

JUNE 2024

## Custom Test Report

# Canon imagePROGRAF GP-4600S vs. HP DesignJet Z6

Advantage ✓	Canon imagePROGRAF GP-4600S	HP DesignJet Z6
Image Quality	✓	
Print Productivity	✓	
Banner Printing	✓	
Ink Consumption		✓
Direct Print Submission Functionality	✓	
Device Feature Set	✓	
Print Driver Feature Set	✓	
Printhead Reliability/Cleaning Routines	✓	

## Objective

Canon Europe commissioned Keypoint Intelligence to conduct confidential performance testing on the 44" Canon imagePROGRAF GP-4600S and the HP DesignJet Z6 and produce a report comparing the relative strengths and weaknesses of the two products in the areas of image quality, productivity, ink consumption, direct print submission functionality, device feature set, driver functionality and printhead stability and cleaning routines. All testing was performed in Keypoint Intelligence's European test facility in Wokingham, UK.

## Executive Summary

In Keypoint Intelligence's rigorous graphic arts evaluation, both the Canon imagePROGRAF GP-4600S and the HP DesignJet Z6 wide format printers excelled, each showcasing certain strengths. The Canon GP-4600S demonstrated superior results in image quality, productivity, and device and driver feature sets, with the HP DesignJet Z6 exhibiting more efficient ink usage in two out of three tests. The GP-4600S had a clear speed advantage in all speed tests and modes, making it a potent, productive choice for high-resolution environments such as photographic studios, while also being well-suited for medium-resolution work like signs and posters. Additionally, it was capable of printing Keypoint Intelligence's banner file, whereas the HP unit was unable to generate a preview or print any part of it. Both models' printheads performed reliably throughout the evaluation; however, when powered off over a weekend, the Canon model's printhead did not experience nozzle clogging issues, while the HP model's printhead required two clean cycles to rectify nozzle check pattern issues.

In terms of image quality, the Canon GP-4600S produced sharper, crisper text and line artwork, and a larger colour gamut. Its colour halftone images exhibited brighter, punchier colours, more natural-looking warm skin tones, and better fine detailing in light contrast areas. A new ink formulation, containing wax, reportedly enhances scratch resistance, though this wasn't tested by Keypoint Intelligence. Additionally, the new ink set can achieve 96% of PANTONE FORMULA GUIDE Solid Coated, according to Canon. The HP DesignJet Z6 produced comparably high-quality neutral grey halftone images with better fine details in dark contrast areas. It offers a valuable tool—HP Professional PANTONE Emulation—which allows users to create and print a swatchbook of multiple PANTONE colours and see how the printer will reproduce them on selected media.

The GP-4600S further enhances ease of use with hallmark features such as on-the-fly ink replacement and efficient media-loading capabilities, including automatic detection of media type and remaining quantity, without requiring a printed barcode. Media loading on the HP is less user-friendly as it's conducted at the top rear of the device, which may require two people for handling long or heavier media rolls, as advised by HP. Paper tracking via a printed barcode is also supported.

Other notable features for the GP-4600S (not supported on the HP Z6) include its unidirectional feature, which can eliminate banding, and flexible ink capacity options to suit different print shop setups. Both devices offer intuitive touchscreens to aid walk-up tasks, comprehensive job accounting tools, and provide similarly intuitive direct print submission utilities and OEM mobile apps for easy job submission while on the go. Canon's web-based PosterArtist is a free graphic application design service that's worth highlighting. It provides access to a wealth of templates as well as stock photo libraries, enabling Canon users to easily create and print posters, flyers, banners, and so on. It supports flexible nesting, whereas automatic nesting is available with the HP unit, which allows for more efficient use of media.

Although the HP boasts an impressive device feature set and offers more efficient ink usage overall, the Canon GP-4600S is judged as the stronger performer, primarily due to its superior image quality, higher productivity, and better usability.

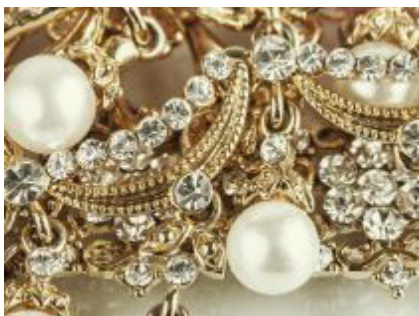
## Image Quality

Advantage ✓	Canon imagePROGRAF GP-4600S	HP DesignJet Z6
Text	✓	
Fine Lines	✓	
1x1 Pixel Grid	=	=
Halftone Range	=	=
Halftone Fill	=	=
Solid Density	✓	=
Colour Drift Across FOGRA39	=	=
Skin Tone Consistency	=	=
Neutral Grey Consistency		✓
Colour Photographic Images	✓	
Monochrome Photographic Images	=	=
Colour Gamut	✓	

Keypoint Intelligence's image quality test evaluation was conducted using Canon's Premium Semi-glossy 280gsm media and HP's Instant-Dry Satin Photo Paper 260gsm media, with quality set to 'Highest' on the Canon model and the HP model set to 'Best'.



*Fruits* and vegetables



Keypoint Intelligence's colour and greyscale halftone test targets

- The GP-4600S delivered smooth and distinct fonts that were fully formed at the 5-pt. level (serif) and 3-pt. level (sans serif). Text produced by the HP DesignJet Z6 was fully formed at the smallest 3-pt. level and dark, however characters lacked smoothness under magnification due to slight ink bleed.
- Both models' fine line artwork was crisp and clean at the 0.1-pt. level; the GP-4600S produced more slender lines compared to the HP DesignJet Z6's output (of which the 0.1-pt. and 0.25-pt. lines were indistinguishable) and were rated excellent with HP's rated good.
- Circles produced by the GP-4600S were smooth and distinct and were judged very good at the 0.1-pt. level. The HP DesignJet Z6's circles at the 0.1-pt. level were smooth and bold (again, similar to 0.25-pt. circles).
- Both devices produced very good CMYK 1x1 pixel grids with consistent dot formation and dot laydown.
- Both models delivered colour and black halftone output across the full range—from the 10% to the 100% dot-fill levels—with distinct transitions between all levels.
- Both models delivered an impressive range of halftone fills in colour mode, with no banding or graininess issues. Neutral greyscale halftone coverage was equally excellent from both units.
- The Canon GP-4600S produced higher cyan, magenta, and yellow optical densities, while black density was comparable to that from the HP Z6.
- Results were mixed in the three skin tone tests; each device delivered a low drift in one of the tests and had comparable drift results in the remaining test.
- Neutral grey consistency was better maintained by the HP DesignJet Z6 with a lower variance across the page.
- In Keypoint Intelligence's colour drift analysis, which involves printing and measuring (using EFI Color Verifier software), a FOGRA39 media wedge before and after productivity and ink consumption tests, both devices demonstrated low mean Delta E drifts (0.3 for the Canon, 0.2 for the HP).
- When printing on semi glossy media in highest quality settings, the Canon GP-4600S delivered a 47.7% larger colour gamut—737,735 CIE volume versus 499,573 CIE volume for the HP model.
- Keypoint Intelligence technicians rated the colour and greyscale images from both devices as exceptionally high quality. Colour output from the Canon GP-4600S was judged superior in several areas, however. It exhibited brighter and punchier memory colours and sharper fine detailing in highlights. Its metallics and pearlescents were more lustrous. Skin tones were smooth and warm which made them slightly more natural looking than those produced by the HP model which were comparatively pale.
- Greyscale halftones from both models were photographic-like, with smooth tonal transitions and true neutral grey tones. The Canon unit had better depth of field and details in highlight areas, while the HP's output had sharper fine detailing and textures in dark contrast areas.

## Print Productivity

Advantage ✓	Canon imagePROGRAF GP-4600S	HP DesignJet Z6
First Print Out from Ready State Portrait Printing	✓	
First Print Out from Ready State Retail Poster Printing	✓	
Throughput Speed A1 Portrait Printing	✓	
Throughput Speed A1 Retail Poster	✓	
Throughput Speed A0 Portrait Printing	✓	
Throughput Speed A0 Retail Poster	✓	

Productivity evaluation is based on Fast/Fast, Standard/Normal, and High/Best modes.

- When printing a single high-resolution portrait from ready state, the Canon GP-4600S scored a faster first-print-out time in all three tested speeds; in Fast mode it was 39.2% faster, in Standard/Normal mode 33.3% faster, and 37.7% in High/Best mode when compared with the HP model.
- When printing a single medium-resolution retail poster from ready state, the Canon model was the most productive model in all tested speeds. It was 28.7% faster in Fast mode, 15.9% faster in Standard/Normal mode, and 11.6% faster in High/Best mode when compared with the HP device.
- In Keypoint Intelligence's A1 high-resolution portrait throughput speed evaluation, the Canon GP-4600S's per-page speed was 34.7% faster in Fast mode, 30.6% faster in Standard/Normal mode when compared with the HP model. In High/Best, the Canon device had the faster (by 33.5%) per-page speed, with a one minute, 49.67 second speed advantage over the HP model.
- When printing five copies of a single-page A1-size medium-resolution retail poster test document, the Canon GP-4600S's per-page speeds were 46.3% in Fast mode, 35.1% in Standard/Normal mode, and 18.5% faster in High/Best mode when compared with the HP DesignJet Z6.
- In the A0 high-resolution portrait throughput speed evaluation, the Canon GP-4600S's per-page speed was 22.1% faster in Fast mode and 15.7% faster in Standard/Normal mode compared with the HP Z6. However, in High/Best mode, the GP-4600S's per-page speed was 80.8% slower than that of the HP device.
- When printing five copies of a single-page A0-size medium-resolution retail poster test document, the Canon model's per-page speeds were 33.8% in Fast mode, 29.6% in Standard/Normal mode, and 11.5% faster in High/Best mode when compared with the HP DesignJet Z6.

## Banner Printing

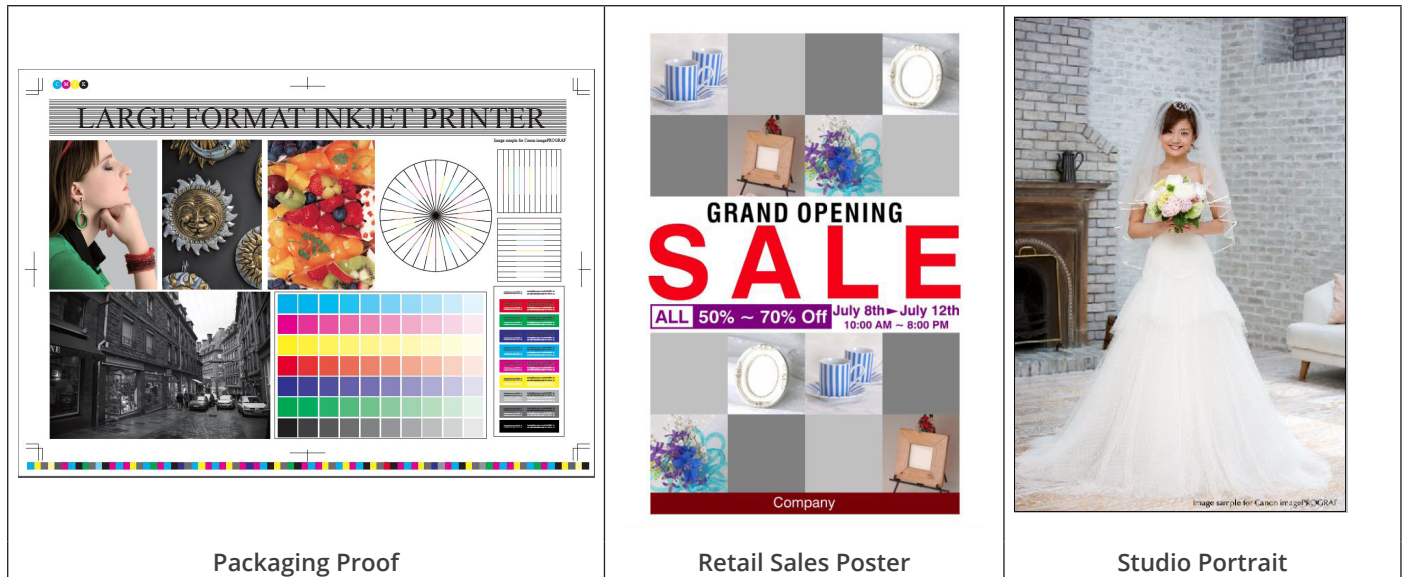
Advantage ✓	Canon imagePROGRAF GP-4600S	HP DesignJet Z6
Image Quality	✓	
Productivity	✓	



Keypoint Intelligence 24" x 70" banner (4,955-KB PDF file)

- The Canon imagePROGRAF GP-4600S successfully printed the banner in Fast mode with slight banding visible on output, taking 30.91 seconds to generate a preview at the desktop, and an additional two minutes, 47.24 seconds from preview to final paper cut.
- While a preview feature is available with the HP DesignJet Z6, no actual image was displayed, and it was incapable of printing the banner. When the job was submitted for printing, the device indicated that it was processed and ejected, however it did not print any portion of the banner.
- We expect such banners to be typically viewed from a distance (which means the impact of the banding is negligible), but the Canon device offers an advantage with its unidirectional feature (not available with the HP model). When the banner was printed on the GP-4600S with the feature enabled, banding was eliminated with a print time from preview to final paper cut of four minutes, 9.06 seconds.

## Ink Consumption



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 GP-4600S	HP DesignJet Z6
Packaging Proof	100.2	101.9
Retail Sales Poster	82.8	72.3
Studio Portrait	130.3	98.8

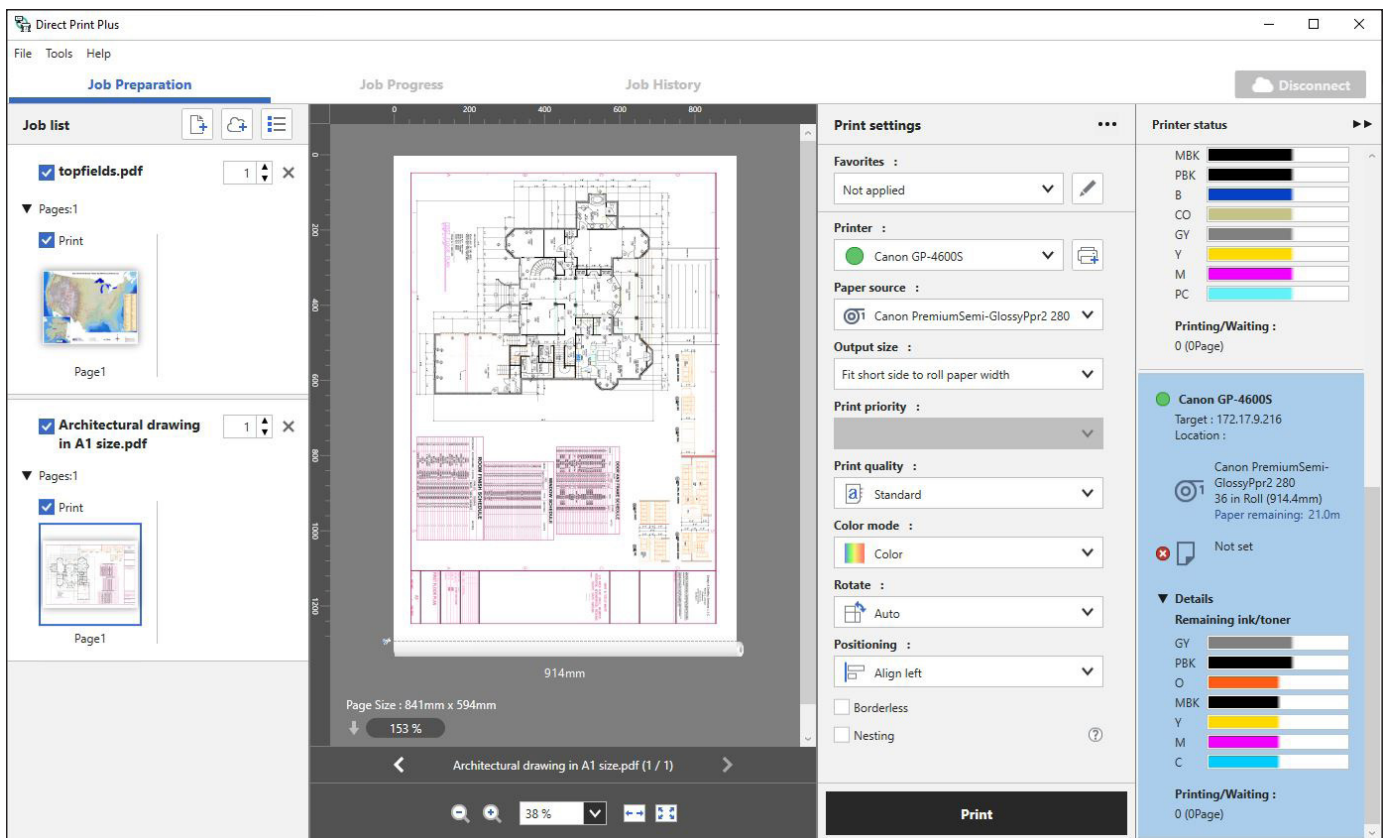
Results are averaged across three sets of 50-page A1 printing in Standard/Normal mode.

- The Canon GP-4600S and HP DesignJet Z6 used comparable amounts of ink when printing a Packaging Proof test target in Standard/Normal mode. This translates to the Canon device using 2.0% of its total available ink, while the HP model used 5.4%.
- When printing the Retail Sales Poster test target on matte coated media, the Canon unit used 14.5% more ink compared with the HP Z6. For the same print scenario, the Canon GP-4600S used 1.6% of its total available ink, while the HP model used 3.8%.
- In the Studio portrait ink consumption test conducted using semi-gloss photo media, the Canon GP-4600S used 31.9% more ink compared with the HP device, which meant it used 2.6% of its total available ink for the test, while the HP Z6 used 5.2%.

## Direct Print Submission Functionality

Advantage ✓	Canon imagePROGRAF GP-4600S	HP DesignJet Z6
Ease of Use	=	=
Direct Print Submission Functionality	=	=
Mobile App Integration	=	=

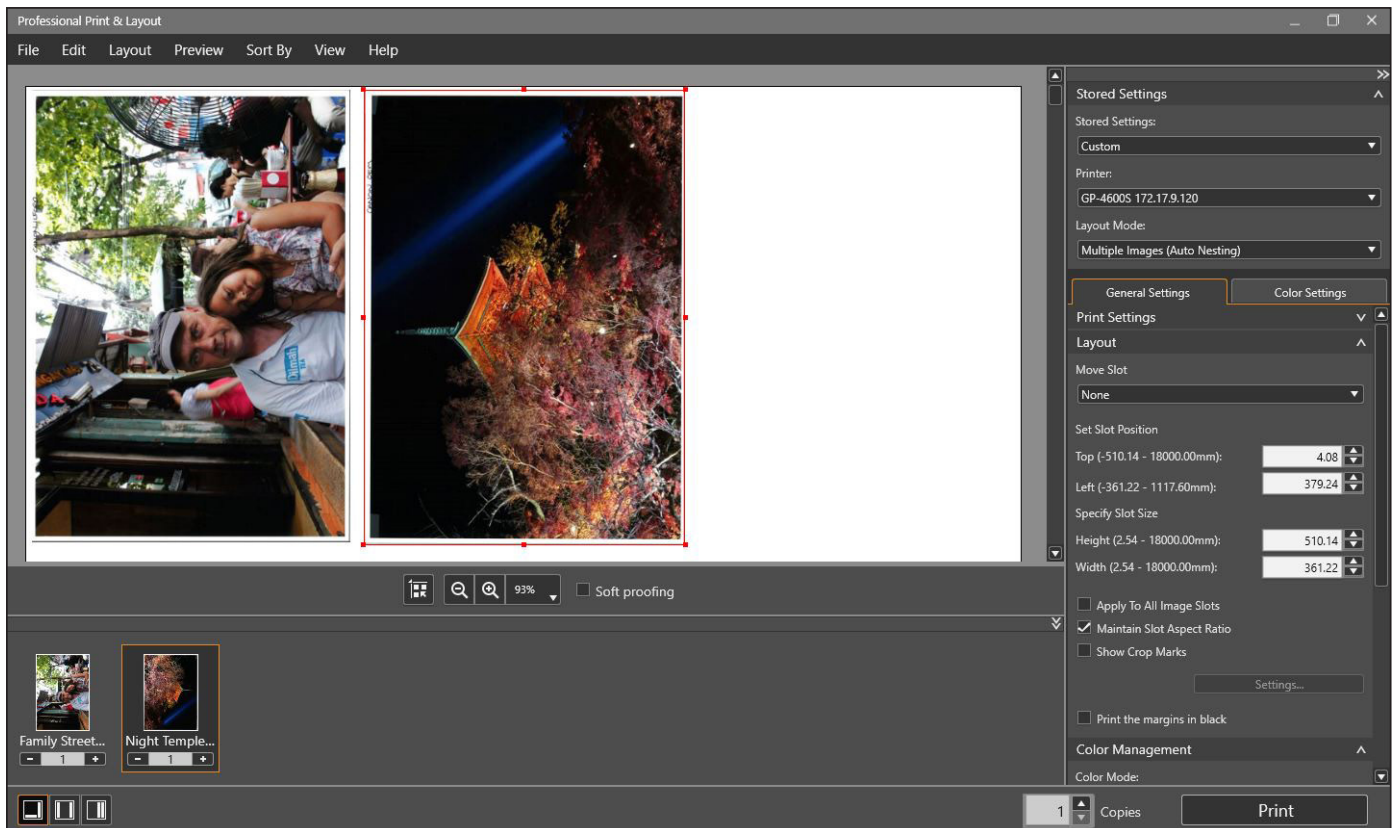
- Canon's Direct Print Plus, featuring a Canon-developed PDF engine, offers a user-friendly interface with improved PDF file processing and printing. Its layout includes three tabs: Job Preparation (the home screen), Job Progress, and Job History. The Job Preparation tab is divided into four sections—Job list, Preview, Print settings, and Printer status—allowing quick access to job settings, previews, and printer status information without the need to link to the Status Monitor. The bidirectional 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. There is also a link to Canon Accounting Manager to keep track of project costs.

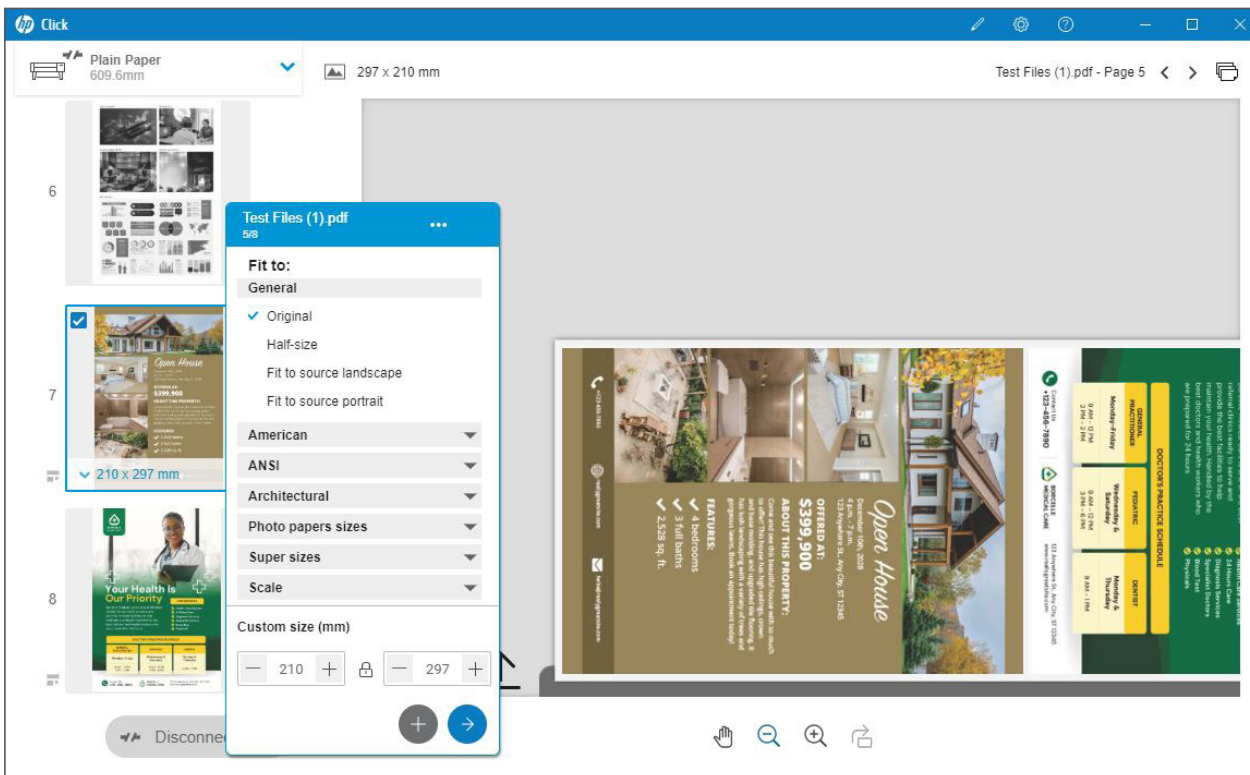
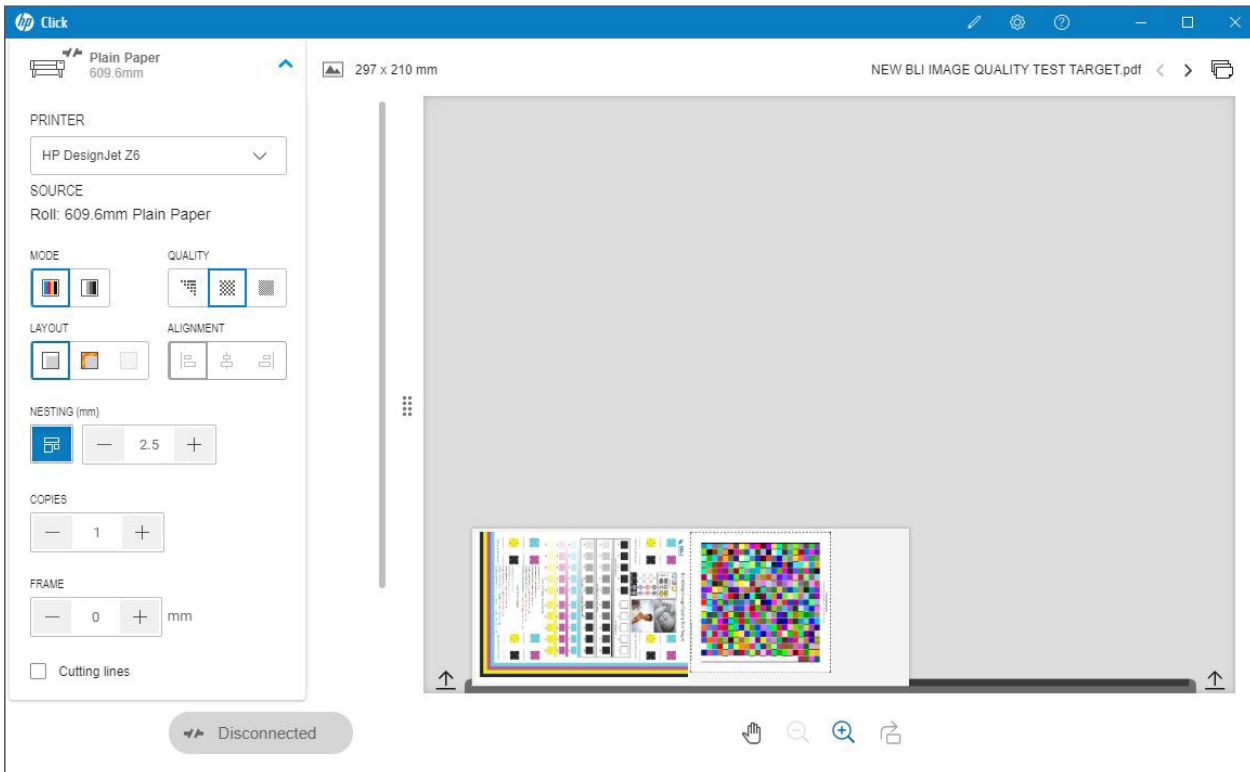


- Direct Print Plus supports 'Shortcut Print' functionality which helps streamline print workflows. Akin to a hot folder workflow, users can create desktop shortcuts that allow drag and drop automatic file printing with predefined print settings. Multiple desktop icons can be created containing different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



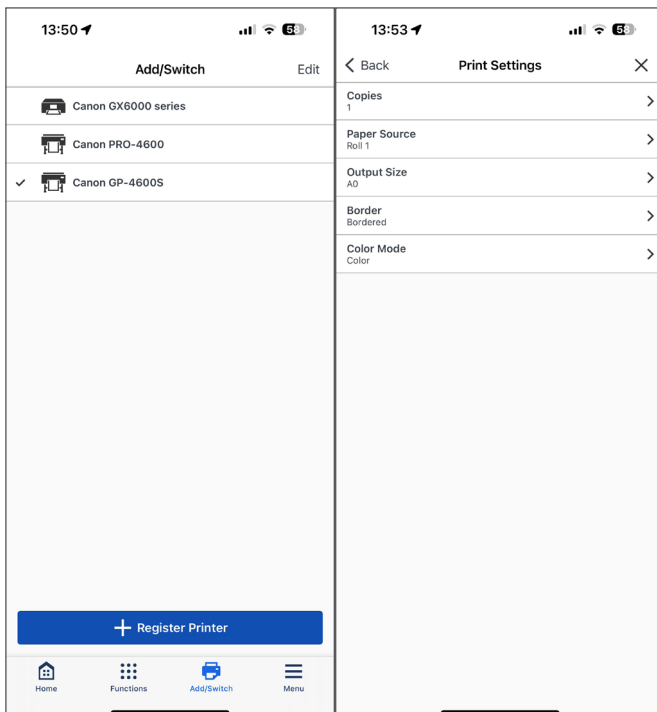
Canon's Professional Print & Layout utility offers an easy-to-use interface. The latest version (V1.4) can automatically retrieve paper type information from the printer.

- Canon's Professional Print & Layout software enables files—even those from different applications—to be scaled, resized, or grouped together as a single job. It features both auto and flexible nesting options for more efficient media use, with the latter allowing users to manually arrange images on a page. Previews, soft proofing, and pattern printing all enable users to check and adjust colour balance, contrast, and brightness. This is done by creating variations with the resulting 'pattern' allowing user to identify and select the desirable value.
- Job setting adjustments include colour management, print quality, image rotation, amongst others. The utility supports plug-in features with various software options designed to appeal to specific segments of the Graphic Arts market, such as photography and fine art display. These include a print plug-in for Photoshop, which, according to Canon, allows users to print 16-bit files directly from Adobe RGB with a wide gamut and clear tonal gradation, as well as a plug-in for DPP (Digital Photo Professional) that includes a Digital Lens Optimizer to improve photographic image quality and enhance depth of field; Adobe Lightroom is also supported.

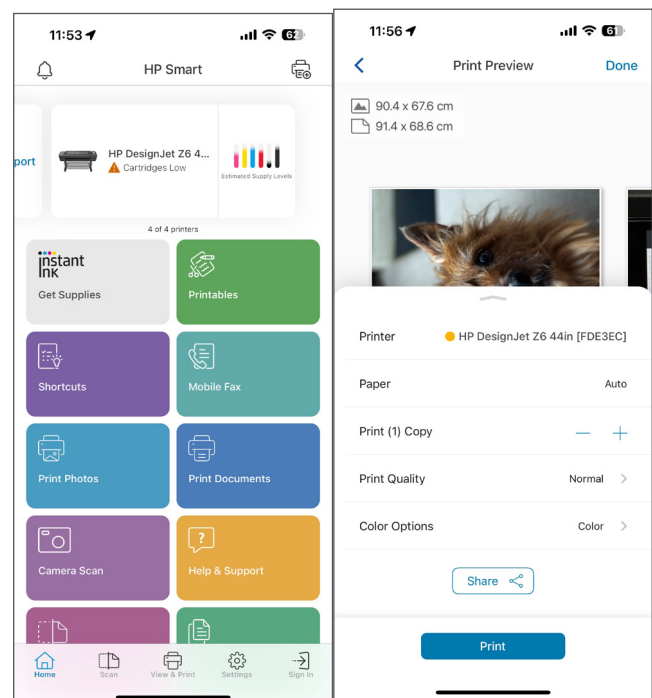


HP Click utility provides user friendly job submission procedures and a broad range of job and layout adjustment options.

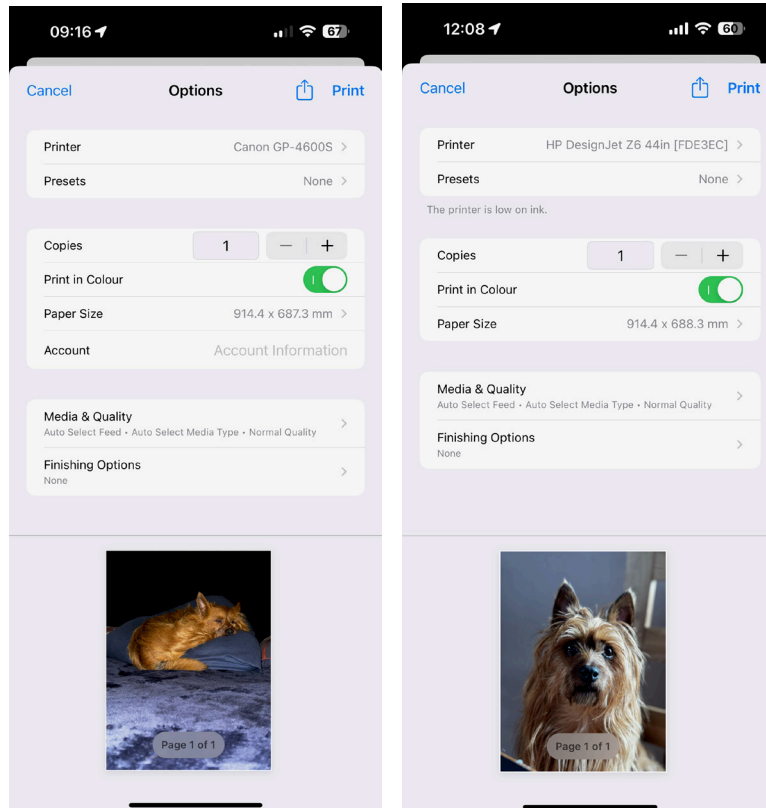
- HP Click printing software, available as a free download, enables direct printing of PDF, JPEG, TIFF, and HPGL/2 files from the PC desktop, without the need for native applications or print drivers. Users can select basic print settings, preview, resize and align images. The utility also has an automatic nesting feature to reduce waste (however, unlike the Canon tool, it does not allow users to have precise control over the positioning of jobs).
- Both devices offer excellent mobile print support via a proprietary mobile app—Canon PRINT and HP Smart—making it easy for users to print wirelessly to compatible large-format printers on the same WiFi network. Both apps offer a clean interface and a broad range of print settings as well as the ability to retrieve documents from a variety of cloud storage services such as Dropbox, Box, and Google Drive. Canon Android users will need to use Canon Print Service app to print from their smart devices; the HP Smart app is compatible with iOS and Android platforms.
- Both models support mobile printing via AirPrint for added flexibility.
- In addition, the HP Z6 supports HP ePrint functionality, whereby users can send print jobs remotely by email either via a workstation PC or a mobile device; PDF, TIFF and JPEG files (up to 10 MB) are supported.



Canon PRINT mobile print app



HP Smart mobile print app



Apple AirPrint settings (Canon left, HP right)

## Device Feature Set

- The GP-4600S features a seven-ink set which includes orange, grey, and two black inks. New ink formulation includes wax in the pigment ink, which according to Canon, increases resistance to scratching. The HP DesignJet Z6 uses six inks, including chromatic red and two black inks. Canon has the advantage of allowing ink replacement during operation, reducing downtime. It offers 160/330/700 ml cartridge sizes while the HP supports a single size (300 ml) option only.
- The Canon unit's ink delivery system dispenses a slightly smaller 4-picoliter drop size for all colours while the HP Z6 ink delivery system dispenses two drop sizes: 7/3-picoliter dual drop weight (M, C, PK) and a 6-picoliter drop size for yellow, chromatic red and matte black.
- Both units utilize user-replaceable printheads, which take less than five minutes to replace on both printers.
- The Canon GP-4600S offers a user-friendly, fast media loading process. Its smart roll paper set function allows for automatic media feeding once the roll is secured. As the roll rotates, a proximity sensor detects the edge of the paper and allows the printer to complete the loading process, minimizing user intervention. Built-in sensors identify paper characteristics, including type and thickness, and remember settings for future use, further reducing the need for manual input (in the event of a brand-new media being used for the first time on the device, the operator may need to indicate the media type on the control panel).
- Media loading on the HP DesignJet Z6 occurs at the top rear of the device. Users must lift the roll cover and lift out the spindle, which has a stop at each end to keep the roll in position. With one stop removed, the media roll can be loaded onto the spindle. There are labels on the spindle to ensure the roll is loaded in the correct orientation. The spindle is then placed back into the device, which requires the user to bend forward a little and makes the process less user friendly especially if using heavy weight media. HP recommends using two people for handling long rolls. Once the roll is in place, the user feeds the paper into the device which, once it is detected, then loads it automatically. The operator must confirm the media type on the control panel to complete the process unless the roll has a media remaining information barcode. Instructions on the control panel dynamically update as each step is completed.
- The Canon GP-4600S enhances efficiency with dual sensors that measure, estimate, and display the remaining roll length on its touchscreen. This feature eliminates barcode printing and reading for partially used rolls, and alerts operators if there's insufficient media to complete a job, reducing the risk of unexpected runouts.
- The HP DesignJet Z6 features convenient paper tracking (must be enabled), allowing users to print a media information barcode on a partial roll's edge, indicating remaining length and paper type, which is also displayed on the control panel.
- The GP-4600S's media mismatch feature temporarily holds jobs that require different media than what's loaded, while continuing to print jobs matching the current media; it automatically resumes held jobs once the correct paper is in place. The HP DesignJet Z6 allows users either to put the job on hold and continue with the next (the held job will be kept in the printer queue until suitable paper is loaded) or print it anyway; all jobs that are slated for the paper type that is already loaded will print without delay. A third option is 'pause and ask' so that users are alerted to the mismatch upon submitting their job.
- The Canon GP-4600S supports borderless printing regardless of what media is being used, with a media sensor detecting the edges and automatically adjusting the margin, so there is no ink waste; users can choose free size or three-sided borderless. The HP DesignJet Z6 supports borderless printing as well with select media and common media widths.
- Both models support Gigabit Ethernet and wireless connectivity, as well as direct printing of PDF and JPEG files from a USB flash drive, which helps aid document portability.

- Both models come with a built in self-encrypting 500-GB hard drive, which allows for the storage of commonly used documents and aids spooling workflow.
- Both units offer an optional dual-roll unit, giving users the added flexibility of switching between different media types or sizes without having to reload the media each time. The units can act as an auto Take-up-Roll unit with bi-directional rewind, which could be an extremely valuable feature in high-volume production environments, enabling large numbers of prints to be conveniently stored on a single roll.
- Both models come with a simple output catch basket which collects prints as they emerge from the device; they work better for single prints or short-run jobs, as multiple sheets can build up on the basket and roll up.
- The Canon GP-4600S's interior can be illuminated (enabled at the control panel), which makes it easy for the user to identify the printing position and the status of the job being printed; this feature is not available on the HP Z6.
- A V-Trimmer comes with the HP Z6dr model (not available with the Canon device), which enables the unit to trim most supported media, including HP Artist and Professional Matte Canvas and Scrim Banner, and allows borderless output on all sizes and media supported. The Canon model supports borderless output on all media, too.
- Both models feature bright and responsive touchscreens which offer clear menu settings to simplify walk-up operation. From the home screen, operators can readily view printer and consumable status. When the printers are active, the respective displays show the current job's title, with the Canon also reporting the remaining print time for the current page and the HP displaying the count of printed pages in the ongoing job; both Canon and HP users can navigate menus during operation.
- Cloud-based HP PrintOS enables HP users to monitor and view device and consumable status; alerts can be sent to a mobile app version for remote control and monitoring.



Canon GP-4600S control panel

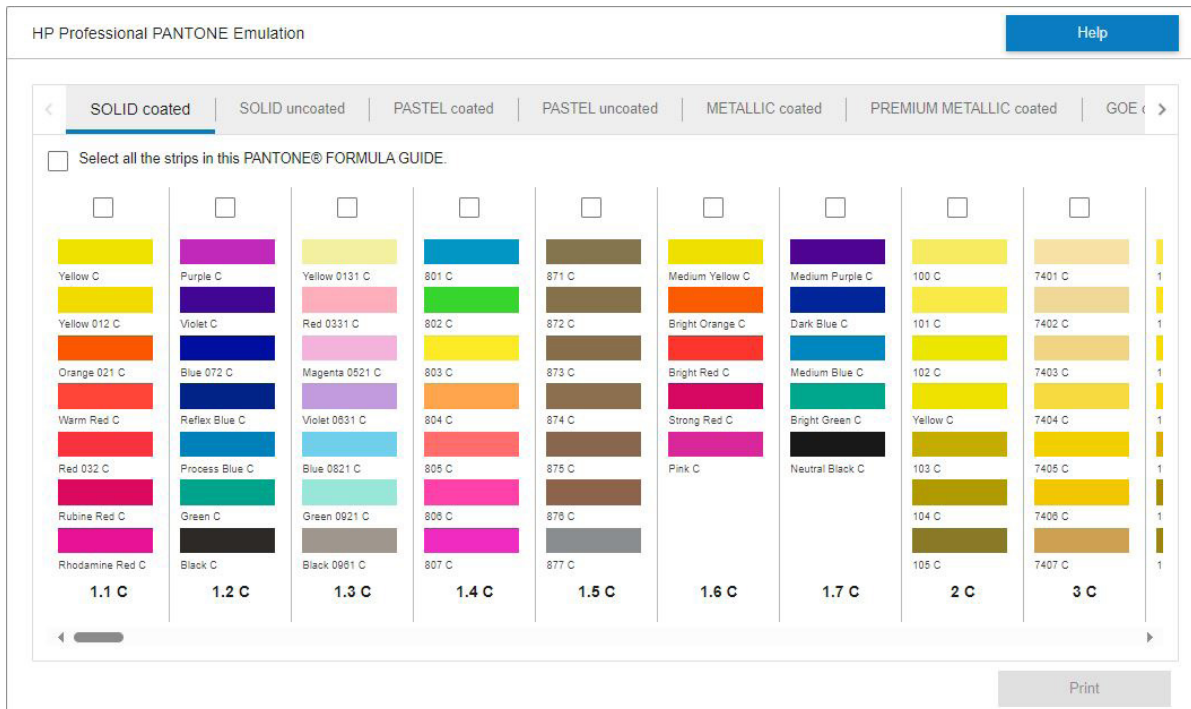


HP DesignJet Z6 control panel

- The HP model is lighter (96 kg versus 181 kg) than the Canon unit, which helps operators when maneuvering the unit on the floor.
- Rated noise emissions while the devices are printing are slightly higher for the Canon model (49 dB) compared to 42-45 dB for the HP unit.

## Print Driver Feature Set

- Both models offer a variety of speed settings, although depending on the media type selected, not all speed options will be available.
- The Canon driver includes 62 media profiles versus 46 for the HP driver. Canon's Media Configuration Tool allows for new custom media types to be registered based on custom media information added to the printer, and users can also organize media shown on the control panel or driver, rename and show/hide information. HP users can access additional HP-certified media profiles from HP PrintOS Media Locator or deploy substrate packages to compatible DesignJet printers via HP PrintOS Configuration Centre.
- The GP-4600S driver features include a watermark capability, page stamping (date, time, job name, and page number), 16-up maximum printing, and a 2 by 2 poster mode, all of which are not available with the HP driver.
- The Canon driver has a unidirectional printing option, which helps to eliminate banding across output because the printhead travels in only one direction when creating the image. The HP driver does not offer this feature.
- The Canon driver offers a wide range of built-in adjustments for CMY, balance, brightness, and contrast. ICC profile settings are also available in its Matching tab under Colour Settings. Canon operators can select four modes— Driver Matching, ICC Profile Matching, ICM (and choose one of four rendering methods—perceptual, relative colorimetric, absolute colorimetric or saturation) or Off. The HP Color Center Utility offers the HP Easy Profiling feature, which enables users to build custom ICC colour profiles and embed them in the HP Z6 printer. Users can also re-profile existing media as well as new, third-party media.
- HP Professional PANTONE Emulation feature (available from the embedded web server) is highly beneficial for customers who require precise colour matching. Operators can create and print a swatchbook of multiple PANTONE colours, so that they can see just how accurately the printer will reproduce them on selected media. Canon does not offer such a feature.
- While the Canon unit does not offer a similar swatchbook feature, the GP-4600S's new LUCIA PRO II ink system can achieve 96% of PANTONE FORMULA GUIDE Solid Coated, according to Canon. This is beneficial when handling colour-critical brand work.



HP Professional PANTONE Emulation

- The Canon driver includes the Colour imageRUNNER Enlargement Copy Mode utility, which allows users to integrate a Canon MFP or other scanner with the GP-4600S. Documents scanned by the Canon MFP, or another configured scanner are automatically routed to a hot folder, which is monitored by the GP-4600S driver. The image is then resized and printed, offering a fast, easy-to-use poster creation tool for office users.
- The Canon model offers a plug-in for printing from Microsoft Office applications, which includes useful tools for automatic media resizing, nesting, and borderless printing. Keypoint technicians were unable to find out whether the HP device supports a similar feature.
- The GP-4600S is compatible with a free Canon Accounting Manager utility. Users can log actual costs for individual inks and media types for cost per job tracking and reporting. Job information on areas including media type, print area, ink used, and total print time is recorded, and more granular cost and consumption details can be obtained by double-clicking on an individual job name or by highlighting a range of different jobs. Job management reports can be exported in .CSV format. HP offers accounting functionality from the device's embedded web server; in addition to tracking the costs of ink and media, the utility can assign costs for low- and high-density images, premium quality images, blueprint paper and for general fixed cost. Reports can be exported in CSV format, as well.



**Job Properties Summary:**

- Document Name : Sale Poster.jpg
- Printer : GP-4600S
- Printing Results : Complete
- Owner : uktes
- Account ID :
- Department (Account ID2) :
- Print Job Start Time : 2024/02/20 11:18:37
- Print Time : 00:02:04
- Pages : 1
- Print Quality : 4
- Output Image Size : 59.400 x 84.100[cm]
- Total Job Cost : 1.146[€]
- Total Paper Cost : 0.570[€]
- Total Ink Cost : 0.576[€]
- Total of Other Costs : 0.000[€]
- Total Ink Consumed : 1.487[m]
- Total Paper Consumed [Area] : 0.5430[square meter]
- Paper Width : 91.440[cm]
- Paper Height : 59.390[cm]
- Total Sheets of Paper Consumed [Converted to A4 Size] : 9

**Job Cost and Consumption Details:**

Item	Amount Consumed	Cost [€]
C(Cyan) Ink Co...	0.245	0.095
GY(Gray) Ink C...	0.246	0.095
M(Magenta) In...	0.416	0.161
MBK(Matte Bla...	0.183	0.071
O(Orange) Ink...	0.272	0.105
PBK(Photo Bla...	0.011	0.005
Y(Yellow) Ink C...	0.114	0.044

**Canon Accounting Manager**

**Usage Accounting Summary:**

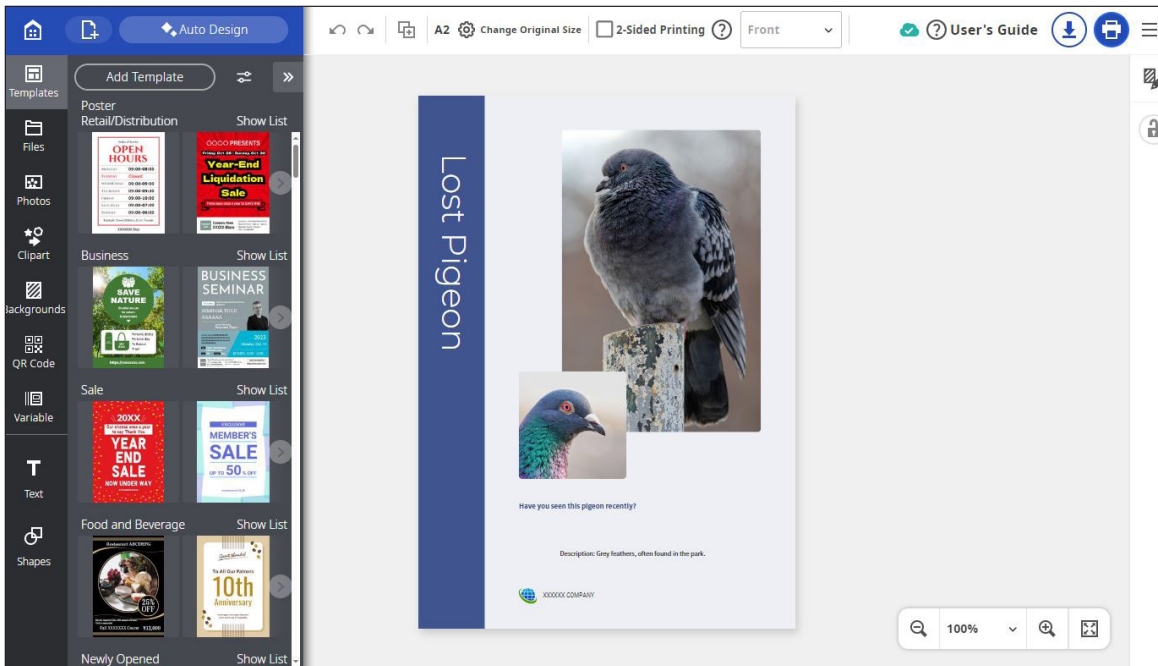
- Number of last jobs to show: 10
- TOTAL - SELECTED JOBS: 10
- Copies: 306
- Pages: 307
- Paper area (m²): 169.20

Number	Time	Type	Source	Print quality	Copies	Pages	Status	Paper type	Paper area (m²)	Pap
61	2024/5/1 18:56	Print	Driver	Best	5	5	Printed	HP Premium Instant-dry Satin Photo Paper	5.42	
62	2024/5/1 19:30	Print	Driver	Normal	1	1	Printed	Plain Paper	0.00	
63	2024/5/1 19:44	Print	Driver	Fast	1	1	Printed	Plain Paper	0.00	
64	2024/5/1 22:22	Print	Demo plot	Normal	1	1	Printed	Plain Paper	0.02	
65	2024/5/2 2:31	Print	Driver	Normal	50	50	Printed	HP Premium Instant-dry Satin Photo Paper	27.10	
66	2024/5/2 19:04	Print	Driver	Normal	50	50	Printed	HP Premium Instant-dry Satin Photo Paper	27.10	
--	2024/5/2						Job has	HP Premium Instant-dry		

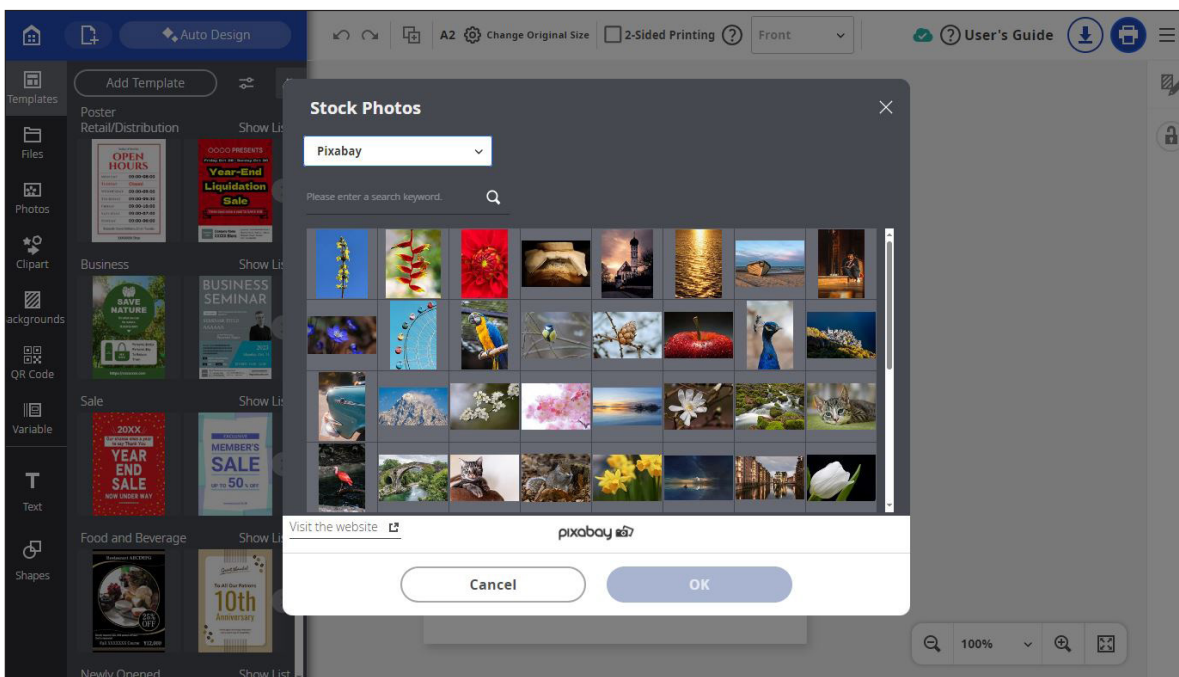
Accounting features are available in the HP Z6's embedded web server.

- Canon's web-based PosterArtist is a user-friendly tool for creating posters and signage. It provides access to stock photo services like Pixabay, Pexels, and Unsplash, and a wide selection of royalty-free images. The software also offers a variety of pictographic icons and templates sorted by type and event, and supports multi-language poster creation with 900 common expressions across 10 languages.
- Within PosterArtist, users can use Free Layout plus tool enables efficient media use by allowing custom arrangement of files and correct double-sided printing orientation for when folding is required.

HP users can create posters via a poster application in the HP Applications Center, accessed through HP PrintOS. The utility provides access to creative tools such as Unsplash, dreamstime, and Pattern Design, enabling users to create artwork and print them via HP Click. The HP unit supports a similar nesting feature, which can be activated directly on the control panel, 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

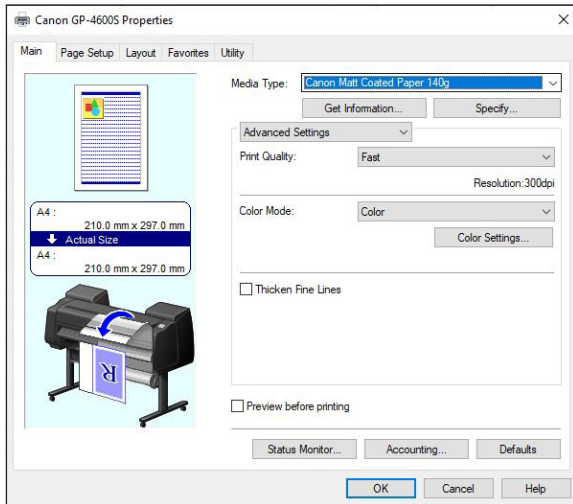


Canon PosterArtist provides a wide range of customizable templates.

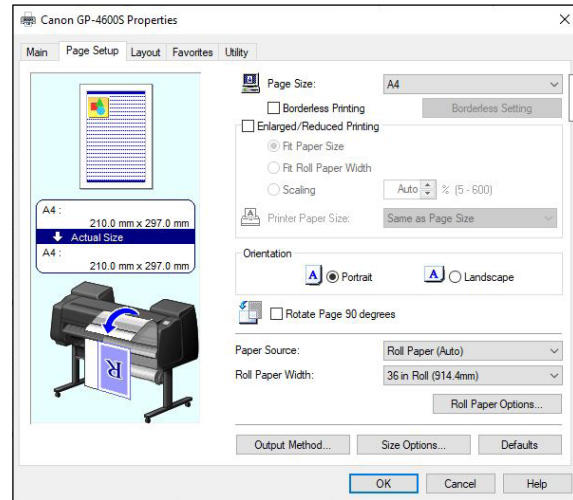


PosterArtist Web integrates with Pixabay, Unsplash, and Pexels photo libraries.

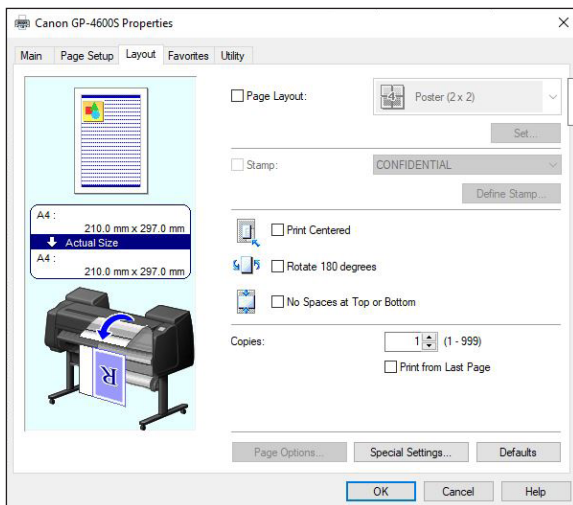
## Test Models' Print Driver Screenshots



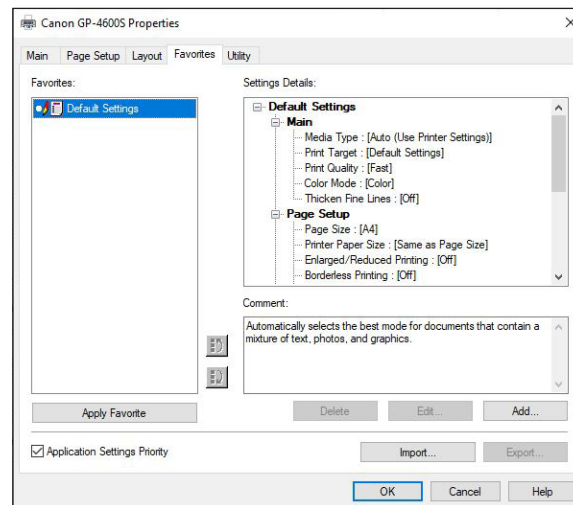
Canon GP-4600S Main tab



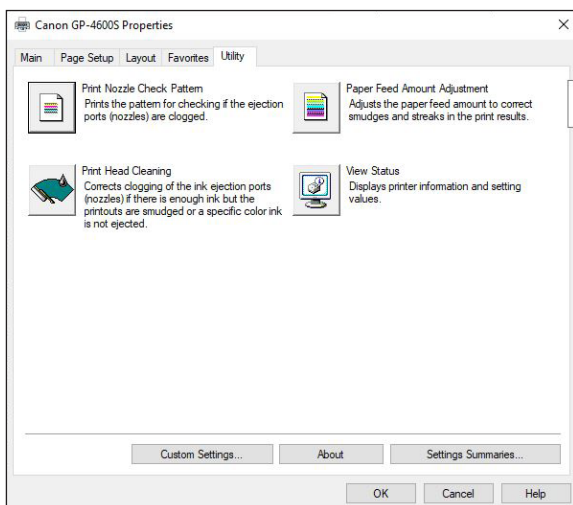
Canon GP-4600S Page Setup tab



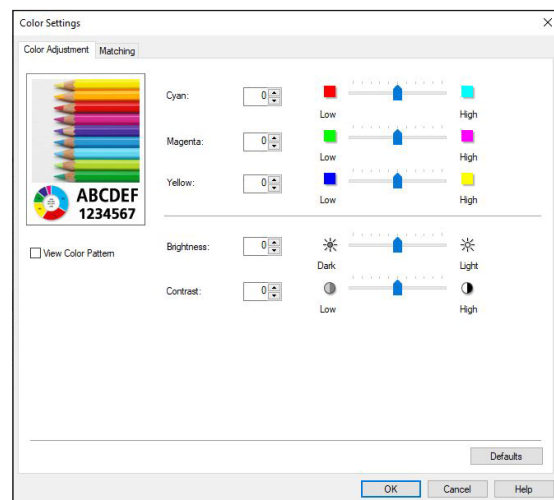
Canon GP-4600S Layout tab



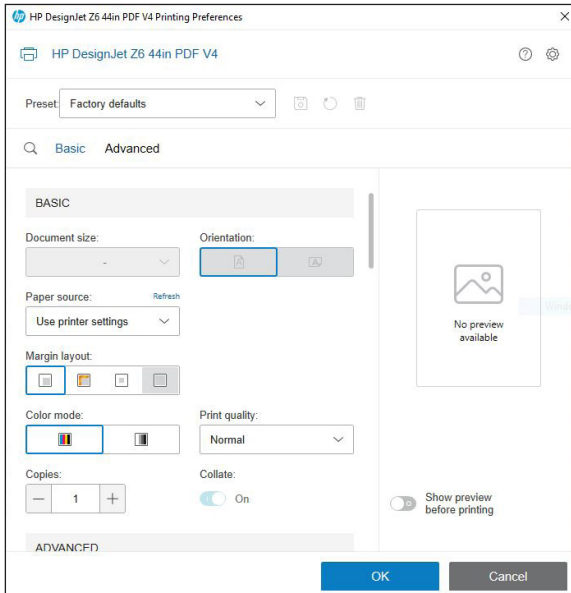
Canon GP-4600S Favourites tab



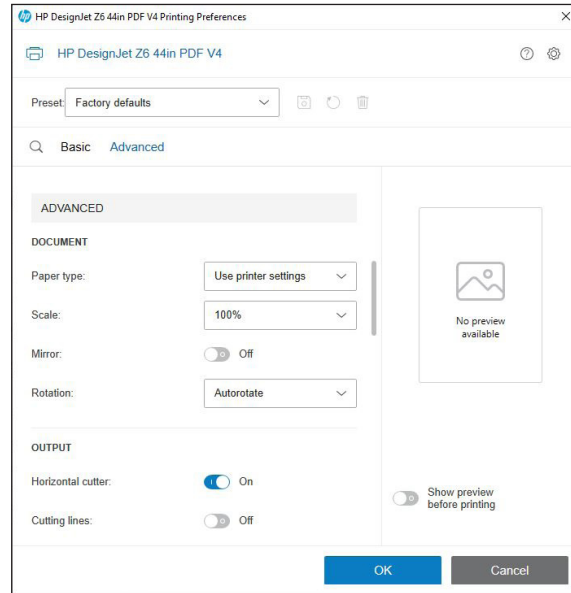
Canon GP-4600S Utilities tab



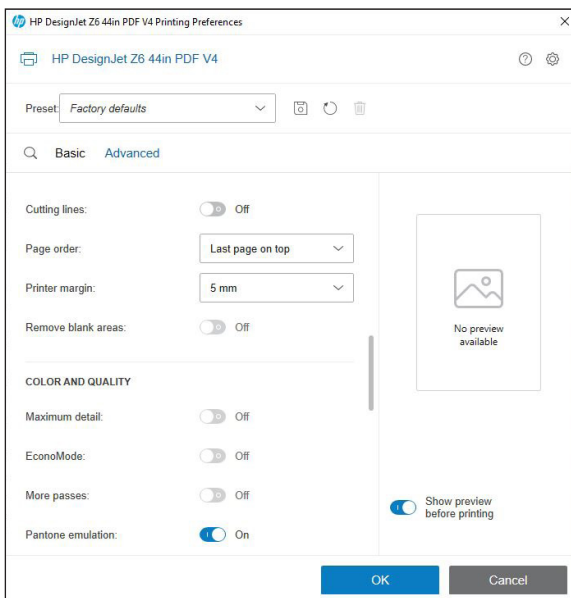
Canon GP-4600S Colour Adjustment Settings tab



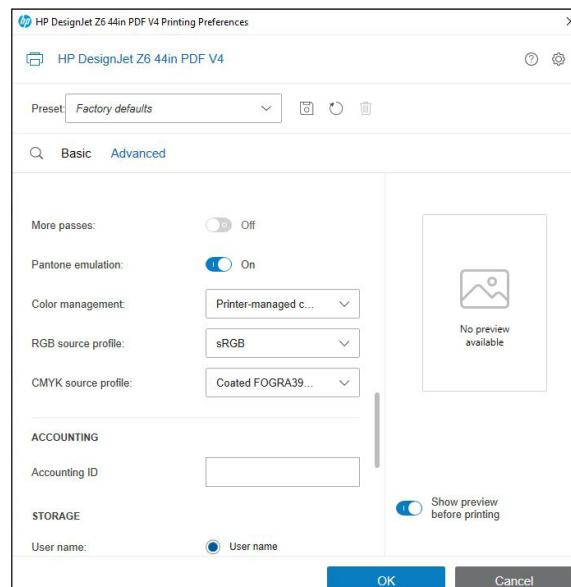
HP DesignJet Z6 Basic driver settings



HP DesignJet Z6 Advanced driver settings



HP DesignJet Z6 Advanced driver settings continued



## Printhead Reliability and Cleaning Routines

- The Canon GP-4600S offers a printhead nozzle check, accessible through both the control panel and the embedded web page. Set to 'Auto nozzle check' by default, this function automatically monitors the nozzles at specified intervals. Users have the flexibility to set these intervals based on specific page counts. When detecting a clogged nozzle, the Canon printer automatically pauses, runs a cleaning cycle, and resumes printing once complete, requiring no user intervention. The HP DesignJet Z6 conducts automatic cleanings periodically to prevent nozzle clogging issues, but users can run a nozzle check via the Print Diagnostic Image option from the control panel, which can be found in the main Settings menu.
- The Canon offers an Ink Ejection Status check feature which can be set to Auto Fix, Display Warning, or Off. This is a newly developed ink sensing system designed to monitor ink ejection status, helping to prevent any deterioration in image quality.
- For image quality issues, Canon users can initiate printhead cleaning cycles from the desktop or control panel, offering three levels: Cleaning (4 minutes), Deep Cleaning (4 minutes), and System Cleaning (up to 13 minutes). The latter (with standard and short options) is recommended if initial cleanings don't resolve nozzle clogs, with the choice to clean all colors or specific ink groups. HP users while users can initiate a clean printhead maintenance process at the control panel for one, two, three, or all printheads. The control panel indicates an estimated time and estimate of the amount of ink consumed, which differs depending on how many printheads are selected.
- A standard cleaning cycle performed on the Canon model takes approximately four minutes, 1 second on average to complete, whilst on the HP model, a cleaning cycle lasts approximately 10 minutes.
- Both devices were turned off over the course of a weekend and upon restarting the following Monday, the Canon device had no issues with clogged nozzles and printed a nozzle check pattern perfectly. In contrast, the nozzles of the HP unit became clogged and required at least two cleaning cycles (approximately 10 minutes per clean cycle) to resolve the issue, leading to operator downtime.

# Supporting Test Data

## Productivity

### Colour Throughput Time – A1 High-Resolution Portrait Printing (in Seconds)

	Fast/Speed	Standard/Quality	High/Best
Canon imagePROGRAF GP-4600S	124.00	188.95	217.50
HP DesignJet Z6	189.83	272.27	327.17

A single-page high-resolution A1 portrait was printed as a five-page job using the device driver set to the semi-gloss photo/colour setting. Both devices were loaded with 36" rolls, with each job set to auto-rotate to save media. The time indicated is the average number of seconds (based on timing from the cutting of the first page to the cutting of the final page and dividing by four to exclude the initial processing time).

### Colour Throughput Time – A1 Medium-Resolution Portrait Printing (in Seconds)

	Fast/Fast	Standard/Normal	High/Best
Canon imagePROGRAF GP-4600S	51.38	88.76	190.80
HP DesignJet Z6	95.76	136.70	234.01

A single-page medium-resolution A1 portrait was printed as a five-page job using the device driver set to the matte coated/colour setting. Both devices were loaded with 36" rolls, with each job set to auto-rotate to save media. The time indicated is the average number of seconds (based on timing from the cutting of the first page to the cutting of the final page and dividing by four to exclude the initial processing time).

### Colour Throughput Time – A0 High-Resolution Portrait Printing (in Seconds)

	Fast/Fast	Standard/Normal	High/Best
Canon imagePROGRAF GP-4600S	202.60	352.65	989.68
HP DesignJet Z6	260.20	418.54	547.39

A single-page high-resolution A0 portrait was printed as a five-page job using the device driver set to the semi-gloss photo/colour setting. Both devices were loaded with 36" rolls, with each job set to auto-rotate to save media. The time indicated is the average number of seconds (based on timing from the cutting of the first page to the cutting of the final page and dividing by four to exclude the initial processing time).

### Colour Throughput Time – A0 Medium-Resolution Portrait Printing (in Seconds)

	Fast/Fast	Standard/Normal	High/Best
Canon imagePROGRAF GP-4600S	100.05	170.60	393.23
HP DesignJet Z6	151.07	242.28	444.10

A single-page medium-resolution A0 portrait was printed as a five-page job using the device driver set to the matte coated/colour setting. Both devices were loaded with 36" rolls, with each job set to auto-rotate to save media. The time indicated is the average number of seconds (based on timing from the cutting of the first page to the cutting of the final page and dividing by four to exclude the initial processing time).

### First-Print-Out Time from Ready State – High-Resolution Portrait Printing (in Seconds)

	Canon imagePROGRAF GP-4600S	HP DesignJet Z6	Canon imagePROGRAF GP-4600S	HP DesignJet Z6	Canon imagePROGRAF GP-4600S	HP DesignJet Z6
	Fast	Fast	Standard	Normal	High	Best
Time Before Printing Commences	22.04	38.63	22.59	28.77	21.88	45.83
First Print Out Time	126.48	207.95	188.68	278.57	220.11	353.03

First-page-out times are determined by sending an A1 high-resolution portrait PDF file to print, timed from job release to page out, with both Canon and HP drivers set to semi-gloss photo media. Both devices were loaded with 36" rolls.

### First-Print-Out Time from Ready State – Medium-Resolution Retail Poster Printing (in Seconds)

	Canon image-PROGRAF GP-4600S	HP DesignJet Z6	Canon image-PROGRAF GP-4600S	HP DesignJet Z6	Canon image-PROGRAF GP-4600S	HP DesignJet Z6
	Fast	Fast	Standard	Normal	High	Best
Time Before Printing Commences	19.92	30.61	20.62	19.59	21.53	41.77
First Print Out Time	61.03	85.57	97.05	115.35	202.00	228.41

First-print-out times are achieved by sending an A1 medium-resolution retail sales poster PDF file to print, timed from job release to page out with both Canon and HP drivers set to matte coated media. Both devices were loaded with 36" rolls.

## Colour Print Quality

### Colour Optical Density Evaluation

Canon imagePROGRAF GP-4600S						
	Highest					
	1	2	3	4	Max.	Min.
Cyan	2.15	2.15	2.18	2.13	2.18	2.13
Magenta	1.89	1.88	1.88	1.88	1.89	1.88
Yellow	1.38	1.37	1.37	1.39	1.39	1.37
Black	2.22	2.21	2.22	2.23	2.23	2.21

HP DesignJet Z6						
	Best					
	1	2	3	4	Max.	Min.
Cyan	0.78	0.78	0.77	0.76	0.78	0.76
Magenta	1.45	1.44	1.44	1.42	1.45	1.42
Yellow	1.13	1.12	1.13	1.12	1.13	1.12
Black	2.22	2.23	2.24	2.24	2.24	2.22

Note: Colour density readings were assessed by printing a Keypoint Intelligence proprietary PDF test target on proofing paper at the respective highest/best quality driver settings, with no colour correction. Density was measured with an XRite exact<sup>XP</sup> densitometer.

### Skin Tone and Neutral Grey Consistency

	Skin Tone 1 (Formula: C=6, M=15, Y=16, K=0)	
	Canon imagePROGRAF GP-4600S	HP DesignJet Z6
Colour block		
2	0.11	0.26
3	0.42	0.16
4	0.21	0.08
5	0.11	0.43
6	0.46	0.26
7	0.25	0.35
8	0.11	0.43
9	0.14	0.27
<b>Max. Delta E Variance</b>	<b>0.35</b>	<b>0.35</b>



	Skin Tone 2 (Formula: C=30, M=63, Y=75, K=0)	
	Canon imagePROGRAF GP-4600S	HP DesignJet Z6
Colour block		
2	0.24	0.28
3	0.02	0.42
4	0.28	0.17
5	0.20	0.22
6	0.04	0.41
7	0.11	0.33
8	0.29	0.33
9	0.34	0.40
<b>Max. Delta E Variance</b>	<b>0.32</b>	<b>0.25</b>

	Skin Tone 3 (Formula: C=19, M=33, Y=50, K=0)	
	Canon imagePROGRAF GP-4600S	HP DesignJet Z6
Colour block		
2	0.36	0.14
3	0.27	0.27
4	0.41	0.05
5	0.43	0.08
6	0.33	0.12
7	0.45	0.47
8	0.08	0.49
9	0.27	0.38
<b>Max. Delta E Variance</b>	<b>0.37</b>	<b>0.44</b>

	Neutral Grey	
	Canon imagePROGRAF GP-4600S	HP DesignJet Z6
Colour block		
2	0.72	0.43
3	0.18	0.20
4	0.58	0.39
5	0.61	0.38
6	0.17	0.43
7	0.86	0.41
8	0.78	0.54
9	0.57	0.20
<b>Max. Delta E Variance</b>	<b>0.69</b>	<b>0.34</b>

Note: Skin tone and neutral grey consistency measurements are based on nine readings taken from a Keypoint Intelligence proprietary PDF test target file comprising four A1-sized solid coverage documents of three skin tones and a neutral grey with the Highest/Best setting selected in the driver and the target printed on the manufacturer's own brand of proofing semi-gloss media, with no colour correction. Colour differences across the A1 image were measured comparing eight locations to that of the colour measured at the top left of the page, using an EFI ES1000 colour spectrophotometer and Gretag MacBeth EyeOne Share colour comparison software.

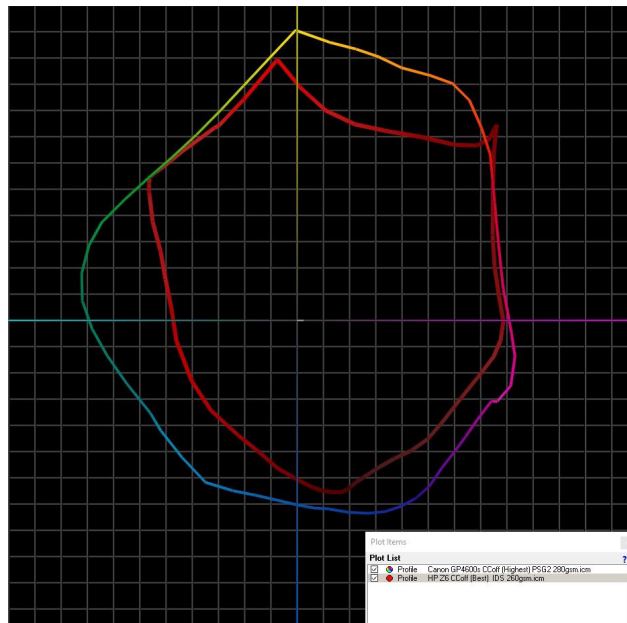
## FOGRA 39 Drift Test

### Comparison of FOGRA39 colour patches before and after ink consumption test

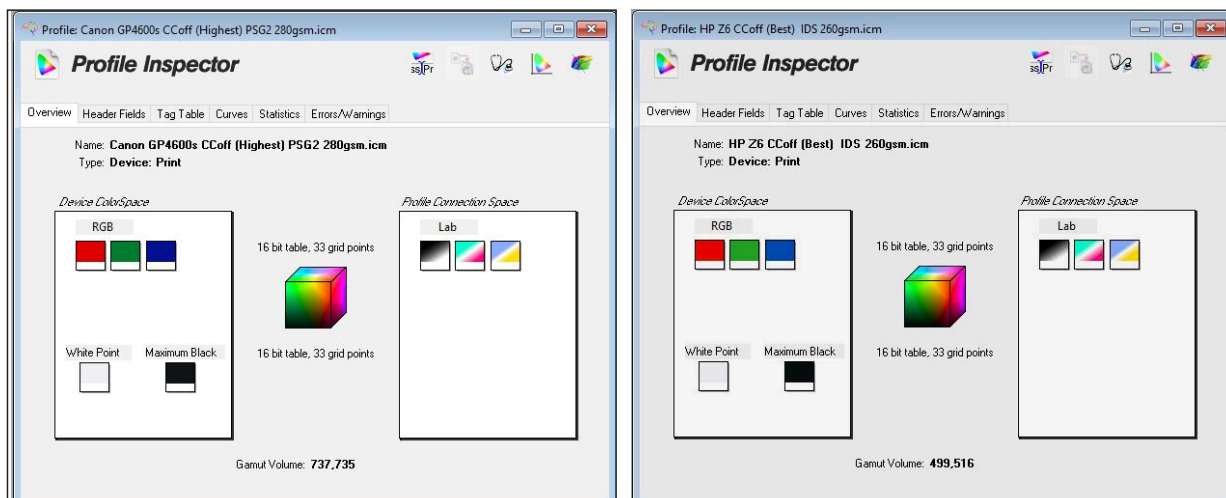
	Canon imagePROGRAF GP-4600S	HP DesignJet Z6
Delta E Drift	0.3	0.2

### Colour Gamut Cubic L\*a\*b Unit Volume Comparison

Media Type/Settings	Canon imagePROGRAF GP-4600S	HP DesignJet Z6	Canon % larger/smaller (-) than HP
Premium Semi-Gloss Photo Paper Highest/Max Quality	737,735	499,573	47.7%



Canon imagePROGRAF GP-4600S colour gamut (shown chromatically) on semi-gloss photo paper in Highest mode with colour correction disabled versus HP DesignJet Z6 colour gamut (red) on Instant-Dry Satin photo paper in Best quality mode with colour adjustment disabled.



Colour gamut profile for Canon imagePROGRAF GP-4600S (left) and HP DesignJet Z6 (right) on semi-gloss/satin photo paper in highest-quality mode.

## Device Feature Set

	Canon imagePROGRAF GP-4600S	Advantage ✓	HP DesignJet Z6
Max. print resolution	2400 x 1200 dpi		2400 x 1200 dpi
Number of inks	7 (MBK, PBK, C, M, Y, GY, PGY, O)	✓	6 (C, M, Y, CR, PBK, MBK)
Ink tanks replaceable during operation	Yes	✓	No
Ink-drop size	Minimum 4 picoliter	✓	7/3 picoliter dual-drop weight (M, C, PK); 6 picoliter single-drop weight (Y, CR, MK)
Starter cartridge ink capacity	330 ml bundled starter ink per colour		INA
Ink cartridge capacity	160 ml, 330 ml, and 700 ml (all colours)	✓	300 ml (all colours)
Number of nozzles	18,432 nozzles in total (MBK, C, M, Y, O: 1,536 x 2 channels; PBK, GY: 1,536 nozzles x 1 channel)	✓	12,672 nozzles in total (2,112 per colour)
Number of printheads	1		3
Printhead replacement	User replaceable		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), 12.7 mm (Bottom)		Roll paper: Borderless (select media) or 5 mm (all sides); Cut sheet: 5 x 17 x 5 mm
Borderless (0 mm) printing	Yes, recommended sizes and free size borderless printing support on roll paper by user definition		Yes, with select media and sizes
Maximum outside diameter of roll paper	170 mm		INA
Maximum printable paper roll length	Roll: 18 m (varies according to the OS, RIP, and application used)		INA
Maximum printable cut-sheet media length	1.6 m		1.676 m
Maximum media thickness	Roll/cut: 0.07-0.8 mm		Up to 0.8 mm
Maximum media width	44"		44"
Media loading	One roll: Upper loading; added roll: front loading		Upper rear
Roll paper	Optional multifunction roll system (dual roll and/or bi-directional auto Take up configuration)		Optional dual roll/take up reel unit
Optional media handling	Roll holder set (supports 2" and 3" media cores)	✓	Roll holder adapter (supports 3" media core)
Standard RAM	3 GB	✓	128 GB with 4 GB physical memory

Hard drive	Standard self-encrypting 500-GB			Standard self-encrypting 500-GB
Interface	Hi Speed USB; 10/100Base-TX/1000Base-T/TX; Wireless LAN: 802.2.11 b/g/n			10/100/1000Base-T Ethernet (802.3, 802.3u, 802.3ab), USB Type-A host port
PDL	SG Raster; PDF Ver. 1.7; JPEG (Ver. JFIF 1.02)			Adobe PostScript 3, Adobe PDF 1.7, TIFF, JPEG, CALS G4, HPGL/2, HP-RL
Net weight (unpacked) and size	181 kg 1,593 x 984 x 1,168 mm (W x D x H; basket open)		✓	96 kg 1,802 x 695 x 998 mm (W x D x H)
Power consumption when in standby	1.7 W or less (using wired LAN)	✓		< 32 W
Power consumption when active	94 W or less (using wired LAN)	✓		< 100 W
Acoustic pressure	Operation: 49 dB (A) or less		✓	Operation: 42-45 dB (A)
Acoustic power	Operation: 6.6 Bels		✓	Operation: 6.0-6.3 Bels

INA – Information not available

## Driver Feature Set

	Canon imagePROGRAF GP-4600S	Advantage ✓	HP DesignJet Z6
Speed settings	Fast, Standard, High, and Custom (with various settings depending on media selection)		Fast, Normal, and Best
Economy mode	Yes (Custom Fast)		Yes (EconoMode)
Predefined profiles	4 available under Easy Settings: Default; Photo (Color); Poster; Custom	✓	7 available: Default; B&W Photo; CAD; Canvas; GIS; Photo; Poster (and ability to create custom profiles)
Overview of profile settings provided	Yes	✓	No
Media profiles	62 plus 10 custom profiles	✓	46
IQ optimized for various types of output	Yes		Yes
Watermark	Yes	✓	No
Sharpen text	No		Yes (called Max Detail)
Thicken fine lines	Yes		Yes (called Max Detail)
Mirror image	Yes		Yes
Multi-up printing	Yes (2 to 16)	✓	No
Poster print mode	Yes (2 by 2)	✓	No
Page stamping	Yes (Under Layout and Page Options: Date, Time, Username, Page Number)	✓	No
Image rotation	Yes, 90 degrees and 180 degrees	✓	Yes, Auto, 0, 90, 180, and 270 degrees

Option to preview before print	Yes			Yes
Link to device web server from driver	Yes (via link to Status Monitor)	✓		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 (ability to change RGB or CYMK source profile)
Enlargement Copy Mode	Yes			INA
Free Layout Capability	Yes (flexible placement)	✓		Yes (automatic placement via HP Click)
MS Office Plug-in	Yes			INA
Adobe Photoshop Plug-in*	Yes			INA
Accounting Capability	Yes			Yes (via embedded web server)
Disable automatic cutter	Yes			Yes
Unidirectional printing selection option	Yes	✓		No
Integration with MFP	Yes			INA

\* The Canon GP-4600S supports PosterArtist Web and Professional Print & Layout (PPL) v.1.4 workflow software, which is designed to accentuate details in highlight areas and make in-focus areas stand out. It can be used as a standalone RIP or as an export module from industry-standard editing and graphics software such as Adobe Photoshop, Adobe Lightroom, as well as Canon Digital Photo Professional.

## Ink Consumption

Table 1: Amount of Ink in Each Canon imagePROGRAF GP-4600S 700-ml Cartridge (in Grams)

	GY	PBK	O	MBK	Y	M	C
Weight of cartridge prior to installation	930.7	924.4	921.8	942.3	921.1	924.9	920.8
Weight of cartridge at end of life	207.4	207.4	207.4	207.4	207.4	207.4	207.4
Net weight of ink	723.3	717.0	714.4	734.9	713.7	717.5	713.4
Total ink weight across seven cartridges							<b>5,034.2</b>

Table 2: Amount of Ink in Each HP DesignJet Z6 300-ml Cartridge (in Grams)

	M	Y	C	CR	PBK	MBK
Weight of cartridge prior to installation	417.3	416.2	496.6	418.8	418.0	419.8
Weight of cartridge at end of life	109.7	109.7	137.5	109.7	109.7	109.7
Net weight of ink	307.6	306.5	359.1	309.1	308.3	310.1
Total ink weight across six cartridges						<b>1,900.7</b>

Table 3: Ink Used in Three 50-Page Runs of Packaging Proof Test Document (Standard Mode) on the Canon imagePROGRAF GP-4600S (in Grams)

	GY	PBK	O	MBK	Y	M	C
Test Run 1 Net weight of ink used	27.1	19.1	12.0	9.9	5.7	16.4	9.3
Test Run 2 Net weight of ink used	27.2	18.6	14.2	10.4	6.1	15.1	9.6
Test Run 3 Net weight of ink used	27.8	18.6	12.0	9.8	6.4	15.9	9.4
Average amount of ink used across three runs	27.4	18.8	12.7	10.0	6.1	15.8	9.4
Total ink weight across seven cartridges for 50-page run (based on averages)							<b>100.2</b>

Table 4: Ink Used in Three 50-Page Runs of Packaging Proof Test Document (Normal Mode) on the HP DesignJet Z6 (in Grams)

	M	Y	C	CR	PBK	MBK
Test Run 1 Net weight of ink used	12.5	16.3	10.1	12.4	47.9	2.7
Test Run 2 Net weight of ink used	12.4	16.2	9.9	12.2	47.6	3.1
Test Run 3 Net weight of ink used	12.6	16.5	10.1	12.2	47.8	3.1
Average amount of ink used across three runs	12.5	16.3	10.0	12.3	47.8	3.0
<b>Total ink weight across six cartridges (based on averages)</b>						<b>101.9</b>

Table 5: Ink Used in Three 50-Page Runs of Retail Sales Poster Test Document (Standard mode) on the Canon imagePROGRAF GP-4600S (in Grams)

	GY	PBK	O	MBK	Y	M	C
Test Run 1 Net weight of ink used	21.7	7.5	13.1	10.1	8.4	14.8	8.4
Test Run 2 Net weight of ink used	20.7	7.8	12.5	9.3	8.3	14.6	9.4
Test Run 3 Net weight of ink used	21.2	7.3	12.4	9.0	8.4	14.7	8.4
Average amount of ink used across three runs	21.2	7.5	12.7	9.5	8.4	14.7	8.8
<b>Total ink weight across seven cartridges for 50-page run (based on averages)</b>							<b>82.8</b>

Table 6: Ink Used in Three 50-Page Runs of Retail Sales Poster Test Document (Normal Mode) on the HP DesignJet Z6 (in Grams)

	M	Y	C	CR	PBK	MBK
Test Run 1 Net weight of ink used	10.4	3.4	6.7	22.2	21.4	6.6
Test Run 2 Net weight of ink used	10.8	3.5	6.9	22.4	21.7	7.1
Test Run 3 Net weight of ink used	10.9	3.7	7.0	23.0	22.2	7.0
Average amount of ink used across three runs	10.7	3.5	6.9	22.5	21.8	6.9
<b>Total ink weight across six cartridges (based on averages)</b>						<b>72.3</b>



Table 7: Ink Used in Three 50-Page Runs of Studio Portrait Test Document (Standard mode) on the Canon imagePROGRAF GP-4600S (in Grams)

	GY	PBK	O	MBK	Y	M	C
Test Run 1 Net weight of ink used	45.7	14.2	11.8	12.8	14.3	15.0	15.9
Test Run 2 Net weight of ink used	45.0	14.6	12.4	12.0	14.6	15.3	15.6
Test Run 3 Net weight of ink used	47.6	14.2	13.7	12.0	14.6	15.7	13.8
Average amount of ink used across three runs	46.2	14.3	12.6	12.3	14.5	15.3	15.1
Total ink weight across seven cartridges for 50-page run (based on averages)							<b>130.3</b>

Table 8: Ink Used in Three 50-Page Runs of Studio Portrait Test Document (Normal mode) on the HP DesignJet Z6 (in Grams)

	M	Y	C	CR	PBK	MBK
Test Run 1 Net weight of ink used	18.2	18.8	17.6	9.6	30.6	4.0
Test Run 2 Net weight of ink used	18.2	18.6	17.6	9.7	30.7	4.1
Test Run 3 Net weight of ink used	18.2	18.4	17.7	9.8	30.5	4.1
Average amount of ink used across three runs	18.2	18.6	17.6	9.7	30.6	4.1
Total ink weight across six cartridges (based on averages)						<b>98.8</b>

## Test Methodology

**Ink Consumption:** Keypoint Intelligence analyzed ink consumption using three different document types: a PDF-formatted Packaging Proof, a Retail Sales Poster (jpg), and a Studio Portrait (tiff), all sized at ISO A1.

In Keypoint Intelligence's lab, the Canon imagePROGRAF GP-4600S, with the latest "01.00" firmware (as of February 2024) was connected to a Windows 10 workstation via a 1000BaseT TCP/IP connection and maintained in default configuration for testing. Using the Canon imagePROGRAF Printer Driver in its default colour settings, the Packaging Proof was printed on Canon medium weight proofing media, the Retail Poster on 140gsm matte coated media, and the Studio Portrait on 280gsm semi-gloss photo media, all in Standard mode.

The HP DesignJet Z6 was installed with the latest "JGR6\_09\_23\_48.1" level of firmware (as of April 2024) and connected to a Windows 10 workstation via a 1000BaseT TCP/IP connection and maintained in default configuration for testing. Using the HP DesignJet Z6 44in PDF V4 driver in default colour settings, the Packaging Proof document was printed on photo semi gloss/satin paper media, the Retail Poster on heavyweight matte coated media, and the Studio Portrait on HP 260gsm premium instant-dry gloss photo media, all in Normal mode.

Lab technicians weighed each ink cartridge before installation (with the weight of each ink with all packaging removed recorded) and after every 50-print test run, calculating the weight of ink used for each colour. To account for the Canon model's sub-tank, 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 10 Professional workstations, 10/100/1000BaseTX network switches and CAT5e/6 cabling.

**Test Procedures:** Keypoint Intelligence employs proprietary procedures and industry-standard test procedures in its lab test methods. In addition to a number of proprietary test documents, Keypoint Intelligence uses industry-standard files including an ASTM monochrome test document for evaluating black image quality. Alongside 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 i1i0 Advanced Scanning Table. Density of black and colour output was measured using XRite 508 and XRite exact<sup>xp</sup> 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.

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