Saturation Adjustment	No			No
Advanced Colour Management Options	Yes	✓		No
Enlargement Copy Mode	Yes	✓		No
Free Layout Capability	Yes (flexible placement)	✓		Yes (automatic placement)
MS Office Plug-In	Yes	✓		No
Accounting Capability	Yes			INA
Disable Automatic Cutter	Yes			Yes
Unidirectional Printing Selection Option	Yes	✓		No
Integration with MFP	Yes			No

The Canon imagePROGRAF TM-350 comes bundled with PosterArtist Lite.

Ink Consumption

Table 1: Amount of Ink in Each Canon imagePROGRAF TM-350 Cartridge (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Weight of Cartridge Prior to Installation	395.5	388.9	386.7	392.3	390.2
Weight of Cartridge at End of Life	83.5	83.5	83.5	83.5	83.5
Net Weight of Ink	312.0	305.4	303.2	308.8	306.7
Total Ink Weight Across Five Cartridges					**1,536.1**

Table 2: Amount of Ink in Each HP DesignJet T850 Cartridge (in Grams)

	Matte Black	Cyan	Magenta	Yellow
Weight of Cartridge Prior to Installation	420.1	419.1	420.3	418.7
Weight of Cartridge at End of Life	107.1	107.1	107.1	107.1
Net Weight of Ink	313.0	312.0	313.2	311.6
Total Ink Weight Across Four Cartridges				**1,249.8**

Table 3: Ink Used in Three 50-Page Runs of Cottage Architectural Plan Test Document (Standard Mode) on the Canon imagePROGRAF TM-350 (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Test Run 1 Net Weight of Ink Used	25.6	2.3	2.2	5.6	8.9
Test Run 2 Net Weight of Ink Used	21.8	1.2	1.5	2.3	5.4
Test Run 3 Net Weight of Ink Used	23.6	1.0	1.2	4.2	6.6
Average Amount of Ink Used Across Three Runs	23.7	1.5	1.6	4.0	7.0
Total Ink Weight Across Five Cartridges for 50-Page Run (Based on Averages)					**37.8**

Table 4: Ink Used in Three 50-Page Runs of Cottage Architectural Plan Test Document (Normal Mode) on the HP DesignJet T850 (in Grams)

	Matte Black	Cyan	Magenta	Yellow
Test Run 1 Net Weight of Ink Used	19.1	8.2	6.5	1.3
Test Run 2 Net Weight of Ink Used	18.6	8.2	6.5	1.2
Test Run 3 Net Weight of Ink Used	20.7	9.4	7.7	2.3
Average Amount of Ink Used Across Three Runs	19.5	8.6	6.9	1.6
Total Ink Weight Across Four Cartridges for 50-Page Run (Based on Averages)				**36.6**

Table 5: Ink Used in Three 50-Page Runs of ISO Poster Test Document (Standard Mode) on the Canon imagePROGRAF TM-350 (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Test Run 1 Net Weight of Ink Used	19.1	1.1	1.2	22.6	76.5
Test Run 2 Net Weight of Ink Used	21.0	1.3	1.5	22.6	77.1
Test Run 3 Net Weight of Ink Used	21.0	1.2	1.3	22.6	77.5
Average Amount of Ink Used Across Three Runs	20.4	1.2	1.3	22.6	77.0
Total Ink Weight Across Five Cartridges for 50-Page Run (Based on Averages)					**122.5**

Table 6: Ink Used in Three 50-Page Runs of ISO Poster Test Document (Normal Mode) on the HP DesignJet T850 (in Grams)

	Matte Black	Cyan	Magenta	Yellow
Test Run 1 Net Weight of Ink Used	17.1	61.5	29.6	6.6
Test Run 2 Net Weight of Ink Used	18.6	62.3	30.5	7.5
Test Run 3 Net Weight of Ink Used	17.2	60.7	29.3	6.7
Average Amount of Ink Used Across Three Runs	17.6	61.5	29.8	6.9
Total Ink Weight Across Four Cartridges for 50-Page Run (Based on Averages)				**115.8**

Table 7: Ink Used in Three 50-Page Runs of GIS Map Test Document (Standard Mode) on the Canon imagePROGRAF TM-350 (in Grams)

	Matte Black	Black	Yellow	Magenta	Cyan
Test Run 1 Net Weight of Ink Used	31.1	1.3	17.7	13.8	33.1
Test Run 2 Net Weight of Ink Used	33.5	1.4	19.9	13.8	33.7
Test Run 3 Net Weight of Ink Used	32.1	0.9	19.6	14.9	35.8
Average Amount of Ink Used Across Three Runs	32.2	1.2	19.1	14.2	34.2
Total Ink Weight Across Five Cartridges for 50-Page Run (Based on Averages)					**100.9**

Table 8: Ink Used in Three 50-page Runs of GIS Map Test Document (Normal Mode) on the HP DesignJet T850 (in Grams)

	Matte Black	Cyan	Magenta	Yellow
Test Run 1 Net Weight of Ink Used	10.3	42.7	27.5	25.7
Test Run 2 Net Weight of Ink Used	10.4	43.7	27.9	26.3
Test Run 3 Net Weight of Ink Used	11.9	44.7	28.9	27.4
Average Amount of Ink Used Across Three Runs	10.9	43.7	28.1	26.5
Total Ink Weight Across Four Cartridges for 50-Page Run (Based on Averages)				**109.2**

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 TM-350 was installed in Keypoint Intelligence's lab with the latest "01.00" level of firmware (as of launch) 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 T850 was installed in Keypoint Intelligence's lab with the latest "6.19.1.9-202309101034" level of firmware (as of October 2023) and connected to a Windows 10 workstation using a 1000BaseT TCP/IP connection. The HP GL/2 driver was used for all testing with media selection set to plain paper and the image set to print at actual size. Print priority settings for the Cottage Architectural Plan were set to CAD, and to Photo and GIS for the ISO poster and GIS map, respectively. 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 several proprietary test documents, Keypoint Intelligence 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 exactXp densitometers.

About Keypoint Intelligence

For over 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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