

HP CMYK Plus



Use



# HP CMYK Plus

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User Guide



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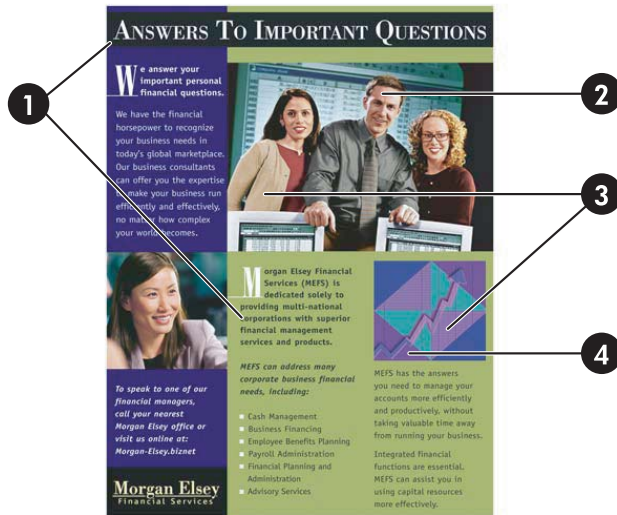
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# 1 Overview of HP CMYK Plus

HP CMYK Plus is a proprietary Hewlett Packard color management technology that allows you, with just a few clicks, to take full advantage of HP Color 9850mfp full-gamut capabilities when printing CMYK (cyan, magenta, yellow, and black) files. HP CMYK Plus supports intelligent color mapping from standard CMYK file colors to more saturated vivid colors, leaving hue, skin tones, and grays, and preserving original K-channel (black-channel) characteristics. This includes improvements in contrast because of the higher dynamic range of the HP Color 9850mfp.



1	Black-only text and objects are printed using only black ink.
2	Skin tones are preserved.
3	Hues are preserved.
4	Colorfulness is boosted. HP CMYK Plus has similar colorfulness as the native color space, and at the correct hue.

Until now, only three options have been available when working with CMYK files:

- Simulate a well-defined press like SWOP (Specification for Web Offset Publications). Colors are correct, but since these standards are designed for a wide range of printers, the colors are dull when compared to the full capabilities of the HP Color 9850mfp printer.
- Print in the native color space of the printer. This makes colors very saturated, but incorrect.
- Open the file and edit colors to improve the appearance of the overall image. This is time-consuming and expensive.

The HP Color 9850mfp provides a fourth option:

- HP CMYK Plus re-renders press CMYK data, allowing direct CMYK-to-CMYK (4-to-4) mapping. This method maintains press hues and K-channel, adapts lightness range, increases colorfulness, and scales chroma in a non-linear fashion from press to output digital device to take advantage of the full-color gamut.

HP CMYK Plus is not a rendering intent, but is implemented as an ICC device link profile.



**NOTE** HP CMYK Plus works with untagged (unknown) CMYK data prepared for a variety of offset press standards. However, if you print a document with embedded profiles, HP CMYK Plus will ignore the profiles and link the device to the CMYK color data. This is done to incorporate the HP CMYK Plus effect during printing without the need to modify the document file.

**NOTE** HP CMYK Plus works only on CMYK workflows, so it does not work on the PCL driver.

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## 2 Benefits of HP CMYK Plus

Using HP CMYK Plus, creative professionals can produce impressive portfolio prints and presentations using final CMYK files without clipped colors. Printers with HP CMYK Plus produce outstanding output with rich and vibrant colors that is perceptually consistent with press-printed documents in hue and lightness relationships. The output color looks just like offset four-color printing, only better. HP CMYK Plus is the ideal complement for digital devices with wider gamut than traditional offset.

Print service providers can produce output from standard CMYK files (prepared for offset) that take full advantage of the gamut of the device at the first attempt, without manual intervention. This output is perceptibly consistent with offset output and the original RGB file.



# 3 How HP CMYK Plus works

When a digital printer receives a CMYK image without an attached color profile or other information, it typically assumes that the CMYK values are to be interpreted directly using its own colorants. HP CMYK Plus, on the other hand, takes into account the fact that most CMYK content is generated for offset presses, and applies a different approach to rendering untagged CMYK data on a particular digital printer.

The HP CMYK Plus re-rendering process works as follows:

- 1 It first ensures that the black (K) channel is preserved so that a given K value in the source data is always replaced by the same black value in the destination (except for some rounding differences).  
  
Any source colors defined using K only (such as text, lines, or drop shadows) are also kept as K only in the destination.
- 2 The color appearance of the untagged source CMYK data is interpreted by applying a press ICC profile. The result at this stage would yield colors with the appearance of the source CMYK printed on a conventional offset press.
- 3 Since the dynamic ranges of digital printers often differ from those of conventional presses, the dynamic range of the initial color values is transformed (by either compression or expansion) to fit that of the destination digital printer.
- 4 The shapes of digital printer color gamuts also differ from those of conventional presses in terms of the levels of colorfulness that they can achieve at different hues and lightness levels. To make better use of the color gamut of a digital printer, the levels of colorfulness are also transformed. This results in more colorful digital prints than those obtained from an offset press, since the gamut of the digital printer is larger. This is done without distorting the appearance of neutral colors or familiar colors like skin tones. Throughout this re-rendering process, the hue of the source color remains unchanged, since this is the color attribute that can be most objectionable if changed in color reproduction. Keeping the hue as it would be on a press also means that HP CMYK Plus output is still consistent with press appearance.
- 5 Destination CMY values are computed from the destination colors obtained above. The K amount is determined from the results of the first step and by using the ICC profile of the destination printer.
- 6 The resulting CMYK values are rendered on the destination printer.

The effect of HP CMYK Plus is illustrated in the figure below, where a CMYK image is shown after being processed using different workflows on the HP Color 9850mpf with semi-glossy proofing paper.

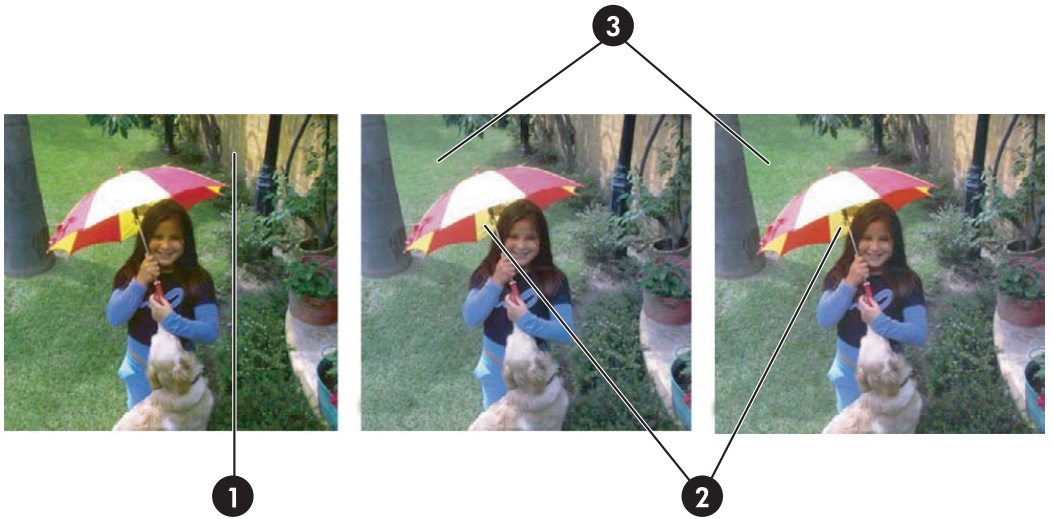
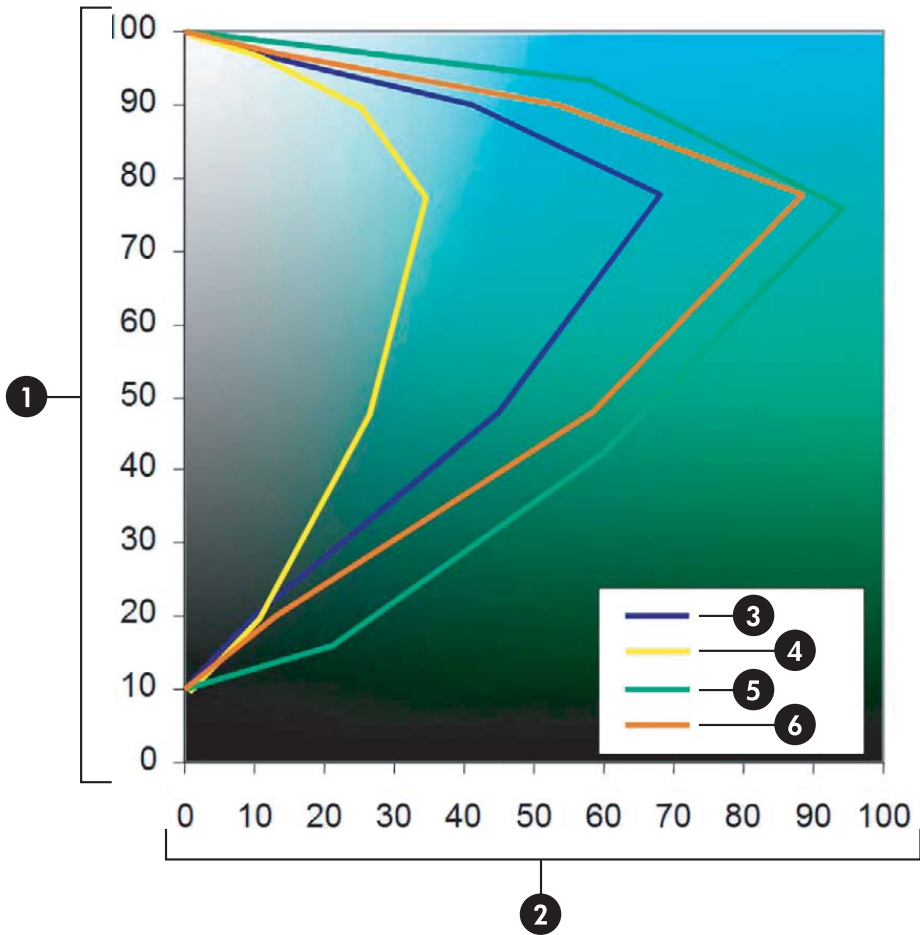


Figure on left:	Figure in center:	Figure on right:
Native: Very saturated but incorrect. Note greenish wall at 1.	SWOP: Correct, but colors are dull. Note the more saturated yellows at 2 and the greenish lawn at 3.	HP CMYK Plus: Correct, and colors are more saturated. Note the more saturated yellows at 2 and the greenish lawn at 3.

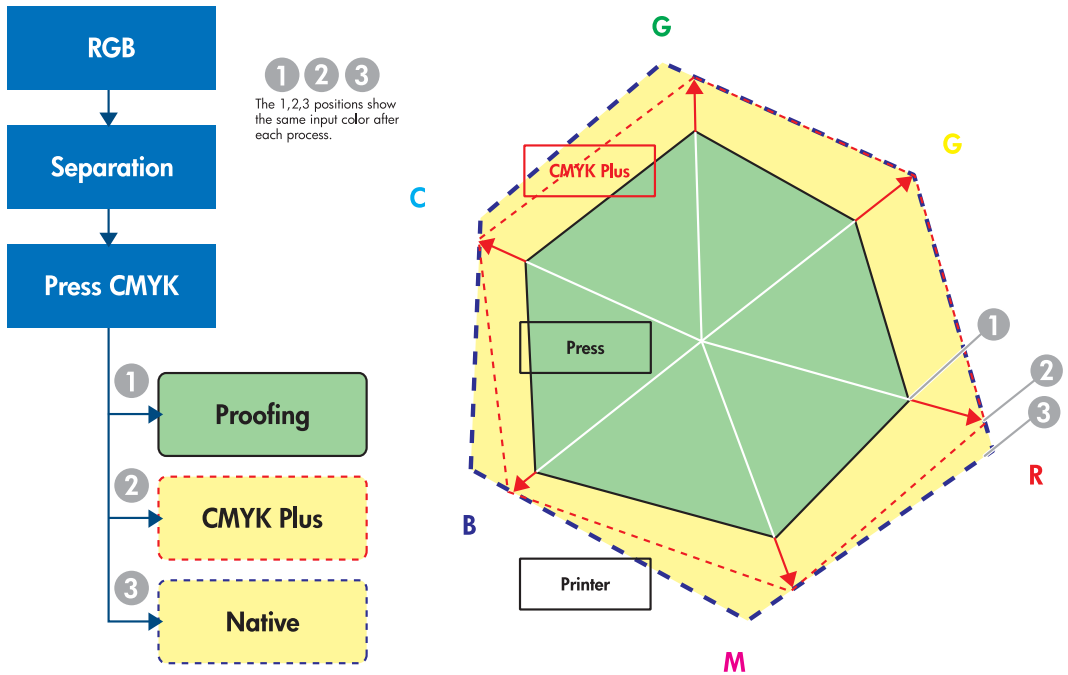


**NOTE** Due to the nature of the HP CMYK Plus technology, it is difficult to do these differences justice with any single hardcopy process. Prior to printing, prepare an electronic (PDF) copy of the document and view the file on a reasonably well-calibrated monitor.



1	Brightness
2	Colorfulness
3	SWOP gamut boundary
4	Grays (core)
5	HP Color 9850mfp gamut boundary
6	Limits of the expansion to avoid color clipping

This figure represents a slice of the color space where the source (SWOP or similar), and the destination gamuts are represented. Source gamut is expanded to the orange limit in a non-linear fashion to avoid artifacts. To keep neutrals, the core central part is not touched. Skin tones also remain untouched.



In this representative figure, a slice of the color space top view and the printing options with the HP Color 9850mfp are shown:

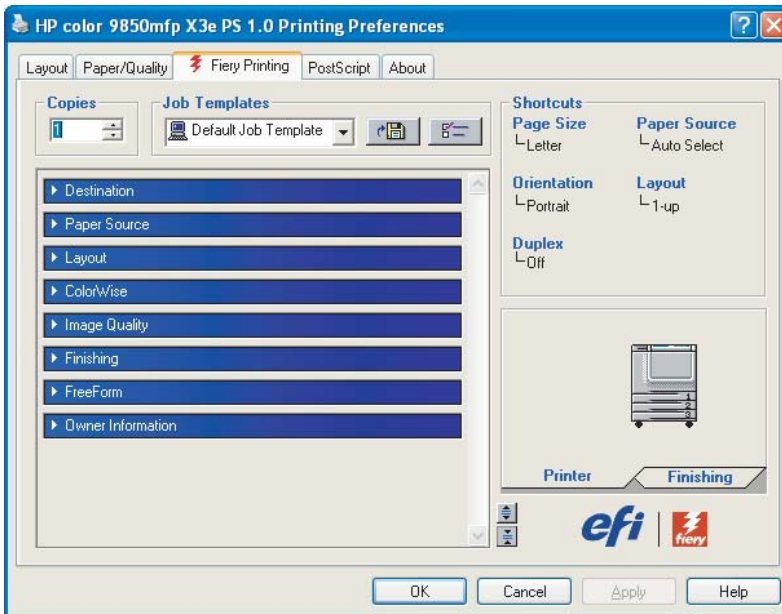
- 1 A proofing print rotates the color gamut (press inks are different than dry electro-photographic inks), and tries to match the press gamut (SWOP) colors.
- 2 HP CMYK Plus also expands the colors in a non-linear fashion to take advantage of most of the HP Color 9850mfp gamut, producing more vivid colors and improved contrast. Skin tones and neutrals are left untouched.
- 3 Native colors print. This will leave wrong hue locations of the CMYK colorants.

# 4 How to use HP CMYK Plus

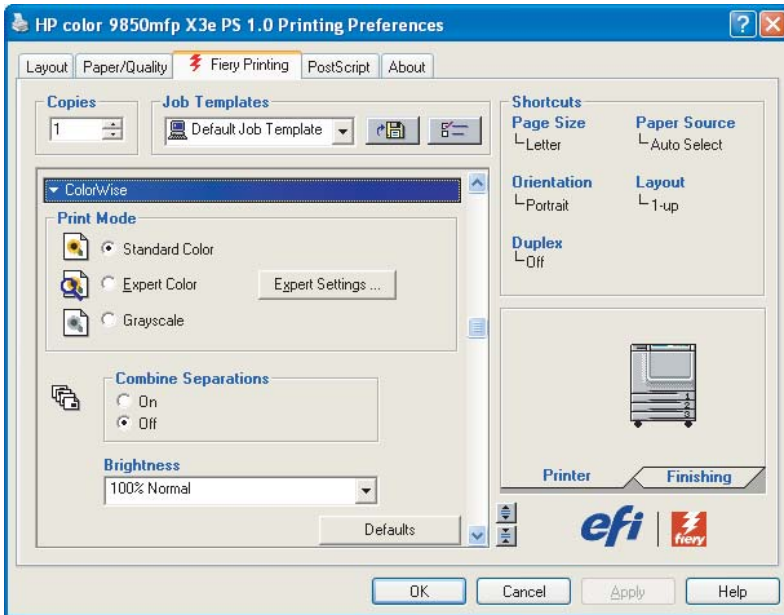


**NOTE** HP CMYK Plus technology is available in the PostScript® driver.

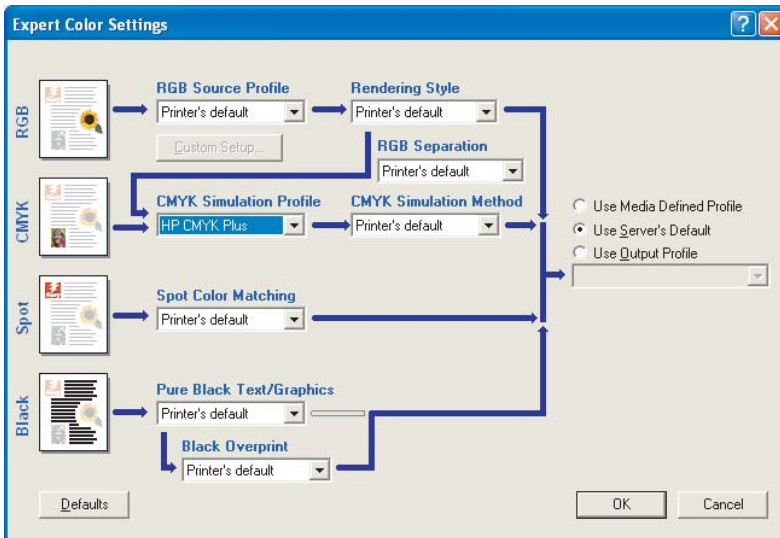
In the printer driver, click **Properties**. The **Printing Preferences** menu, comparable to the menu below, appears:



In the window, click **ColorWise**, and the following window opens:



Click **Expert Color**, and the following window opens:



In this window, use the pull-down **CMYK Simulation Profile** menu to select **HP CMYK Plus**.

Click **OK**.



You can use HP CMYK Plus with any of the output profiles in the device. The first time that you select a new profile, the controller calculates the CMYK-CMYK device link and applies it. This could impact ripping performance by few seconds only the first time that it is used.

You can also apply HP CMYK Plus to any profiles that have already been created.



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**NOTE** Command Workstation and ColorWise Pro Tools use a comparable interface.

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