

# PANTONE®-calibrated printers



## PANTONE® certified vs. PANTONE® calibrated

The PANTONE® Company offers “The PANTONE® Certified Printer Program” in which certification experts audit, inspect, analyze and qualify a printer to ensure the highest level of accurate color reproduction. A comprehensive print test evaluates the accuracy of reproducing spot and process color printing, TVI (dot gain) curves, gray balance, photo half-tones, and overall print color and clarity. The certification must be renewed through an annual audit. Only printers with the PANTONE® seal of approval are officially certified (for example, digital or analog ink presses).

HP printers are PANTONE®-calibrated. When a printer is PANTONE®-calibrated, the printer manufacturer has engaged PANTONE® to develop specially optimized color data so that the customer can get the best possible representation for the PANTONE® Solid Color standard on coated stock. The specific driver/RIP, device settings, ink set, color engine and paper stock used are considered in developing the color data since all these factors can affect color output.

## PANTONE® background

PANTONE® started as a company that produces inks for the commercial printing industry. In 1963, Lawrence Herbert saved PANTONE® from bankruptcy with the creation of an innovative system of identifying, matching, and creating colors. This solved the problems associated with producing accurate color matches in the graphic arts community. The PANTONE® system starts with 14 inks known as the “PANTONE® Basic Colors” (2 yellows, orange, 4 reds, purple, violet, 3 blues, a green and a black). Herbert’s unsupported assumption that the spectrum of color is seen differently by each individual led to his dramatic innovation of the PANTONE MATCHING SYSTEM®, a “book” of standardized colors in fan-format. By standardizing the colors, different manufacturers in different locations were able to refer to the PANTONE® system to make sure colors match without direct contact with one another. Each color was printed on coated and uncoated stock and was accompanied by the precise ink formula for accurate reproduction on press.

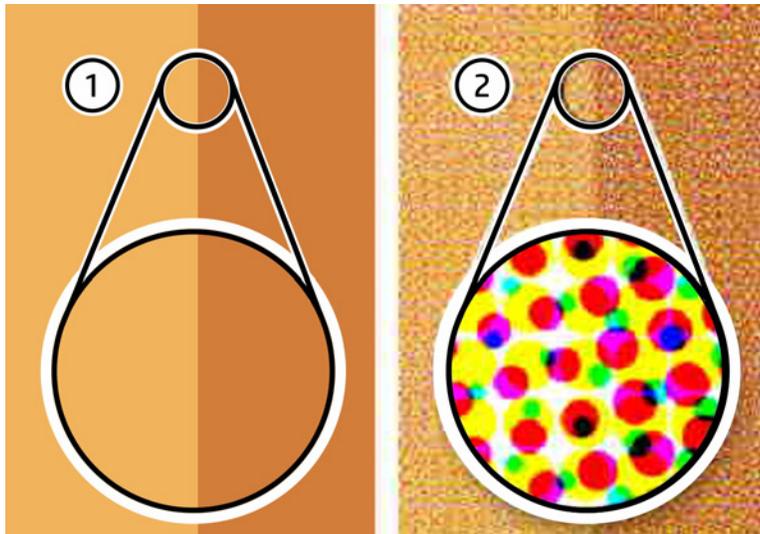
The current edition of the PANTONE MATCHING SYSTEM® has 1,085 such colors often referred to as “Solid Colors” since they are made by mixing inks and adding them to a solid color station rather than by half-toning the process like CMYK inks. The CMYK process is a method of printing color by using four inks—cyan, magenta, yellow, and black. With CMYK printing, halftoning (also called screening) allows for less than full saturation of the primary colors; tiny dots of each primary color are printed in a pattern small enough that human beings perceive a solid color. Magenta printed with a 20% halftone, for example, produces a pink color, because the eye perceives the tiny magenta dots on the large white paper as lighter, and less saturated, than the color of pure magenta ink.

Without halftoning, the three primary process colors could be printed only as solid blocks of color, and therefore could produce only seven colors: the three primaries themselves, plus three secondary colors produced by layering two of the primaries: cyan and yellow produce green, cyan and magenta produce a purplish blue, yellow and magenta produce red (these subtractive secondary colors correspond roughly to the additive primary colors) plus layering all three of them resulting in black. With halftoning, a full continuous range of colors can be produced.

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August 2014

**Figure 1: PANTONE® solid colors and CMYK half-toned colors**



The PANTONE MATCHING SYSTEM® is widely used by the printing industry to specify the color of objects. By using PANTONE®-calibrated colors and palettes, you can achieve the closest color match possible when a file is printed on HP Color LaserJet printers.

For PS and PCL printing, application-specific palettes are available and can be used to color the objects in a document with the best PANTONE® color simulation for the HP printer. In addition, the HP printer RGB (red-green-blue) and CMYK values for each PANTONE® color are available by printing an .eps, .tif, or .ps file, or by finding the value in a text lookup table.

## HP printers are PANTONE® calibrated

Printing PANTONE® colors on an HP CMYK four-color laser printer is always a simulation of PANTONE® Solid Colors. HP PANTONE® simulations provide a representation of a portion of the true PANTONE® Solid Colors.

HP partners with PANTONE® to create the PANTONE® color tables for our printers. These color tables are a “best effort” simulation of the PANTONE® Solid Color guide. The PANTONE® tables in HP Color LaserJet printers are developed to simulate the PANTONE® Solid Colors, not the process color patches. A large number of the PANTONE® Solid Colors (approximately 60%) are outside the color range (gamut) of our CMYK color laser printers. This means that we have the ability to accurately print approximately 40% of the 942 colors in the PANTONE® Process Color Imaging Guide. The colors that are reproducible generally fall in or close to the neutral axis of the printer’s color gamut. The remaining 60% of these out-of-gamut colors fall well outside the gamut of our Color LaserJet printers and will be represented by colors that do not match the intended PANTONE® Solid Colors.

The job of a color scientist is to re-map these out-of-gamut colors to best represent the PANTONE® Solid Colors. One method is to re-map to the closest color that the printer is capable of producing. Although this is the simplest method, it would render a large number of simulated PANTONE® color swatches to be printed as the same color. In an attempt to create a series of color variations to give each simulated color patch a slightly different color, the color scientist creates a series of colors that progress in steps to the most saturated color the printer can produce. This technique provides a color change between patches, but it may not be identical to the PANTONE® Solid Color seen in the PANTONE® Process Color Imaging Guide. This system of PANTONE® matching produces a placeholder color that may or may not be an exact match to the PANTONE® Solid Color.

## Color consistency

When printing PANTONE® colors on HP printers, the printed output may not match the PANTONE® Process Color Imaging Guide Solid Colors. This is not a sign of a damaged or malfunctioning printer. HP Color LaserJet printers are not designed to be PANTONE® proofing devices and have a limited capability to produce the full range of PANTONE® colors.

## Using PANTONE® calibrated tables and palettes

The printer-specific PANTONE® palettes are available on [hp.com](http://hp.com) on the printer support site. Search under product support for your specific printer to access application-specific palettes, as well as a specific name-to-printer CMYK color tables for your printer. Also available are .tif (Tifchart) and .eps (EPSchart) files that can be printed to create color charts of the PANTONE®-calibrated printer colors.

You must select the correct palette and color chart based on the print driver that you are using. The CMYK palettes can only be used with the PS driver. The CMYK palettes are optimized for the default setting (Default CMYK Inkset) of the printer. The RGB palettes work best with the PCL (5 or 6) driver. The RGB palettes are optimized for the sRGB default “Color Setting” to “Automatic.” They can be used in many applications with the PS driver, but will produce unpredictable results with some software that does not send RGB data through PS.

Any color management software, such as ICM or ColorSync, must be turned off when printing PANTONE® colors specified as CMYK or sRGB values. These color conversions will change the colors sent to the printer and reduce the accuracy of the PANTONE® color simulation.

## Loading custom PANTONE® palettes in applications

Each palette is specifically designed for the application/printer combination. Load the printer PANTONE® palette for your application, as explained in the PANTONE® User Guide document, located with the palettes and tables on the HP website. Because each palette is unique, the palette must be loaded into the application that you are using to create documents with HP-calibrated PANTONE® colors. Supported applications include: Adobe® InDesign, Illustrator, Macromedia Freehand, PageMaker, and Photoshop®; CorelDraw; and QuarkXPress.

## Color printing variables

PANTONE® colors generated by the HP Color LaserJet are four-color process simulations and cannot match PANTONE®-identified Solid Color standards. Use current PANTONE® color reference manuals for accurate color.

There are many variables in the four-color process reproduction of colors generated by the HP Color LaserJet, any of which can affect the quality of the PANTONE® color simulation, including:

- Type of paper used
- Type of toner used
- CMYK Inkset setting
- Color settings
- Environmental conditions
- Overhead lighting
- Personal differences in perception of color
- Software applications
- Printer drivers

For optimum results, we recommend that the following be used:

- Paper: HP LaserJet paper
- Toner: HP Color LaserJet print cartridges
- CMYK Inkset: Default
- Color options: Automatic

## Depend on HP innovation and reliability

HP works very closely with PANTONE® to ensure our laser printers and MFPs are PANTONE®-calibrated and match the PANTONE® colors as closely as possible. In addition to our efforts with PANTONE®, HP Color LaserJet devices employ built-in proprietary image enhancement technologies that render vibrant and sharp color prints, particularly with HP ColorSphere toner, which is independently formulated to work optimally with each engine design. Automatic print quality enhancements include HP EasyColor, HP ImageREt, adaptive half toning, trapping, environmental sensing, and intelligent automatic color calibration. The results are consistently realistic images with smooth and uniform colors, crisp detail, sharp edges and text,

excellent tone scale, and fine line art. According to Buyers Laboratory LLC, HP “color production remained consistent from the first page to the last.”<sup>1</sup> This consistency is essential for your business to create marketing tools in-house. Printing color in-house can save you up to 50% in printing costs, according to InfoTrends.<sup>2</sup>

HP innovative devices consistently deliver prints with:

- **Sharp edges.** Adaptive half-toning and trapping provide sharper overprints and better edge quality on colored text and line art. HP automatic enhancements deliver bold, legible lines, while our excellent color plane registration and trapping algorithm leave clean black lines on colored backgrounds. When it comes to colored text, HP technology produces sharp, evenly shaded text without jagged edges or a halo around edges.
- **Uniform colors and smooth gradients.** HP half-toning algorithms provide consistent and vibrant colors without the graininess seen in many competitors’ prints, while providing smooth transitions along gradients.
- **Realistic images.** HP ImageREt technology provides smooth colors and excellent tone scale with realistic depth.

## Common acronyms and definitions

**CMYK:** Cyan, magenta, yellow, and black (CMYK) are the ink colors commonly used in printing. The process is often called “four-color printing.” CMYK data files are typically used by and originate from graphic arts (printing and publishing) environments.

**HP PPE:** HP Professional PANTONE® Emulation is a technology that enables graphical elements in designs to have PANTONE® color names assigned to them. The HP printer substitutes these PANTONE® color names with RGB or CMYK values determined specifically for that printer and media at the time of printing.

**PCL:** Printer Control Language is a language (command codes) that enables applications to control some HP printers.

**PS:** Postscript is a programming language that describes the appearance of a printed page. All major printer manufacturers make printers that contain or can be loaded with Postscript software, which also runs on all major operating system platforms. A Postscript file can be identified by its “.ps” suffix. Postscript describes the text and graphic elements on a page to a black-and-white or color printer or other output device.

**sRGB:** Standard red-green-blue is a world-wide color standard originally developed by HP and Microsoft® as a common color language for monitors, input devices (scanners and digital cameras), and output devices (printers and plotters). It is the default color space used for HP products, Microsoft operating systems, the World Wide Web, and most office software sold today.

## For more information

For a list of PANTONE®-calibrated printers, visit: [pantone.com/pages/calibratedprinters](http://pantone.com/pages/calibratedprinters)

<sup>1</sup> Source: “BLI Winter 2013 Pick Award, Hewlett-Packard Company, Outstanding Color Printer/MFP Line of the Year.” Copyright 2013 Buyers Laboratory LLC. For more information visit [buyerslab.com](http://buyerslab.com).

<sup>2</sup> Based on InfoTrends Cost of Print Studies, April 2010.

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