Fiery Color Profiler Suite

User Guide

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This product may be covered by one or more of the following U.S. Patents:

5,276,490, 5,278,599, 5,335,040, 5,343,311, 5,398,107, 5,424,754, 5,442,429, 5,459,560, 5,467,446, 5,506,946, 5,517,334, 5,537,516, 5,543,940, 5,553,200, 5,563,689, 5,565,960, 5,583,623, 5,596,416, 5,615,314, 5,619,624, 5,625,712, 5,640,228, 5,666,436, 5,682,421, 5,745,657, 5,760,913, 5,818,645, 5,835,788, 5,859,711, 5,867,179, 5,940,186, 5,959,867, 5,970,174, 5,982,937, 5,995,724, 6,002,795, 6,025,922, 6,035,103, 6,041,200, 6,065,041, 6,081,281, 6,112,665, 6,116,707, 6,122,407, 6,134,018, 6,141,120, 6,166,821, 6,173,286, 6,185,335, 6,201,614, 6,215,562, 6,219,155, 6,219,659, 6,222,641, 6,224,048, 6,225,974, 6,226,419, 6,238,105, 6,239,895, 6,256,108, 6,269,190, 6,271,937, 6,278,901, 6,279,009, 6,289,122, 6,292,270, 6,327,047, 6,327,050, 6,327,052, 6,330,363, 6,331,899, 6,340,975, 6,341,018, 6,341,307, 6,347,256, 6,348,978, 6,366,918, 6,369,895, 6,381,036, 6,429,949, 6,449,393, 6,457,823, 6,476,927, 6,490,696, 6,501,565, 6,519,053, 6,539,323, 6,543,871, 6,546,364, 6,549,294, 6,549,300, 6,550,991, 6,552,815, 6,559,958, 6,572,293, 6,590,676, 6,606,165, 6,616,355, 6,633,396, 6,636,326, 6,637,958, 6,643,317, 6,647,149, 6,657,741, 6,660,103, 6,662,199, 6,678,068, 6,679,640, 6,707,563, 6,741,262, 6,748,471, 6,753,845, 6,757,436, 6,757,440, 6,778,700, 6,781,596, 6,786,578, 6,816,276, 6,825,943, 6,832,865, 6,836,342, 6,850,335, 6,856,428, 6,857,803, 6,859,832, 6,866,434, 6,874,860, 6,879,409, 6,885,477, 6,888,644, 6,905,189, 6,930,795, 6,950,110, 6,962,449, 6,967,728, 6,974,269, 6,978,299, 6,992,792, 7,002,700, 7,023,570, 7,031,015, 7,058,231, 7,064,153, 7,073,901, 7,081,969, 7,090,327, 7,093,046, 7,095,518, 7,095,528, 7,097,369, 7,099,027, 7,105,585, 7,116,444, 7,177,045, 7,177,049, 7,204,484, 7,206,082, 7,212,312, 7,229,225, 7,233,397, 7,233,409, 7,239,403, 7,245,400, 7,248,752, 7,259,768, 7,259,893, 7,280,090, 7,296,157, 7,301,665, 7,301,667, 7,301,671, 7,302,095, 7,302,103, 7,304,753, 7,307,761, 7,342,686, 7,343,438, 7,349,124, 7,365,105, 7,367,060, 7,367,559, 7,389,452, 7,396,119, 7,396,864, 7,397,583, 7,397,961, 7,426,033, 7,431,436, 7,433,078, 7,453,596, 7,460,265, 7,460,721, 7,461,377, 7,463,374, 7,466,441, 7,471,403, 7,480,070, 7,489,422, 7,495,812, 7,506,253, 7,522,311, 7,522,770, 7,528,974, 7,532,347, 7,552,207, 7,552,923, 7,554,687, 7,562,957, 7,564,583, 7,574,545, 7,574,546, 7,579,388, 7,587,336, 7,587,468, 7,598,964, 7,600,867, 7,630,106, 7,636,180, 7,648,293, 7,653,683, 7,669,096, 7,672,013, 7,673,965, 7,684,085, 7,688,458, 7,688,486, 7,706,015, 7,724,392, 7,729,014, 7,738,147, 7,738,710, 7,742,204, 7,756,346, 7,770,999, 7,791,777, 7,800,773, 7,800,776, 7,812,999, 7,828,412, 7,831,830, 7,849,316, 7,859,689, 7,859,711, 7,859,724, 7,861,156, 7,869,079, 7,880,934, 7,884,962, 7,889,403, 7,889,361, 7,911,432, 7,911,433, 7,982,890, 7,996,806, 8,013,871, 8,014,036, 8,031,363, 8,107,122, 8,139,256, 8,169,630, 8,171,103, 8,208,012, 8,243,326, 8,294,925, RE38,732, D406,117, D416,550, D417,864, D419,185, D426,206, D439,851, D444,793.

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THE FOLLOWING REGULATORY NOTICES AND MARKINGS APPLY IF THE EFI PRODUCT YOU RECEIVED INCLUDES EQUIPMENT.

WARNING: FCC Regulations state that any unauthorized changes or modifications to this equipment not expressly approved by the manufacturer could void the user's authority to operate this equipment.

Refer to the Class Compliance sticker affixed to the back of your Fiery (or, in the case of embedded systems, to the sticker affixed to the print engine) to identify the appropriate classification (A or B, below) for this product.

FCC Class A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause interference, in which case the user will be required to correct the interference at his own expense.

Industry Canada Class A Notice

This Class A digital apparatus complies with Canadian ICES-3(A).

Avis de Conformation Classe A de l'Industrie Canada

Cet appareil numérique de la Classe A est conforme à la norme NMB-3(A) du Canada.

FCC Class B Declaration of Conformity

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of the manufacturer could void the user's authority to operate this equipment.

Industry Canada Class B Notice

This Class B digital apparatus complies with Canadian ICES-3(B).

Avis de Conformation Classe B de l'Industrie Canada

Cet appareil numérique de la Classe B est conforme à la norme NMB-3(B) du Canada.

RFI Compliance Notice

This equipment has been tested concerning compliance with the relevant RFI protection requirements both individually and on a system level (to simulate normal operation conditions). However, it is possible that these RFI Requirements are not met under certain unfavorable conditions in other installations. It is the user who is responsible for compliance of his particular installation.

Dieses Gerät wurde sowohl einzeln als auch in einer Anlage, die einen normalen Anwendungsfall nachbildet, auf die Einhaltung der Funkentstörbestimmungen geprüft. Es ist jedoch möglich, dass die Funkentstörbestimmungen unter ungünstigen Umständen bei anderen Gerätekombinationen nicht eingehalten werden. Für die Einhaltung der Funkentstörbestimmungen einer gesamten Anlage, in der dieses Gerät betrieben wird, ist der Betreiber verantwortlich.

Compliance with applicable regulations depends on the use of shielded cables. It is the user who is responsible for procuring the appropriate cables.

Die Einhaltung zutreffender Bestimmungen hängt davon ab, dass geschirmte Ausführungen benützt werden. Für die Beschaffung richtiger Ausführungen ist der Betreiber verantwortlich.

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INTRODUCTION

The Fiery Color Profiler Suite application enables you to create color profiles that are fully compliant with International Color Consortium (**ICC**) standards, evaluate the profiles, edit, and test them. The Color Profiler Suite kit includes the EFI ES-2000 Spectrophotometer, which you can use to create profiles.

Fiery Color Profiler Suite modules

This document describes how to use Color Profiler Suite, which includes the following modules:

- **Fiery Printer Profiler** creates ICC output profiles of an RGB or CMYK output device from measurements made by a measurement instrument or from imported IT8 measurement files. Printer Profiler can also import an existing ICC profile and recalculate it with different settings.
- **Fiery Monitor Profiler** calibrates and creates ICC profiles for CRT, LCD, and laptop displays.
- **Fiery Device Linker** creates fully ICC compatible device link profiles for RGB and CMYK color spaces using existing source and output profiles. You can optimize a device link profile to meet the requirements of a particular standard. You can also optimize spot color definitions for a Fiery server.
- **Fiery Print Matcher** helps you obtain consistent color output across a group of Fiery-driven printers using the color management features of the Fiery server. You can create a calibration and an output profile that is common to multiple printers. You can create device link profiles that convert from the output color space of each printer to the common color space between the printers.
- **Fiery Profile Inspector** displays color spaces plotted as Lab values in a three-dimensional modeling area. This module allows you to compare ICC profiles and named colors, and view how color is transformed from source profile to destination profile.
- **Fiery Profile Editor** provides an intuitive user interface with tools for editing RGB or CMYK output profiles.
- **EFI Verifier** enables you to measure and compare two different sets of color values to ensure that color accuracy is maintained. This module can be used to check the color accuracy of profile-to-proof and profile-to-print output combinations.
- **Fiery Auto Verifier** can print test pages periodically to one or more Fiery servers. You can measure the pages in Auto Verifier to check for color accuracy.

- **Fiery Color Verification Assistant** is a utility that lets you evaluate the color accuracy of a Fiery-driven printer for particular job settings (for example, for matching to a standard). You can start Color Verification Assistant from Fiery Command WorkStation when Color Profiler Suite is installed on the same system as Command WorkStation. You do not access this module from the main window of Color Profiler Suite.

Measurement instrument

Color Profiler Suite includes the EFI ES-2000 Spectrophotometer. This measurement instrument measures a full spectrum of light as it is reflected from color samples. It can also be used to create monitor profiles and as a densitometer for calibration purposes.

The EFI ES-2000 Spectrophotometer also functions as a dongle for activating the software. See "License activation process" on page 18.

The optional X-Rite i1iO Scan Table is a device that holds and manipulates the EFI ES-2000 Spectrophotometer to take measurements automatically. The iO consists of a flat surface, where you lay the page to be measured, and a robotic arm that holds and manipulates the spectrophotometer.

A Konica Minolta FD-5BT spectrodensitometer can be used in place of the ES-2000 as a dongle and measurement instrument. For more information about this instrument, contact your EFI representative.

Documentation

Documentation for Color Profiler Suite is available at help.efi.com/cps.

Online Help

Online contextual Help is accessible from each module. You can access Help from the EFI website using a browser.

TO ACCESS ONLINE HELP

- **(Windows) Press the F1 key.**

  (Mac OS X) Press Command+/ or the Help key on the keyboard.
- **Select the appropriate item in the Help menu, if available.**
- **In Fiery Profile Editor, click the Help icon on the toolbar, move the cursor to the area of the window in which you need help, and then click again.**

Technical support

For technical support, see the EFI Technical Support web site: http://www.efi.com/support/

Terminology and conventions

This document uses the following terminology and conventions:

Term or convention	Refers to
Auto Verifier	Fiery Auto Verifier
Color Profiler Suite	Fiery Color Profiler Suite
Color Verification Assistant	Fiery Color Verification Assistant
Verifier	EFI Verifier
Command WorkStation	Fiery Command WorkStation
Device Linker	Fiery Device Linker
Spectrophotometer	EFI ES-2000 Spectrophotometer
Monitor Profiler	Fiery Monitor Profiler
Print Matcher	Fiery Print Matcher
Printer	Any RGB or CMYK printer
Printer Profiler	Fiery Printer Profiler
Profile Editor	Fiery Profile Editor
Profile Inspector	Fiery Profile Inspector
	Topics for which additional information is available by starting Help in the software
	Tips and information
	A warning concerning operations that may lead to death or injury to persons if not performed correctly. To use the equipment safely, always pay attention to these warnings.
	A caution concerning operations that may lead to injury to persons if not performed correctly. To use the equipment safely, always pay attention to these cautions.
	Operational requirements and restrictions. Be sure to read these items carefully to operate the equipment correctly, and avoid damage to the equipment or property.

Color terms and concepts, such as "**color space**," "**spot color**," "**gamut**," and "**source profile**" appear in bold throughout this document. If you are new to desktop color, or if any terms are unfamiliar, see "Glossary" on page 89.

NOTE: Color Profiler Suite procedures are similar for Microsoft Windows and Apple Mac OS X computers. Windows and Mac OS illustrations are used interchangeably in this document. Any differences are noted in the text.

Using Color Profiler Suite

You can use many of the features of Color Profiler Suite in **Demo mode** without a license, but to use the full functionality of the software, you must activate a license that is specially matched to your EFI ES-2000 Spectrophotometer.

Demo mode

In Demo mode, you can take measurements and try out the different functions of the software. You can also create and save profiles for use with Color Profiler Suite only.

NOTE: Monitor Profiler, Verifier, Auto Verifier, and Color Verification Assistant are not available in Demo mode.

License activation process

When matched with a license, the spectrophotometer that accompanies Color Profiler Suite functions as a permanent and active dongle for activating the software. The license is downloaded from the EFI License Fulfillment web site and activated by Color Profiler Suite when the software is installed on a computer and the spectrophotometer is connected.

The licensing process is described in more detail in Help.

Delta E values

The dE (Delta E) method for calculating the numerical difference between colors in all Color Profiler Suite modules except for Verifier is set by a preference. You can access preferences from the Edit menu in the main window of Color Profiler Suite.

Using this document

This document is organized as follows:

- Fiery Printer Profiler describes the possible workflows that you can use to print patch pages, measure them, and create profiles from the measurements.
- Fiery Monitor Profiler describes both the easy and the advanced workflows for creating a monitor profile.
- Fiery Device Linker describes how to use Device Linker to create a device link profile. A device link profile specifies the source profile and output profile used to print a job.
- Fiery Print Matcher describes how to match the output of multiple printers using custom calibrations and output profiles or custom device link profiles.
- Fiery Profile Inspector provides an overview of how to use the tools in Profile Inspector and provides sample scenarios to help you evaluate profiles effectively.
- Fiery Profile Editor describes how to use Profile Editor to modify an existing color profile for a CMYK or RGB output device. This chapter includes examples of typical edits.
- EFI Verifier provides an overview of the Verifier software and suggestions for how Verifier is used with the Color Profiler Suite modules.
- Fiery Auto Verifier describes how to configure automatic color test pages and measure them to check color accuracy.
- Fiery Color Verification Assistant describes how to use Color Verification Assistant to evaluate the color performance of a Fiery server.
- Color Concepts describes color management and how profiles are used to process color data.
- Glossary contains terms that are used in color management and color printing and explains concepts that may not be explicitly referenced in the documentation set.

FIERY PRINTER PROFILER

Use Printer Profiler with a measurement instrument (such as the spectrophotometer included with Color Profiler Suite) to create an **output profile** to describe the **gamut**, or range of reproducible color, of a printer. Printer Profiler allows you to create custom output profiles for most **RGB** and **CMYK** printers: Fiery-driven, Fiery XF server-driven, Splash-driven, inkjet, non-Fiery, and printing presses.

The profiles created are fully compliant with International Color Consortium (**ICC**) standards, so that you can use them with industry standard applications and platforms. You can choose to create sets of patch pages and measure them immediately or later. With Printer Profiler, you can also import measurements from files or ICC profiles, and modify the **gamut mapping** and black controls before saving a new profile.

Printer Profiler workflows

A standard profile generation process includes the following steps:

- **Print patches:** Print one or more color patch pages to show the color behavior of a printer.
- **Measure patches:** Using a measurement instrument record spectral measurements of each color patch.
- **Create a profile:** Apply gamut mapping and separation settings to create an ICC profile that describes the **gamut** of your printer.

Printer Profiler provides procedures for printing patch pages directly to a Fiery server or Fiery XF server. To profile a non-Fiery printer, you save the patch pages as a PDF file.

When you start profiling from the beginning (printing patch pages), you can select one of the following workflows:

- When you select a Fiery server, the manufacturer, model, and color space of the selected printer are retrieved from the Fiery server. Other settings used in creating the profile are retrieved as well.
- When you select a Fiery XF server, you must specify the printer as well, since multiple printers can be connected to one Fiery XF server. Other settings used in creating the profile are retrieved from the Fiery XF server.
- When you select Save as PDF, you specify either CMYK or RGB as the printer color space.

Entry points

Printer Profiler is set up so that you can enter the profiling process at three different points:

- Start at the beginning by generating and printing patches.
- Start by measuring patches that you printed earlier.
- Start with measurements from the patches that you measured previously, or with measurements from an existing **ICC profile**.

Profiling with a Fiery server

You can create a profile for a printer connected to a Fiery server. The Fiery server must be accessible from your computer over the network.

Before you begin profiling, calibrate the Fiery server. For more information, see the documentation that accompanies the Fiery server.

TO CREATE A PROFILE WITH A FIERY SERVER

1. **In Color Profiler Suite, start Printer Profiler and click Print Patches.**
2. **In the Welcome window, click Select Fiery Server and select the Fiery server from the list.**
3. **If the server is not in the list, click the plus sign to add the server using the IP address or by searching.**
4. **Click Next.**
5. **If calibration options are displayed, select the one that is appropriate for the Fiery server and click Next.**

   By default, the option that is appropriate for your model of Fiery server is already selected.
6. **Select the settings for creating the measurement pages.**
7. **If desired, click Settings, select the settings for the measurement instrument, and click OK.**
8. **If desired, click Expert Settings to adjust the maximum densities for CMYK and the patch object type, and click OK.**

   For more information, see "Ink or toner limits" on page 25.
9. **Click Next and save the measurement page ID.**

   For more information, see "Measurement description files" on page 25.
10. **Specify print settings and click Print.**

    For more information, see "Print settings" on page 25.

    The measurement pages are printed.
11. **Follow the on-screen instructions to measure the measurement pages and click Next.**
12. **Click Save to save the measurements and click Next.**

13 **In the Summary window, check the results and click Next.**

Click the Help icon for more information about inspecting measurements and averaging measurements.

14 **In the Apply Settings window, select the profile settings or import settings from an existing profile, and then click Next.**

For more information, see "Profile settings" on page 27. You can also click the Help icon in the Apply Settings window.

15 **In the Save Profile window, specify the profile description, media, and any comments desired.**

16 **Confirm that Install on Fiery Server is selected and the correct Fiery server is selected, and then click Next.**

The profile is created.

17 **Select the profile settings (media and calibration) and click OK.**

The profile is installed on the Fiery server.

18 **Click Done to exit Printer Profiler.**

Profiling with a Fiery XF server

You can create a profile for a printer connected to a Fiery XF server. The Fiery XF server must be accessible from your computer over the network.

For more information about Fiery XF servers, see the documentation that accompanies Fiery XF.

TO CREATE A PROFILE WITH A FIERY XF SERVER

1 **In Color Profiler Suite, start Printer Profiler and click Print Patches.**

2 **In the Welcome window, click Select XF Server and select the Fiery XF server from the list.**

If the server is not in the list, click the plus sign to add the server using the IP address or by searching.

3 **Under Printer description, select the printer to profile and click Next.**

4 **Select ink, media, and calibration set appropriate for the printer and the paper that you are using, and click Next.**

5 **Select the settings for creating the measurement pages.**

6 **Click Settings, select the settings for the measurement instrument, and click OK.**

7 **If desired, for a four-color (CMYK) printer, click Expert Settings to adjust the maximum densities for CMYK, and click OK. For printers that support more than four colors, click Expert Settings, adjust the settings for the additional colors, and click OK.**

8 **Click Next and save the measurement page information.**

For more information, see "Measurement description files" on page 25.

9 **Retrieve the measurement pages from the printer, follow the on-screen instructions to measure the measurement pages, and click Next.**

10 **Click Save to save the measurements and click Next.**

11 **In the Summary window, check the results and click Next.**

Click the Help icon for more information about inspecting measurements and averaging measurements.

12 **In the Apply Settings window, select the profile settings or import settings from an existing profile, and then click Next.**

For more information, see "Profile settings" on page 27. You can also click the Help icon in the Apply Settings window.

13 **In the Save Profile window, specify the profile description, media, and any comments desired.**

14 **Confirm that Install on XF Server is selected and click Next.**

The profile is created and installed on the Fiery XF server.

15 **Click Done to exit Printer Profiler.**

Profiling a non-Fiery printer or remote printer (Save as PDF)

You can profile a printer that is not connected to a Fiery server or Fiery XF server by using the Save as PDF option. In this case, you specify the color space of the printer.

Instead of printing the patch pages, you save them to a PDF file. The PDF file must be conveyed to the printer and printed before you can measure the patch pages in Printer Profiler.

TO CREATE A PROFILE FOR A NON-FIERY PRINTER OR A REMOTE FIERY-DRIVEN PRINTER

1 **In Color Profiler Suite, start Printer Profiler and click Print Patches.**

2 **In the Welcome window, click Save as PDF, select the color space of the printer, and click Next.**

3 **Click Next to accept the default calibration option.**

By default, the profile is created using the current calibration state of the printer. Unless you are profiling a Fiery server that requires a calibration goal in the output profile, use the current calibration.

4 **Select the settings for creating the measurement pages.**

5 **Click Settings and select the settings for the measurement instrument.**

6 **If your printer is a Fiery-driven printer, select Include Fiery specific information in PDF.**

7 **If desired, click Expert Settings to adjust the maximum densities for CMYK and the patch object type.**

For more information, see "Ink or toner limits" on page 25.

8 **Click Next and save the measurement page information.**

For more information, see "Measurement description files" on page 25.

9 **Save the PDF file.**

The file is saved in My Documents\Fiery Color Profiler Suite\Patch Pages (Windows) or Documents/Fiery Color Profiler Suite/Patch Pages (Mac OS X).

10 **Print the PDF file on your printer and retrieve the measurement pages.**

11 **Return to Printer Profiler.**

12 **Follow the on-screen instructions to measure the measurement pages.**

13 **In the Summary window, check the results and click Next.**

14 **In the Apply Settings window, select the profile settings or import settings from an existing profile, and then click Next.**

For more information, see "Profile settings" on page 27.

15 **In the Save Profile window, specify the profile description, media, and any comments desired.**

16 **Select Save on local drive and click Next.**

The profile is created.

17 **Click Done to exit Printer Profiler.**

Patch pages (measurement pages)

With Printer Profiler, you can prepare patch pages that are suitable for practically any CMYK or RGB printer.

Ink or toner limits

Printer Profiler allows you to set ink or toner limits for CMYK patches.

If your printer provides tools for establishing and controlling ink limits, we recommend that you control ink limits in your printer instead of in Printer Profiler.

For special printing conditions, you can specify individual maximum ink percentages for patches printed with two inks, three inks, and four inks. Be sure to prepare patches that have the same characteristics and constraints as the actual jobs.

NOTE: If the ink limits are set too low, Printer Profiler will not adequately measure the full characteristics of the printer.

Print settings

When you print patch pages, make sure to select the media that you plan to use with the profile that you are creating, and any other print options that will be applied to the jobs that you print using the profile. If applicable, select the halftone settings that you use for calibration. Do not change any color settings.

Measurement description files

Patch pages created in Printer Profiler are saved in a measurement description file with the .tid extension. The file name assigned by Printer Profiler contains a unique patch ID. The patch ID is also printed on the patch pages.

When you measure a set of patch pages and save the measurements, the measurements are combined with the measurement description file to create a measurement data file (see "Format for measurement files" on page 26 for the format of this file). The measurement description file (.tid) file is then deleted.

Each set of patch pages is created with a specific set of parameters. To profile a different printer with a different set of parameters, you must create a new set of patch pages with its own specific ID. You cannot use the patch pages for one printer to profile a variety of different printers. To do so could produce an inaccurate profile.

Measurements

With Printer Profiler, you measure the patch pages that you just printed, or you can import measurements from a file.

Inkjet printers

The color output of inkjet printers can take some time to dry and stabilize. Do not measure patch pages produced by such printers until the colors have stabilized. We recommend that you wait several hours before measuring the patches. Exit Printer Profiler and restart the application when you are ready to measure the patches.

Format for measurement files

Measurement files saved by Printer Profiler conform to the ASCII variant of the ANSI CGATS.17-2005 standard, described in the document, *Graphic Technology - Exchange format for color and process control data using XML or ASCII text*. This document is available at from the NPES web site at www.npes.org.

Measurement files that have been saved by other applications can be imported if they conform to the ASCII variant of the ANSI CGATS.17-2005 standard (the CGATS.5 file format is not supported by Printer Profiler). The only mandatory keywords are those defined as such in the ANSI document.

Spectral measurements are needed only if the Fiery ColorWise calibration goal must be calculated (recommended for some Fiery servers), otherwise Lab values are sufficient. When spectral measurements are supplied, the number of bands is not pre-determined. Include all bands that are supplied by your spectrophotometer.

Patch layouts can be any that conform to IT8 standards. Measurement files containing different numbers of data sets can be combined. If you are unsure if a specific file is usable or not by Printer Profiler, you can try importing it. Both demonstration and licensed versions of Printer Profiler can be used to test if a measurement file can be imported.

Sample measurement files are supplied in the Samples folder of the installed Color Profiler Suite application (Program Files\Fiery\Applications3\Color Profiler Suite 4\Samples\Measurements on Windows or Applications/Fiery/Color Profiler Suite 4/Samples/Measurements on Mac OS X). Open and inspect these files using any text editor, or use them as templates in your measurement application.

You can create an ICC profile using the measurements file that you save after measuring patch pages, or you can import an existing IT8 file or ICC profile. You can apply gamut mapping settings for both RGB and CMYK profiles, or edit black controls (CMYK profiles only).

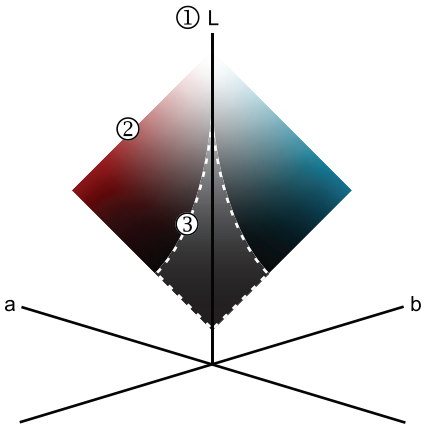
Profile settings

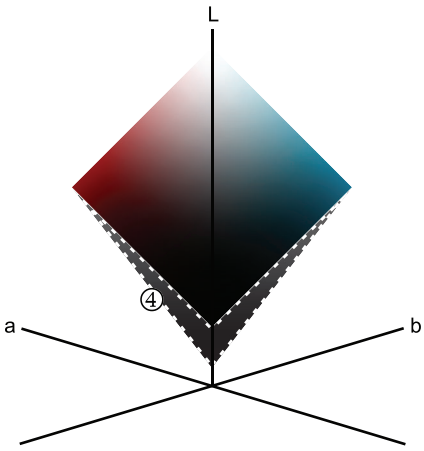
Printer Profiler can import profile settings from an existing profile or from one of several selections for specific printer characteristics.

Printer Profiler also allows you to select the gamut mapping options and separation settings of the profile individually.

The concepts of "Black Width" and "Black amount to extend gamut" are illustrated in the following diagram of a printer's gamut. The shaded area around the neutral axis represents the "Black Width" (3). If you decrease the setting for "Black Width", the shaded area shrinks in towards the neutral axis (the L axis). The shaded area at the edges of the gamut represent the area affected by the "Black amount to extend gamut" setting (4). The shaded area represents the 100% default setting. Reducing the setting reduces the amount of black that is applied in the shadows.

1 Neutral or L axis
2 Area controlled by Black Width setting
3 Edges of gamut
4 Areas controlled by Black Amount to Extend Gamut setting





FIERY MONITOR PROFILER

Fiery Monitor Profiler allows you to create profiles of CRT and LCD monitors, including laptop computer screens. For advanced users, it also lets you calibrate your monitor to your specified target.

Monitor Profiler uses the spectrophotometer included with Color Profiler Suite to measure the color output of a monitor.

Monitor Profiler is not available in Demo mode.

Before you start, we recommend that you set the display settings of your computer to the optimal resolution and best color quality. Be sure to turn off any screensaver or other software that might interfere with the display, especially any graphic arts software that might be color managing the display. If your monitor has a control to reset the monitor to factory default settings, use it to reset the monitor.

Easy method

The Easy method assumes the native monitor settings and profiles the monitor in its current state. You might use the Easy method if:

- You want to profile your monitor quickly.
- You want to profile your monitor in its current state or do not have a preferred state.
- Your monitor does not have controls for adjusting brightness, contrast, and RGB color.

TO PROFILE YOUR MONITOR USING THE EASY METHOD

1. **In Color Profiler Suite, start Monitor Profiler.**
2. **If Easy is not already selected, click Easy.**
3. **Click Next.**
4. **To calibrate the spectrophotometer. place it in its cradle and click Next.**
5. **Use the monitor holder that is included with the spectrophotometer to hang it on the monitor, as shown in the picture on the screen, and click Next.**
6. **Wait while Monitor Profiler displays a sequence of color patches.**

   This takes a few minutes.
7. **When Monitor Profiler indicates that the measurements were successful, remove the spectrophotometer from the monitor and click Next.**

8 **Optionally, click "Compare before and after" to display a test image.**

You can select Before and After to see the effect of the new profile on the image.

9 **Type a description for the profile, or use the default description, and click Next.**

10 **Navigate to the location for the new profile, type a file name or use the default, and click Save.**

The profile is saved and is assigned as the default monitor profile on your computer,

11 **Click Done to exit Monitor Profiler.**

Advanced method

The Advanced profiling method lets you specify desired monitor settings and calibrate the monitor to those settings, and then profiles the monitor in its calibrated state. You might use the Advanced method if:

- You want to profile your monitor calibrated to specific settings.
- You want your monitor to emulate or match another monitor.
- You want to be able to soft proof color on your monitor.

The Advanced mode lets you calibrate the luminance, gamma, and white point. However, you can skip the calibration of any of these parameters.

Before you start, locate the brightness, contrast, and white point controls on your monitor.

- The controls might be physical buttons on the monitor or they might be an on-screen display that you access from a button on the monitor.
- White point controls might be labeled as white point, RGB, or color settings. There might be a single white point control or there might be three controls for Red, Green, and Blue.

When you adjust your monitor, be sure to wait a few seconds after adjusting for the spectrophotometer to measure and display the results before you proceed.

TO PROFILE YOUR MONITOR USING THE ADVANCED METHOD

1 **In Color Profiler Suite, start Monitor Profiler.**

2 **If Advanced is not already selected, click Advanced.**

3 **Select target settings for luminance, gamma, and white point.**

To skip the calibration of any of these parameters, select Native as the setting.

4 **Click Next.**

5 **To calibrate the spectrophotometer, place it in its cradle and click Next.**

6 **Use the monitor holder that is included with the spectrophotometer to hang it on the monitor, as shown in the picture on the screen, and click Next.**

7 **If you chose Native for the target luminance setting, skip to step 9. Otherwise, adjust the brightness control on your monitor to the maximum value and click Next.**

8 **Reduce the brightness control on your monitor until the measured luminance matches the target luminance and click Next.**

9 **If you chose Native for the target gamma setting, skip to step 11. Otherwise, adjust the contrast control on your monitor to the maximum value and click Next.**

10 **Reduce the contrast control on your monitor until the measured gamma matches the target gamma and click Next.**

11 **If you chose Native for the target white point setting, skip to step 21.**

12 **If you have a single white point control on your monitor, adjust the control until the measured white point value matches the target value as closely as possible, and skip to step 20.**

13 **If you have three controls for Red, Green, and Blue on your monitor, find the control with the middle value and set the other two controls to that value as well.**

14 **If these settings result in a noticeable color cast, reduce the dominant color (for example, reduce Red if the cast is reddish) to remove the cast.**

15 **If the color cast persists, set Red, Green, and Blue to 20.**

16 **If the measured white point value is higher than the target value, do either of the following until the measured white point value matches the target value as closely as possible.**

- Increase Red.
- Reduce Green and Blue together, keeping the same value for Green and Blue.

17 **If the measured white point value is lower than the target value, do either of the following until the measured white point value matches the target value as closely as possible.**

- Reduce Red.
- Increase Green and Blue together, keeping the same value for Green and Blue.

18 **Adjust Green and Blue to match the target white point more closely.**

You might not be able to match the target value exactly.

19 **Changing the white point can change the luminance. If the measured luminance no longer matches the target value, adjust the brightness control until it does.**

NOTE: If the measured luminance is still too low at the maximum brightness setting and your monitor has controls for Red, Green, and Blue, gradually increase all three controls, maintaining the same ratios, until the measured luminance matches the target value.

20 **Click Next.**

21 **Wait while Monitor Profiler displays a sequence of color patches.**

This takes a few minutes.

22 **When Monitor Profiler indicates that the measurements were successful, remove the spectrophotometer from the monitor and click Next.**

23 **Optionally, click "Compare before and after" to display a test image.**

You can select Before and After to see the effect of the new profile on the image.

24 **Type a description for the profile, or use the default description, and click Next.**

25 **Navigate to the location for the new profile, type a file name or use the default, and click Save.**

The profile is saved and is assigned as the default monitor profile on your computer,

26 **Click Done to exit Monitor Profiler.**

FIERY DEVICE LINKER

Fiery Device Linker is a tool for creating a **device link profile**, which is a single profile that specifies a the combination of color transforms to achieve a specific objective, such as color consistency or accuracy. In printers that support their use, device link profiles simplify printing workflows and eliminate errors caused by selecting the wrong profile combination. If your situation requires using the same combination of profiles repeatedly over time, you might benefit from using a device link profile.

Device Linker creates a device link profile using existing source and output profiles. Device link profiles created by Device Linker can be tailored to address the following situations:

- You want your printer to match the requirements of a particular color standard (ISO, SWOP, or GRACoL).
- You want the printer that you use for proofing to match the color output of your production printer as closely as possible.

In addition, Device Linker can simply create a device link profile using the source and output profiles you specify.

With Device Linker, you can also optimize spot color definitions to match printed spot colors to the expected colors. Device Linker can read and optimize spot colors that are installed on a Fiery server.

Device link profiles

If your color printing workflow routinely uses the same source and output profiles, you can simplify the printing process using a device link profile. A device link profile is also useful if your printer supports such a large number of profiles that selecting a source profile and output profile for each job is confusing. In a device link profile, the source profile and output profile are linked, so that choosing one automatically chooses the other.

When you use a device link profile, the profile-to-profile calculations are combined into a single conversion. Your **color management system (CMS)** does not have to perform these calculations, ensuring that the calculations are always consistent, even when you use different color management systems.

For example, a Heidelberg CMM might produce different results than an Apple CMM, since each color management system performs color conversion differently. These differences can appear across different operating systems (Windows or Mac OS X) or within the same operating system. Because a device link profile encapsulates color conversion, the variability is eliminated.

In addition to specifying the **rendering intent** for a device link profile, you can also specify some aspects of the separation performed in the device link. For example, you can preserve the K-only black of the input, so that it is not reseparated into a CMYK black when the device link profile is applied.

Using a device link profile can save time and prevent errors. With a device link profile, you do not need to specify the source profile, destination profiles, rendering intent, color management system, or separation controls. These settings are all encapsulated in the device link profile.

With Device Linker, you can link more than two profiles to implement a complex workflow. For example, you might insert an intermediate profile to simulate the output of one printer on another printer.

Example: Optimize a device link (iterative match to a standard)

One example of matching to a standard is when you measure a copy of the Ugra/Fogra Media Wedge printed on your Fiery-driven printer and compare the resulting measurements to an ISO standard.

NOTE: The Ugra/Fogra Media Wedge is a control device used to evaluate hard copy proofs developed by Ugra (the Graphic Technology Research Association of Switzerland) and Fogra (the Graphic Technology Research Association of Germany). You can print the Ugra/Fogra Media Wedge as a control bar on your job when Fiery Graphic Arts Package, Premium Edition is installed and enabled on your Fiery server.

To achieve results that match the standard, use a CMYK source profile that simulates the target standard and an output profile appropriate to your specific printer. Device Linker lets you further optimize for your printer by measuring a patch page to determine the current state of your printer and incorporating the measurements into the device link conversion. You can repeat the printing and measuring of the patch page to progressively fine-tune the optimization with each iteration.

NOTE: The Fiery-driven printer must be properly calibrated and profiled (using Fiery Printer Profiler) before you create the device link profile.

TO MATCH YOUR PRINTER OUTPUT TO A STANDARD

1. **In Command WorkStation, calibrate the Fiery server.**
2. **Check that the measured data closely matches the target densities.**

   This means that your printer is performing up to its capabilities.
3. **In Color Profiler Suite, use Printer Profiler to create a profile for your printer and install the resulting output profile on the Fiery server.**

   For more information, see Fiery Printer Profiler.
4. **In Color Profiler Suite, start Device Linker.**

5 **Click "Optimize a device link (Iterative match to a standard)" and click Next.**

6 **Select the Fiery server.**

7 **Under "Create a new device link profile," select a source profile that is associated with the target standard (for example, ISO Coated), select the output profile that you created in step 3, and click Next.**

The profiles must reside on the Fiery server.

8 **Click Next to accept the default settings.**

9 **Follow the on-screen instructions to print and measure a patch page using the spectrophotometer.**

When you print the page, do not change any color settings.

10 **When the measurement results are displayed, click Iterate to further optimize the profile.**

11 **Repeat step 9 and step 10 until the measured delta E values are within your desired tolerances.**

12 **If an iteration results in higher delta E values, delete the iteration and proceed with saving the profile.**

13 **Click Next to name the new profile, and then click Next to install the profile on the Fiery server.**

Device Linker installs the new device link profile on the Fiery server with the associated profile settings.

14 **Click Done to close Device Linker.**

Later, if you decide that you would like to further optimize the device link profile, you can reopen the profile in Device Linker and perform additional iterations.

TO FURTHER OPTIMIZE A DEVICE LINK PROFILE

1 **In Color Profiler Suite, start Device Linker.**

2 **Select "Optimize a device link (Iterative match to a standard)" and click Next.**

3 **Select the Fiery server.**

4 **Click "Edit a previously optimized device link profile," select the profile, and click Next.**

5 **Click Iterate to further optimize the profile.**

If the measured Delta E values are not reduced by iterative optimization, it might be for one of the following reasons:

- The printer is not performing up to its capabilities (not reaching the maximum toner or ink densities).
- The printer is not capable of printing to the target standard even performing at its best. The colors in the standard are out of the gamut of the printer.
- The printer was already performing to the target standard.

Example: Match to a production printer

Device Linker can create a device link profile to enable one printer to simulate the output of another printer. The proofing device (the simulating printer) and production device (the printer being simulated) do not have to be Fiery-driven printers, but they must be profiled before you create the device link profile. The resulting device link profile, when installed on the proofing device, enables it to print output that matches the output of the production device.

If the gamut of the production device is larger than the gamut of the proofing device, the simulated colors are clipped. The simulation of one printer on another printer can only be accurate when the proofing device has a gamut larger than that of the production device.

TO MATCH YOUR PROOFING DEVICE TO YOUR PRODUCTION DEVICE

1. **Calibrate both printers.**

   For Fiery-driven printers, use Fiery Command WorkStation.

2. **Check that the measured data closely matches the target densities.**

   This means that your printers are performing up to their capabilities.

3. **In Color Profiler Suite, use Printer Profiler to create a profile for your proofing device and a profile for your production device.**

   For more information, see Fiery Printer Profiler.

4. **In Color Profiler Suite, use Device Linker to create a device link profile.**

   - Click “Match to a production printer” on the Welcome screen.
   - Select the source profile that you will be using for printing proofs. Select the profiles that you created for your proofing device and production device in the previous step.
   - For a Fiery-driven proofing printer, install the new device link profile on the Fiery server. Otherwise, save the new device link profile locally and install it on the proofing device.

5. **Print test files on the proofing device and production device using the same color settings.**

   For the proofing device, use the new device link profile. For the production device, use the output profiles that you created in step 3.

6. **Confirm that the proof matches the production output.**

Example: Optimize spot colors

You can use the optimization capability of Device Linker to optimize the spot color definitions on a Fiery server.

TO OPTIMIZE SPOT COLORS

1. **In Color Profiler Suite, start Device Linker.**
2. **Click "Optimize spot colors" and click Next.**
3. **Select the Fiery server, the output profile, and the spot color library, and then click Next.**
4. **Select one or more spot colors, click Add, and then click Next.**
5. **Select the measurement instrument, patch layout (if available), and paper size, and then click Next.**
6. **Specify print settings and click Print.**

   Do not change any color settings before printing.

   A patch page that contains patches of the spot colors is printed.
7. **Follow the on-screen instructions to measure the patch page using the spectrophotometer.**
8. **When the measurement results are displayed, click Iterate to further optimize the spot colors.**
9. **Repeat step 6 to step 8 until the measured delta E values are within your desired tolerances.**
10. **If an iteration results in higher delta E values, delete the iteration and proceed with saving and installing the edited spot colors.**
11. **Click Next to install the edited spot colors on the Fiery server.**

    Device Linker installs the spot colors on the Fiery server.
12. **Click Done to close Device Linker.**

FIERY PRINT MATCHER

Fiery Print Matcher helps you obtain consistent color output across a group of Fiery-driven printers (maximum of five). Printers can produce different color results depending on the manufacturer and model of the printer, environmental factors such as temperature, and the specific characteristics of an individual printer, such as age. Print Matcher uses the color management features of the Fiery server to help minimize these differences.

Using measurement data from all selected printers, Print Matcher generates either a calibration and an output profile or a device link profile. When you use the calibration and output profile or the device link profile to print a job, you can print to any of the printers with similar color results.

Print Matcher provides multiple methods for matching printers, depending on the characteristics of the printers.

- Common calibration and output profile: For printers of the same model. The calibration curves of these printers are similar enough that they can use the same calibration and output profile.
- Common device link profile: For printers of different models or manufacturers. Device link profiles will map the output color space of each printer to the common color space between the printers.

NOTE: You can run Print Matcher in Demo mode and can use almost all features. However, you cannot save any resulting calibration or profile to a Fiery server.

Common calibration and output profile

When the printers are all the same model, use Print Matcher to create a calibration goal and output profile that are common to all the printers. Color measurements from all of the printers are used to calculate the calibration goal and output profile. The resulting calibration goal and output profile are installed on all the Fiery servers associated with the printers.

NOTE: The Fiery server must be running System 10 software or later.

A calibration goal specifies the target density values for a Fiery server. For more information, see the documentation that accompanies your Fiery server.

The output profile represents the common color space between the printers. In other words, the output profile specifies only the colors that all of the printers can print. The calibration goal specifies the maximum densities of C, M, Y, and K that all of the printers can print.

Creating a new common calibration and output profile

When the printers that you want to match are all the same model, use Print Matcher to create a calibration goal and output profile that are common to all the printers.

TO CREATE A NEW COMMON CALIBRATION AND OUTPUT PROFILE

1. **Start Fiery Color Profiler Suite and click Printer Match.**
2. **Select New common calibration and click Next.**
3. **Type a name for this session and click the plus sign (+) to add each Fiery server for the printers that you want to match.**
4. **When you have added all of the Fiery servers to the list, click Next.**
5. **Select the settings for creating the calibration pages, and click Next.**
6. **Select settings for submitting the calibration job to the specified Fiery server and click Print.**
7. **Retrieve the calibration page from the printer and follow the on-screen instructions to measure the page.**

   When you have measured the calibration page, the results (maximum densities for C, M, Y, and K) are displayed.

   NOTE: If necessary, you can save the measurements at this point, quit Print Matcher, and then resume this procedure later. Use "Resume measuring session" when you restart Print Matcher.

8. **Click Next to repeat step 6 and step 7 for each Fiery server that you are matching or, if all of the Fiery servers have been calibrated, to proceed to the next step.**
9. **Review the calibration results and click Next.**

   If any results are questionable, you can click Reprint next to the results to repeat step 6 and step 7 for the specific Fiery server.

   If any results are out of the expected range even after repeating the measurement, you can exclude the Fiery server by clearing the Include check box next to the results. The calibration results will not be used to calculate the common calibration goal, and the common calibration goal and common output profile are not installed on the excluded Fiery server.

   If you exclude a printer from the common calibration, you can include it when you update the common calibration at a later time.

10. **Select the settings for creating the profiling pages, and click Next.**

    The profiling job is submitted to the Fiery server.

11. **Click OK.**

    Profiling pages are printed with the common calibration applied.

12. **Retrieve the profiling pages from the printer and follow the on-screen instructions to measure the pages.**

When you have measured the profiling pages for each Fiery server, the results are displayed. The average and maximum dE values summarize the variation in measurements of multiple patches with the same color.

NOTE: If necessary, you can save the measurements at this point, quit Print Matcher, and then resume this procedure later. Use "Resume measuring session" when you restart Print Matcher.

13 **Click Next to repeat step 11 and step 12 for each Fiery server that you are matching or, if all of the Fiery servers have been profiled, to proceed to the next step.**

14 **Review the profiling results and click Next.**

Profiling pages include multiple patches of the same color. The dE (Delta E) values summarize the variation in measurements of the same color. If any results are questionable, you can click Reprint next to the results to repeat step 11 and step 12 for the specific Fiery server.

Click Inspect measurements to look at the measurement data in Profile Inspector.

15 **In the Apply Settings window, select the profile settings or import settings from an existing profile, and then click Next.**

16 **In the Save Profile window, specify the profile description, media, and any comments desired. Click Next.**

By default, the profile description is the name of the printer matching session. We recommend that you provide enough specific information in the profile description to distinguish it from other profiles that you create.

The profile is created and installed on all of the Fiery servers.

17 **To check your printer matching results, click Test Print to print a color test page to all of the Fiery servers.**

18 **Click Done to exit Print Matcher.**

Updating a common calibration

Because the color output of each printer can change over time, you must update a common calibration periodically to keep the color output consistent across printers. If color consistency is important, calibrate your Fiery servers regularly, at least once a day.

TO UPDATE A COMMON CALIBRATION

1 **Start Fiery Color Profiler Suite and click Printer Match.**

2 **Select Update common calibration, select the printer matching session from the list, and then click Next.**

3 **If necessary, reconnect any disconnected Fiery servers in the list by clicking Update, and then click Next.**

A connection may have been lost because the IP address of the Fiery server changed, for example.

4 **Select the settings for creating the calibration pages, and click Next.**

Use the same settings that you used when you created the common calibration.

5 **Select settings for submitting the calibration job to the specified Fiery server and click Print.**

6 **Retrieve the calibration page from the printer and follow the on-screen instructions to measure the page.**

When you have measured the calibration page, the results (maximum densities for C, M, Y, and K) are displayed.

7 **Click Next to repeat step 5 and step 6 for each Fiery server that you are matching or, if all of the Fiery servers have been calibrated, to proceed to the next step.**

8 **Review the calibration results and click Next.**

9 **To check your printer matching results, click Test Print to print a color test page to all of the Fiery servers.**

10 **Click Done to exit Print Matcher.**

Common device link profile

When the printers are of different manufacturers or different models, use Print Matcher to create a device link profile for each printer that you want to match. Print Matcher uses output profile data from each of the printers to calculate a gamut that is common to all printers. When a job is printed to any of the printers, only those color capabilities that are common to all printers are used, even if the individual printer can print a wider range of colors.

This method uses an existing output profile from the Fiery server associated with each printer. The output profile from each Fiery server is the intermediate profile in its device link profile. The destination in all of the device link profiles is the common color space between the printers. The resulting device link profile is installed on each of the Fiery servers.

Before using this method, make sure that each Fiery server is calibrated and that the profiles on each Fiery server produce acceptable color output (or create a new profile using Printer Profiler).

NOTE: To use profiles from a Fiery server or install profiles on a Fiery server, Print Matcher must have access to the Fiery server on the network.

Creating a new common device link profile

When the printers are of different manufacturers or different models, use Print Matcher to create a device link profile for each printer that you want to match.

TO CREATE A NEW COMMON DEVICE LINK PROFILE

1. **In Command WorkStation, calibrate the Fiery servers for which you want to match printers.**
2. **Check that the measured data for each printer closely matches its target densities.**

   This means that your printers are performing well with respect to their capabilities.
3. **In Fiery Color Profiler Suite, use Printer Profiler to create a profile for each of the printers, and then install each profile on its respective Fiery server.**
4. **Start Fiery Color Profiler Suite and click Printer Match.**
5. **Select New device link and click Next.**
6. **Type a name for this session and click the plus sign (+) to add each Fiery server for the printers that you want to match.**
7. **When you have added all of the Fiery servers to the list, click Next.**
8. **Select a source profile.**

   A device link profile is created for each printer. Each device link profile will use this source profile. Select the CMYK source profile that you prefer for printing most jobs.
9. **For each Fiery server, select the output profile that you created using Printer Profiler in step 3. Click Next.**

   In each device link profile, the profile of the printer being matched is used as an intermediate profile, and the common color space is the destination.
10. **In the Apply Settings window, select the profile settings and click Next.**
11. **In the Save Profile window, specify the profile description and any comments desired for each device link profile. Click Next.**

    We recommend that you provide enough specific information in the profile description to distinguish it from other profiles that you create.

    The device link profile for each Fiery server is installed on the corresponding Fiery server and is associated with the source profile and output profile settings that match the profiles used to create the device link profile.
12. **To check your printer matching results, click Test Print to print a color test page to all of the Fiery servers.**
13. **Click Done to exit Print Matcher.**

FIERY PROFILE INSPECTOR

Profile Inspector allows you to visualize the color space of source and destination ICC profiles and named colors in a three-dimensional model area combined with various controls for manipulating the view of the profiles.

Different color reproduction technologies have different color capabilities, or **gamuts**. Profile Inspector allows you to compare the gamuts of different profiles. Inspecting profiles singly or in pairs can be useful when troubleshooting problems in color printing, or when making decisions about which profiles to use in a color management workflow.

With Profile Inspector, you can select points in the displayed model of a profile and view the Lab values of the point. In addition, you can use the spectrophotometer to measure a color and display the point in the modeling area with the Lab values for that color.

For information about profiles, Lab values, and basic color theory applicable to Profile Inspector, see "Color Concepts" on page 81.

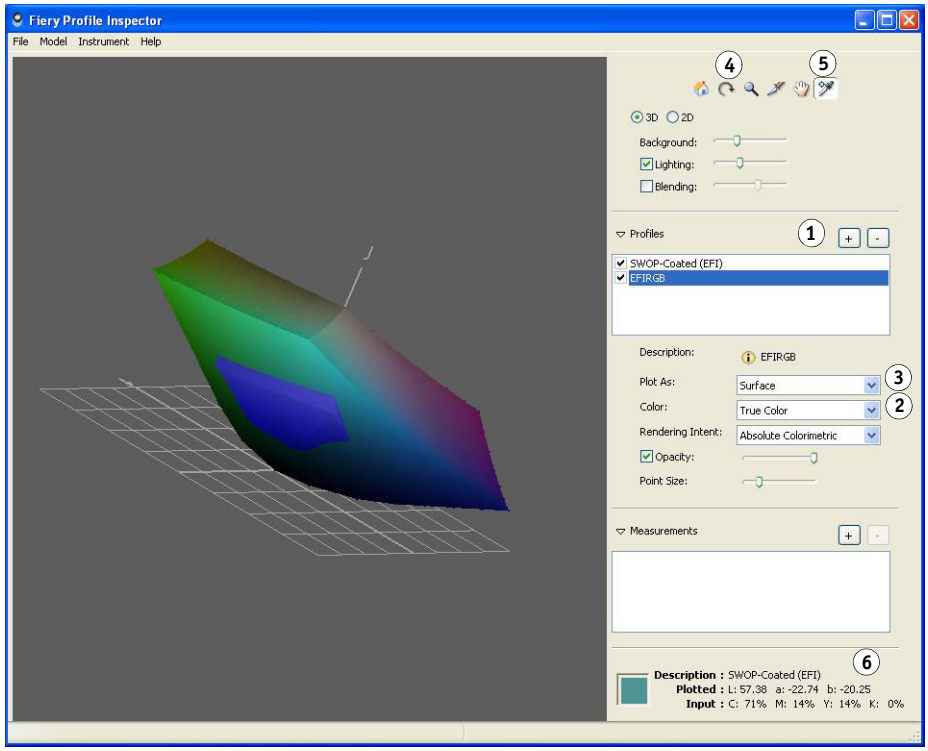
Inspecting profiles

Profile Inspector allows you to view as many as five profiles simultaneously. When you view a profile, you view device-dependent data (CMYK or RGB) converted from the profile device space to the PCS (Profile Connection Space), and plotted as Lab values.

Viewing profiles

In this illustration, we are viewing two profiles: a CMYK profile and an RGB profile.

1 Select profile
2 Select color of display model
3 Select a modeling style
4 Rotate tool
5 Select tool (to select a point)
6 Selected point information



TO VIEW TWO PROFILES

NOTE: The callout numbers on the illustration are referenced in the steps.

1 **Click the plus sign (1) and select the SWOP-Coated (EFI) profile from the Sample Profiles folder.**

The profile is displayed in the model and is added to the list of profiles.

2 **With the SWOP-Coated (EFI) profile selected in the list, select Blue as the display color for the model (2).**

3 **Select Surface + Points from the Plot As menu (3).**

4 **Click the plus sign (1) and select the EFIRGB profile from the Sample Profiles folder.**

The profile is displayed in the model and is added to the list of profiles.

5 **With the EFIRGB profile selected in the list, select True Color as the display color for the model (2).**

6 **With the Rotate tool (4), rotate the model to view the area where the CMYK profile (blue) extends beyond the RGB profile.**

7 **With the Select tool (5), select a point in the model of the EFIRGB profile.**

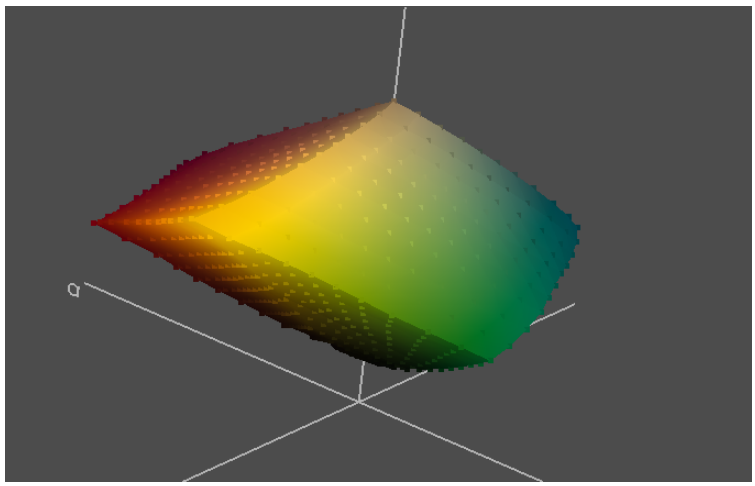
Information about the selected color point is displayed (6).

Evaluating profiles

To help you understand how Profile Inspector can be used to evaluate profiles, we look at some examples of different profiles as they are visualized in Profile Inspector.

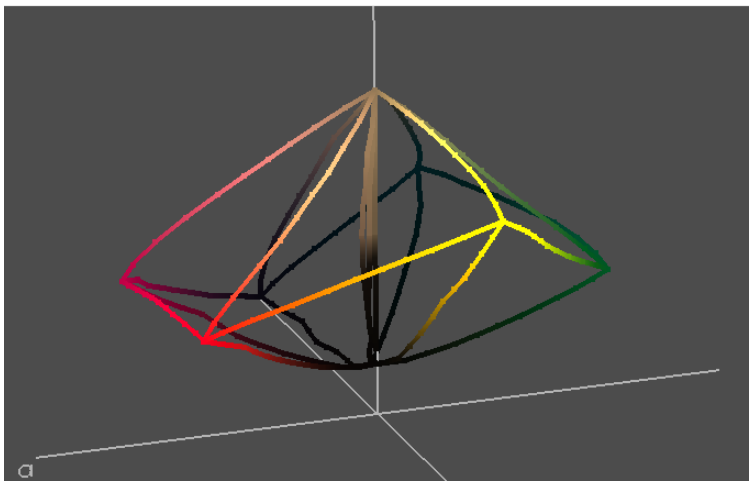
A properly generated CMYK profile

The following illustration displays a nice CMYK device profile in the Surface modeling style. By "nice," we mean a well-behaved, properly-generated profile, which is typical of what users will have. A CMYK profile describes a CMYK printing device, such as a printer connected to a Fiery server, or a printing press, such as SWOP. When you open the profile in Profile Inspector, the model is displayed as a three-dimensional representation of the printer's gamut. It has been plotted using the Lab measurements that mathematically describe the output characteristics of the CMYK printer. The visual model represents all possible colors that the printer is capable of printing. Note that the surface of the gamut model is even and smooth.



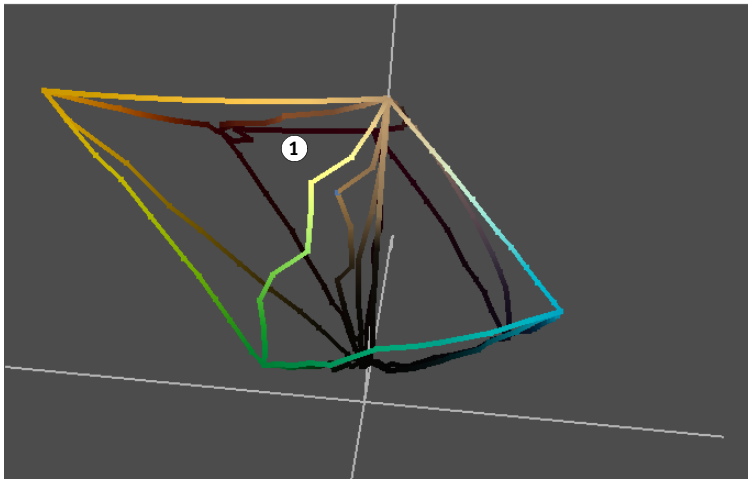
Gray balance

In this illustration, the modeling style has been changed to Edges. The lines, from top to bottom, represent the transitions from white to the primaries (CMYK) and to the secondaries, Red (Magenta + Yellow), Green (Cyan + Yellow), Blue (Cyan + Magenta), and then the transitions from these to black at the very bottom. Down the center, you see three more lines. These indicate the gray transitions from white to black in the profile. The three cases are CMY only (no K), K only (no CMY), and all four colorants: CMYK. Note that the gray axes (CMY, K, and CMYK) are all straight and close to the neutral axis.



The next profile represents a printer that does not have good gray balance. The “1” in the illustration points out the selected point, which is the point farthest off the neutral axis. For this CMY value, the b value is approximately 12. This is not very neutral (a perfect gray would have a and b values equal to 0), and gray balance may be an issue for this profile. To correct this profile, you might want to use a high Black Generation value. In addition, check that the printer was properly calibrated at the time the profile was made. Editing the profile may be necessary.

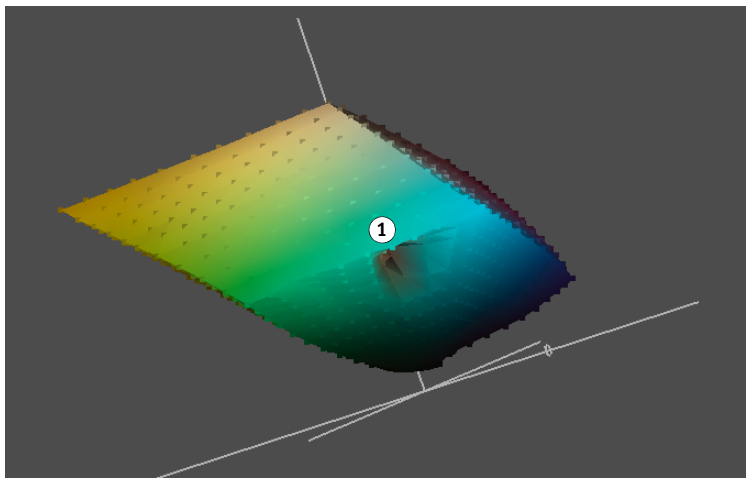
1 Selected point



Incorrect measurements

At first glance, the following profile looks quite acceptable. However, there is a large hole in the Cyan/Green side of the gamut surface. This indicates that some erroneous measurements were made when the profile was created.

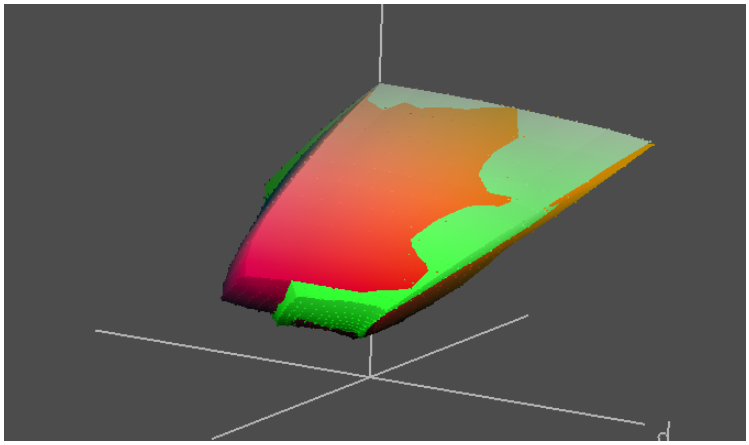
1 Hole in Cyan/Green area



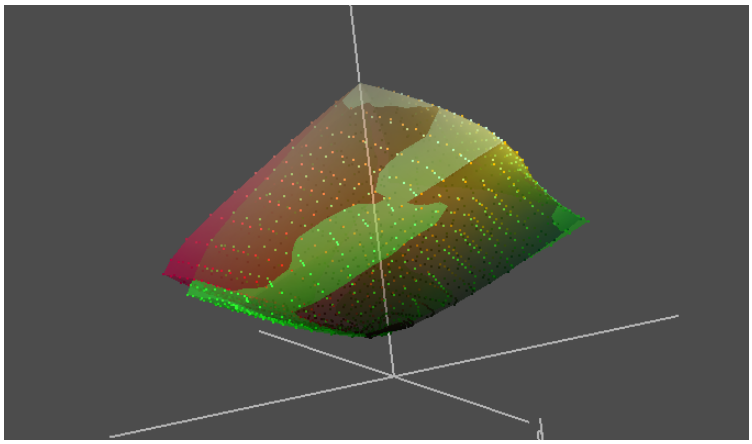
You can use the Opacity control to make the model of the profile with bad measurements more transparent. The error in the profile's measurements becomes more obvious. To fix the error, remeasure the patches that you used to create the profile. If the error persists, print a new set of patch pages after calibrating the printer. You can also check your measurement instrument.

Differences between profiles

In this illustration two CMYK profiles are displayed. The two profiles represent two different printer gamuts. The first CMYK profile is displayed in true color, and the second profile is displayed in green. Note the rather significant difference in the Magenta to Blue area.



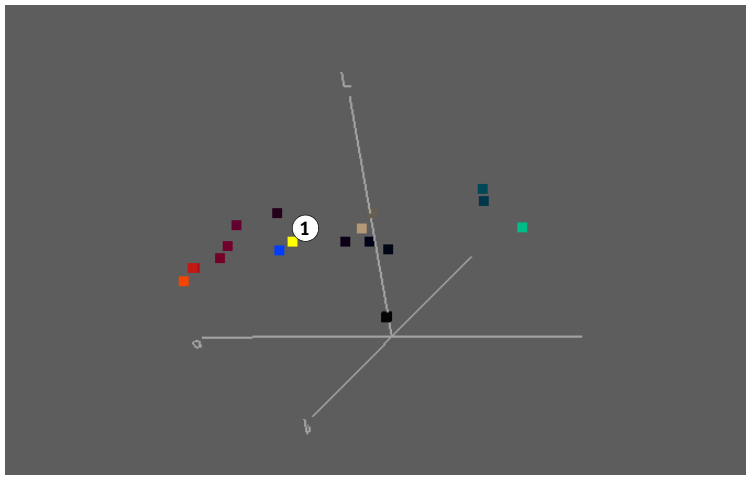
Use the Opacity control and experiment with the modeling style to help investigate the differences between these two profiles. Magenta and Blue colors will not be reproduced consistently by these two printers. Dark, saturated magentas and blue colors can be printed on the nice CMYK printer, but cannot be printed on the second CMYK printer. The second printer is not a good proofing device for the other printer.



Named color profile

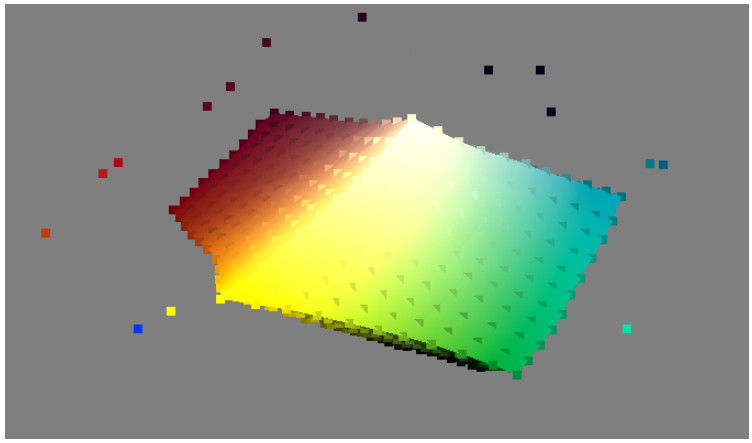
This profile represents named colors, or spot colors. The profile contains the Lab information for all the displayed spot (named) colors. Select a point to see the name of its spot color and its Lab definition. When a point is selected, its color is inverted in the modeling area.

1 Selected point displayed in inverted color



Named color profile with a CMYK profile

This illustration shows a generic CMYK profile and the named colors profile. Many of the named colors are outside the CMYK printing gamut.



FIERY PROFILE EDITOR

Fiery Profile Editor is a tool for modifying an existing output profile. This chapter describes how Profile Editor works and how to use it to solve common problems.

You can use Profile Editor to change CMYK or RGB output profiles. Profile Editor does not operate on input profiles or display profiles.

You cannot use Profile Editor to make fundamental changes to a profile. For example, a profile that misrepresents a large area of the color space cannot be repaired in Profile Editor. Such problems are better addressed by making a new profile with a profile creation tool such as Printer Profiler.

Using Profile Editor

Use Profile Editor to modify many aspects of a profile, including:

- The media whitepoint (in the Absolute Colorimetric rendering intent)
- Overall lightness, contrast, and saturation
- Output curves (C, M, Y, and K or R, G, and B, depending on the color space of the profile)
- Mappings for specific colors or for entire hues
- Individual nodes
- The default rendering intent
- The profile descriptor (internal profile name)

Before starting Profile Editor

Profile Editor displays an image that allows you to preview the effects of the edits that you make to a profile. Therefore, it is important that your monitor displays color correctly. Before starting Profile Editor, check that your monitor is calibrated and that you have a current ICC profile for your monitor in the default color profile location for your operating system. If necessary, use Monitor Profiler to create a profile. For best results, use Profile Editor in a controlled visual environment, with reduced light and no distracting color close to the monitor.

Opening a profile

When you start Profile Editor, you open a profile to edit. You can select only a profile whose class is Output and whose color space is CMYK or RGB.

A default reference image for previewing the effects of the profile is loaded the first time you start Profile Editor. You can also open a different image. It must be in JPEG or TIFF format. A good reference image contains the colors of interest to you.

If the image you select does not have an embedded source profile, select a source profile for displaying the image. The source profile should match the color space used to create the image.

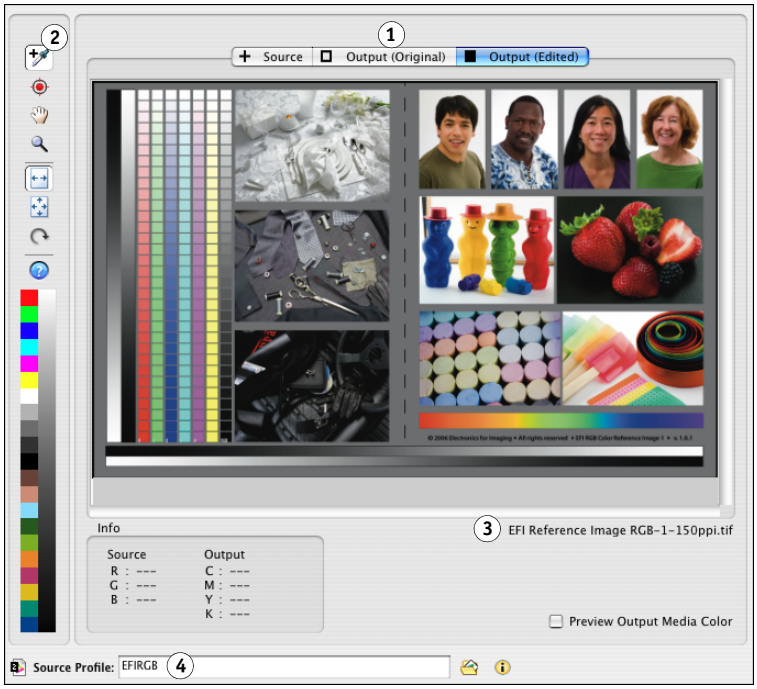
Editing a profile

Profile Editor displays the reference image in three views:

Symbol	View	Description
+	Source	Displays the image using the selected source profile.
□	Output (Original)	Displays the image as it would appear printed using the output profile without any edits.
■	Output (Edited)	Displays the image as it would appear printed using the output profile with edits.

Before you make any edits, the Output (Original) and Output (Edited) views are the same. As you make edits, the Output (Edited) view is updated to show the effect of the edits.

1 Source, original output, and edited output tabs
2 Eyedropper tool (changes cursor)
3 Reference image file
4 Source profile used to display reference image



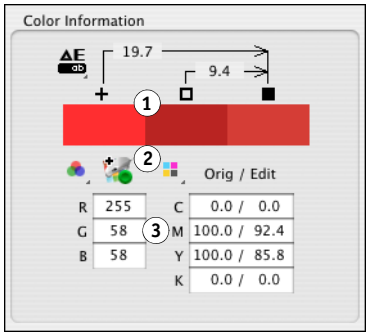
At any time, you can switch between the three tabs (Source, Output (Original), and Output (Edited) by clicking one of the tabs, by choosing the desired view from the View menu, or by entering the keyboard equivalent of the View menu selection.

The default rendering intent for the profile is selected initially. You can make edits in any rendering intent. Some edits necessarily affect more than one rendering intent. In this case, the edit you make in one rendering intent is automatically created in the other rendering intent. In addition, you can copy an edit from one rendering intent to another one explicitly.

To edit a specific hue, color, or node, you select a source color to modify. You can select a source color in one of three ways:

- Use the Eyedropper tool to sample a color from the reference image or from the color swatches to the left of the reference image.
- Click the measurement instrument icon in the Color Information pane and sample the color using the spectrophotometer.
- Enter the coordinates of the source color in the appropriate fields of the Color Information pane.

1 **Swatches of selected color in Source, Output (Original), and Output (Edited)**
2 **Measurement instrument icon**
3 **Color coordinate fields**

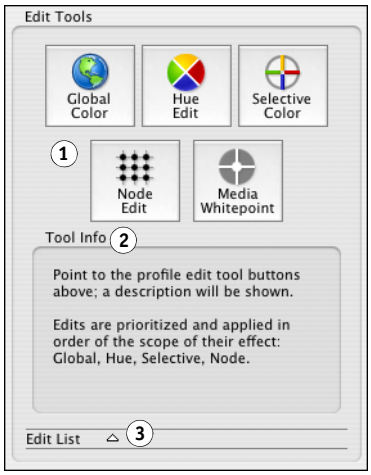


Profile Editor provides the following editing tools:

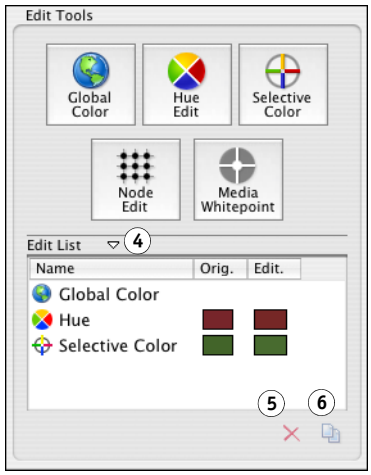
- **Global Color:** Adjusts the lightness, contrast, and saturation of all colors (in the selected rendering intent) and adjusts the individual output curve for each color channel (C, M, Y, and K, or R, G, and B).
- **Hue Edit:** Shifts all colors sharing the same hue (plus a user-specified range of neighboring colors) to a different hue.
- **Selective Color:** Changes one color (plus a user-specified range of neighboring colors) in the source to a different color in the output.
- **Node Edit:** Changes the color content of an individual node in the profile color table.
- **Media Whitepoint:** Changes the whitepoint value. Available only when the Absolute Colorimetric rendering intent is selected.

As you create edits, they are added to the Edit List in the order they will be applied. The order is significant. Each edit is applied taking into account the edits that come before it. Profile Editor automatically applies the edits in order from most to least global. The Media Whitepoint edit is the most global edit, although it is displayed last in the tool icons because it is less frequently used. In general, make global edits (those that affect the entire output) before making edits that affect a small area of the color space. Otherwise, if you add a global edit after you add a more specific edit, the more specific edit might not have the same effect.

1 Click icon to open tool
2 Tool information displayed when you roll cursor over tool icon
3 Click arrow to show Edit List (hides Tool Info)
4 Click arrow to show Tool Info (hides Edit List)
5 Delete selected edit
6 Copy selected edits to another rendering intent



Edit List hidden



Edit List shown

The edits shown in the Edit List are for the selected rendering intent only. You can copy an edit from one rendering intent to another using the Copy icon below the Edit List (shown in the preceding illustration).

Saving a profile

When you save an edited profile, you can choose to preserve the individual edits. You can then return to the profile's original state or any intermediate state by opening the profile again and deleting specific edits. When you finish editing a profile, you can save the profile with the Flatten option, which incorporates and deletes the list of edits, resulting in a more compact file. Whether you use the Flatten option or not, you can still use the profile. You might choose not to flatten the profile, so that you have the option of editing it.

Profile Editor examples

This chapter describes how to use Profile Editor to solve the following common problems:

- Output is too dark
- Output colors are out of balance
- Flesh tones are oversaturated
- Pure tone is grayish
- Hue is incorrect
- Neutral tones are not neutral
- Profile targets a different paper

Each problem and the approach to solving it were chosen to show how to use the different tools in Profile Editor. For most problems, a number of approaches are possible.

Before you begin

Initialize and calibrate the spectrophotometer before you follow these examples. In the Profile Editor main window, select Instrument > (spectrophotometer name) > Calibrate.

Color Profiler Suite includes a number of sample profiles and images that are used in these examples. The profiles are located in the Sample Profiles location, which corresponds to the Samples/Profiles folder in the Color Profiler Suite installation directory. The images are located in the Samples/Images folder, also in the Color Profiler Suite installation directory.

Opening a profile and reference image, and saving a profile

The examples in this chapter require you to open a particular profile and reference image and to save the edited profile. The specific steps for each of these tasks are described in the following procedures.

TO OPEN A PROFILE FOR EDITING

1 **From the Profile Editor main window, select File > Open Profile for Editing.**

Alternatively, if the file appears on your desktop, you can drag the file icon to the Profile Editor main window

2 **Select the profile and click Select.**

The profile is loaded.

When you start Profile Editor, it automatically loads the reference image opened most recently. You can load a different reference image at any time.

TO OPEN AN IMAGE FILE AND SOURCE PROFILE

1 **From the Profile Editor main window, select File > Open Reference Image.**

2 **If necessary, browse to the Samples/Images folder in the Color Profiler Suite installation directory.**

3 **Select the image file and click Open.**

The Select Source Profile dialog box appears.

4 **If Keep Embedded Profile is selected, skip to step 8.**

This option is available only if the image has an embedded profile. All sample reference images included with Profile Editor have embedded profiles.

5 **If Keep Embedded Profile appears dimmed and Select Source Profile is selected, click Browse.**

6 **For Class, select Display.**

Space is automatically set to RGB or CMYK, whichever matches the color space of the image. For an RGB image, only RGB source profiles are listed. For a CMYK image, only CMYK source profiles are listed.

7 **Select a source profile in the list and click Select.**

Adobe RGB or sRGB are good choices for an RGB image if you do not have any information about the device used to create the image. For a CMYK image, a default CMYK profile for Adobe Photoshop is a good choice. You can download Adobe profiles from the Adobe web site.

NOTE: You can load the same image with different source profiles to see which one provides the best results (look at the image on the Source tab).

8 **Click OK.**

The reference image is loaded. The rendering intent is initially set to the default rendering intent for the profile.

If you do not like the appearance of the image on the monitor (assuming that the monitor is properly calibrated and profiled), try using a different source profile.

After you edit a profile, you must save it, usually with a new file name.

TO SAVE AN EDITED PROFILE

1 **Select File > Save Edited Profile As.**

2 **To change the profile descriptor, type a new descriptor next to Name your profile.**

The profile descriptor is the internal profile name that is displayed in an application (such as Adobe Photoshop) to refer to the profile. A good profile descriptor is short and uniquely identifies the profile.

By default, an edited profile is saved with a new profile descriptor to distinguish it from the original profile.

3 **To change the default rendering intent, select a new setting.**

4 **To remove the list of edits from the profile and incorporate the changes into the profile's data, select Flatten Profile.**

If you select Flatten Profile, you cannot undo or change any of the saved edits if you edit the profile again.

5 **Select Save on local drive, if it is not already selected.**

6 **Click Save, navigate to the location in which to save the profile, and then click Save again.**

The profile is saved.

Example: Output is too dark

This example shows a profile that renders all output colors darker than desirable.

TO VIEW AND CORRECT THE PROFILE

1 **Open the profile called Prints Too Dark.**

For instructions on opening a profile, see page 53.

2 **If the reference image is not already EFI Reference Image RGB-1-150ppi.tif, open this reference image.**

For instructions on opening a reference image, see page 54.

3 **Switch between the Source and Output (Original) tabs to see that the output is uniformly darker than the source.**

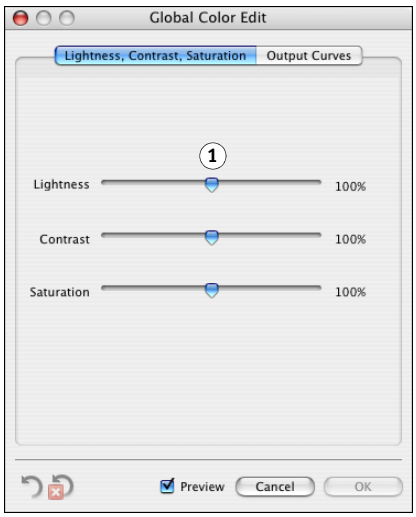
4 **Click the Global Color icon in the Edit Tools pane.**

The Global Color Edit dialog box appears.

5 **If it is not already selected, click the Lightness, Contrast, Saturation tab.**

6 **Drag the Lightness slider to the right.**

1 **Drag slider**



Notice that the Output (Edited) tab in the reference image and the edited output swatch in the Color Information pane (if you have selected a color) are lighter.

7 **Switch between the Output (Edited) and Source tabs to check whether the lightness of the output matches the source, and readjust the Lightness slider as needed.**

8 **Try adjusting the Contrast and Saturation sliders as well, to see the effect of those controls.**

9 **When you achieve a satisfactory output, click OK to enter the edit in the Edit List.**

To show the Edit List, click the up arrow next to Edit List in the bottom-right corner of the main window.

10 **Save the profile, if required.**

For instructions on saving a profile, see page 55.

Example: Output colors are out of balance

This example shows a profile that adds too much magenta to the printed output. The problem might be that the profile was created using an uncalibrated printer, or that the printer is out of calibration and printing magenta incorrectly. You can determine whether the problem is in the profile or the printer when you view the profile in Profile Editor.

If the problem is in the printer, it is best to calibrate the printer. If that is not possible, however, you can edit the profile to compensate for the printer's imbalance.

TO VIEW AND CORRECT THE PROFILE

1. **Open the profile called Prints Too Magenta.**

   For instructions on opening a profile, see page 53.

2. **If the reference image is not already EFI Reference Image RGB-1-150ppi.tif, open this reference image.**

   For instructions on opening a reference image, see page 54.

3. **Switch between the Source and Output (Original) tabs to see the effect of the profile.**

   Notice that the output has a magenta cast. This indicates that the excessive magenta in the output is caused by the profile rather than the printer.

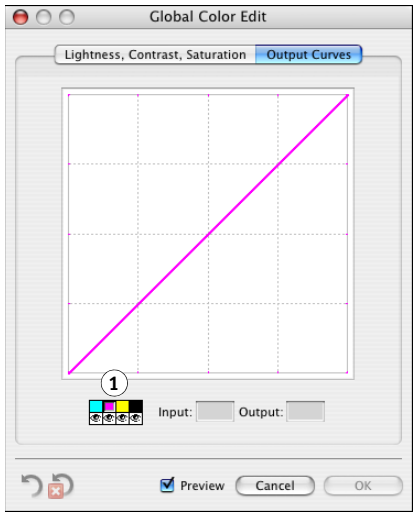
4. **Click the Global Color icon in the Edit Tools pane.**

   The Global Color Edit dialog box appears.

5. **If it is not already selected, select the Output Curves tab.**

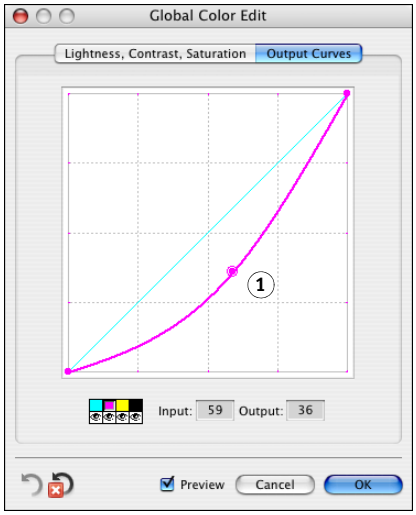
6. **Click the magenta square to activate the magenta curve.**

1 Click magenta square



7 Click a position at about the midpoint of the curve to create a control point, and drag the control point down to reshape the curve.

1 Drag control point to reshape curve



Note that the Output (Edited) tab in the reference image and the edited output swatch in the Color Information pane are less magenta and more green.

If you were editing the profile to compensate for the printer, you would actually want the profile output to be biased toward green. A green-biased profile would cancel out the effect of too much magenta in the printer.

8 When you achieve a satisfactory output, click OK to enter the edit in the Edit List.

9 Save the profile, if required.

For instructions on saving a profile, see page 55.

Example: Flesh tones are oversaturated

This example shows a profile that renders oversaturated flesh tones.

TO VIEW AND CORRECT THE PROFILE

1 **Open the profile called Editor Tutorial #1.**

For instructions on opening a profile, see page 53.

2 **If the reference image is not already EFI Reference Image RGB-1-150ppi.tif, open this reference image.**

For instructions on opening a reference image, see page 54.

3 **For Rendering Intent, select either Saturation (Presentation) or Perceptual (Photographic).**

4 **Switch between the Source and Output (Original) tabs in the reference image.**

Notice that the faces of people in the reference image are an unnatural color. Other colors still look pleasing, though, so it's not necessary to change saturation globally.

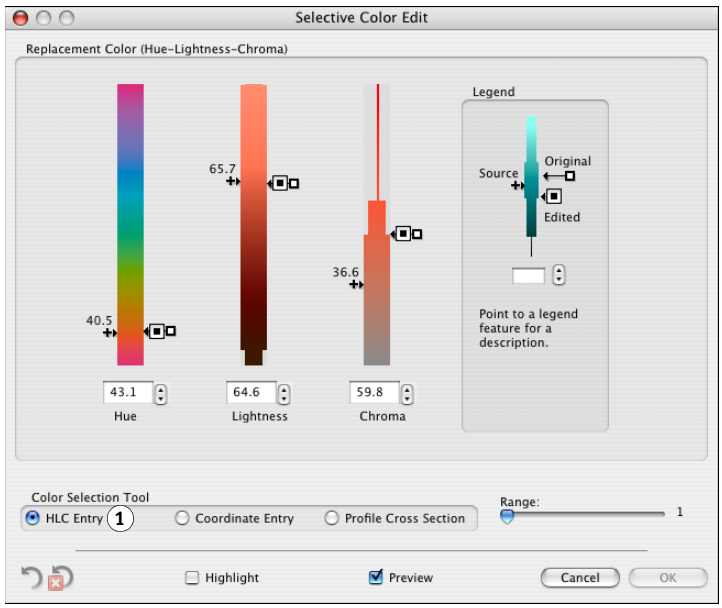
5 **With the Output (Edited) tab displayed, select the Eyedropper tool and sample a bright area of a face.**

6 **Click the Selective Color icon in the Edit Tools pane.**

The Selective Color Edit dialog box appears.

7 **If it is not already selected, select HLC Entry.**

1 **Select HLC Entry**



HLC Entry allows you to change the hue, lightness, and chroma (similar to saturation) of the output color.

8 **Select Highlight.**

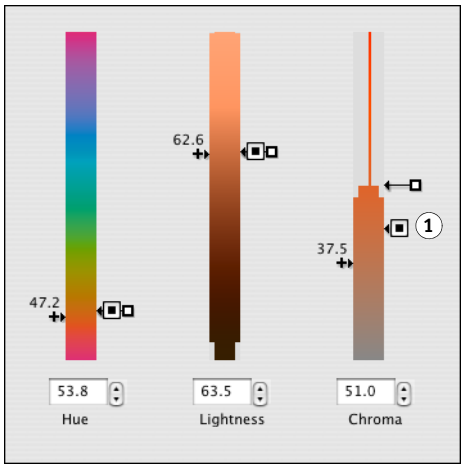
The affected areas of the output image are highlighted in a contrasting (blue) color.

9 **Drag the Range slider until the highlighting includes the entire face of most of the people, at a Range value of about 4.**

10 **Deselect Highlight.**

11 **Drag the Edit marker (black square) on the Chroma bar down until it is about halfway between the source marker (plus sign) and the original marker (white square).**

1 Drag Edit marker



The more you reduce the chroma, the less saturated the flesh tones become.

12 **In the reference image, switch between the Output (Edited) and Output (Original) tabs to see the effect of the edit.**

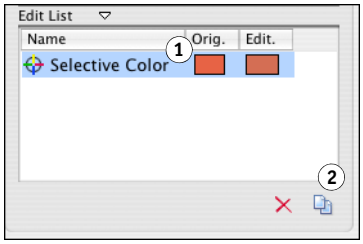
Be careful not to click inside the reference image using the Eyedropper tool, or you will change the source color and lose the edit you made.

13 **Click OK to enter the edit in the Edit List.**

The edit applies to the rendering intent you selected in step 3. However, the oversaturated flesh tones in the other rendering intent have not changed.

14 In the Edit List, select the edit you just made, click the Copy icon below the Edit list, and select the other rendering intent (the one you did not select in step 3).

1 Selected edit
2 Copy icon



The edit is copied to the other rendering intent, and the Rendering Intent at the top of the main Profile Editor window is changed to that rendering intent.

15 Save the profile, if required.

For instructions on saving a profile, see page 55.

Example: Pure tone is grayish

This example shows a profile that renders grayish tones where pure tones are expected.

TO VIEW AND CORRECT THE PROFILE

1 **Open the profile called Editor Tutorial #2.**

For instructions on opening a profile, see page 53.

2 **If the reference image is not already EFI Reference Image RGB-1-150ppi.tif, open this reference image.**

For instructions on opening a reference image, see page 54.

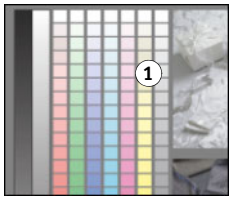
3 **For Rendering Intent, select Saturation (Presentation).**

The Saturation (Presentation) rendering intent is used to display the reference image.

4 **Switch between the Source and Output (Original) tabs in the reference image.**

The image contains test strips of cyan, magenta, yellow, and black swatches in increasing saturation values from 100 to 0 percent. Notice that at the low saturation end of the yellow strip, the yellow swatches are grayish.

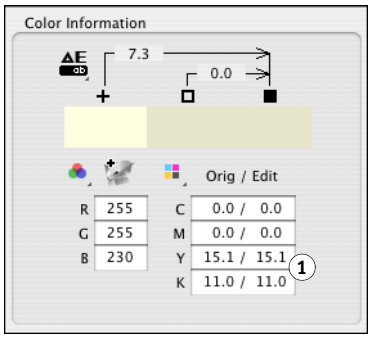
1 **Yellow swatches are grayish**



5 **With the Output (Edited) tab displayed, use the Eyedropper tool to sample one of the grayish yellow swatches and look at the CMYK values under the Orig/Edit column in the Color Information pane.**

Notice that the swatches contain a considerable black component relative to the yellow value. For example, the fourth yellow swatch from the top contains 11% black as well as 15.1% yellow.

1 **Yellow swatch output contains Y and K components**



6 **Sample the fourth yellow swatch from the top with the Eyedropper tool.**

7 Click the Selective Color icon in the Edit Tools pane.

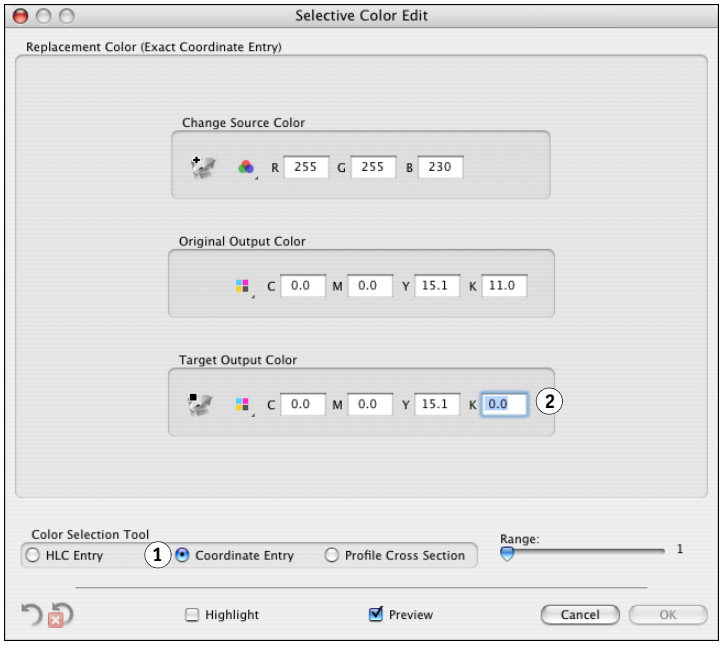
The Selective Color Edit window appears.

8 Select Coordinate Entry.

Coordinate Entry allows you to change the cyan, magenta, yellow, and black coordinates of the output color.

9 Change the black (K) value of the Target Output Color to 0 and click OK.

1 Select Coordinate Entry
2 Change K value



Press Tab or Enter after changing the numeric value to have the change accepted and enable the OK button.

The selective color edit is added to the list of edits, and the reference image is updated.

10 Switch between the Output (Edited) and Output (Original) tabs to see the effect of the edit.

Notice that the edit removes the gray component from the Y swatch as well as from several adjacent Y swatches and M swatches. This is because a selective color edit affects a range of colors close to the selected color in the device color space. Even with the smallest range value (1), a selective color edit will affect more than the single selected color.

11 Click OK to enter the edit in the Edit List.

12 Save the profile, if required.

For instructions on saving a profile, see page 55.

Example: Hue is incorrect

This example shows a profile that results in blues being too purple.

TO VIEW AND CORRECT THE PROFILE

1. **Open the profile called Editor Tutorial #3.**

   For instructions on opening a profile, see page 53.

2. **If the reference image is not already EFI Reference Image RGB-2-150ppi.jpg, open this reference image.**

   This image displays the purple blues we want to correct. For instructions on opening a reference image, see page 54. Keep the embedded profile of the image.

3. **For Rendering Intent, select Perceptual (Photographic).**

4. **Switch between the Source and Output (Original) tabs in the reference image.**

   Notice that the sky in the upper-right image, as well as the blue in the boy's jacket, is output as purple rather than blue.

5. **With the Output (Edited) tab displayed, use the Eyedropper tool to sample the sky color.**

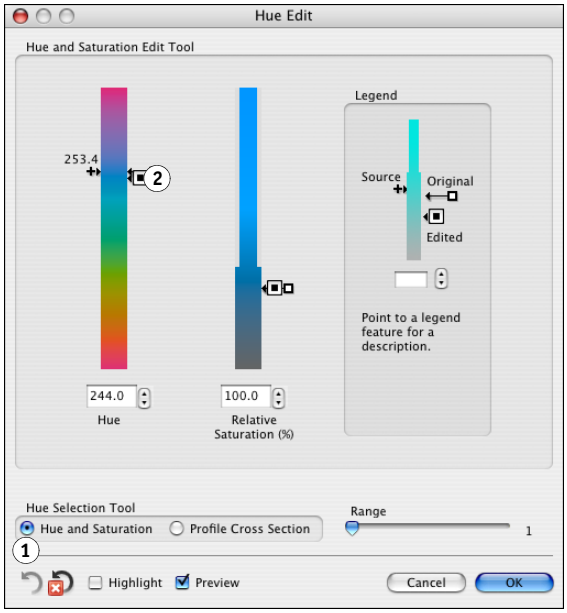
6. **Click the Hue Edit icon in the Edit Tools pane.**

   The Hue Edit window appears.

7. **If it is not already selected, select Hue and Saturation.**

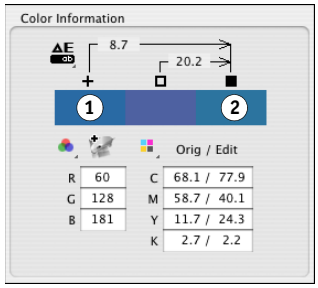
8 Drag the Edit marker (black square) on the Hue bar down, towards blue.

1 Select Hue and Saturation
2 Drag Edit marker



Notice that the output swatch in the Color Information pane becomes closer to the source swatch. You might not be able to match the source exactly. This means that the particular blue you selected is not reproducible on the output device.

1 Source color
2 Edited output color



9 In the reference image, switch between the Output (Edited) and Output (Original) tabs to see the effect of the edit.

10 Now, try to enter the Hue Edit using the Profile Cross Section. Click the Clear icon to remove the change you made.

The edited and original output colors match again.

11 Select Profile Cross Section.

A horizontal cross-section of the output color space is displayed, with markers indicating the source, original output, and edited output colors (a plus sign, empty square, and filled square, respectively).

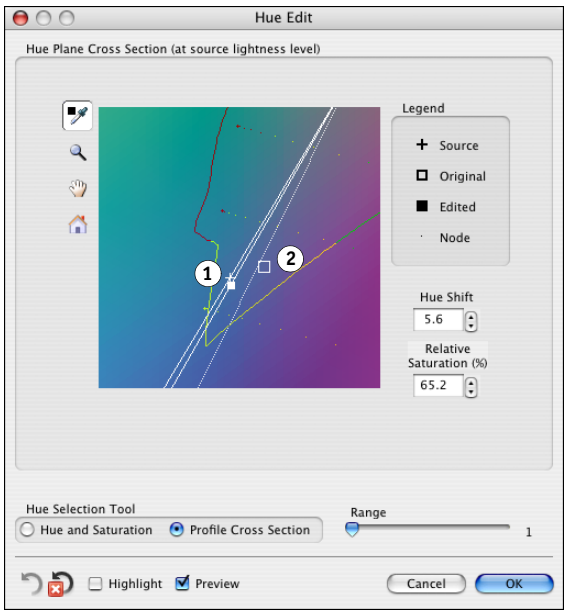
12 **Select the Zoom tool, and zoom in until you can see the individual markers.**

13 **Select the Eyedropper tool.**

14 **Click at a point on the line through the Source marker (plus sign) that is below the Source marker and inside the irregular shape that represents the device gamut.**

1 **Edited marker near Source marker at same hue angle**

2 **Original marker**



The Edited marker (filled square) is moved to that point. Notice that the output swatch in the Color Information pane becomes closer to the source swatch. This is because you have moved the output color to a color that is closer to the source color in the color space.

15 **In the reference image, switch between the Output (Edited) and Output (Original) tabs to see the effect of the edit.**

16 **Click OK to enter the edit in the Edit List.**

17 **Save the profile, if required.**

For instructions on saving a profile, see page 55.

Example: Neutral tones are not neutral

This example shows a profile in which not all neutral grays are completely neutral. You can edit the nodes near the neutral axis of the profile to correct this problem.

TO VIEW AND CORRECT THE PROFILE

1. **Open the profile called Neutrals Not Neutral.**

   For instructions on opening a profile, see page 53.

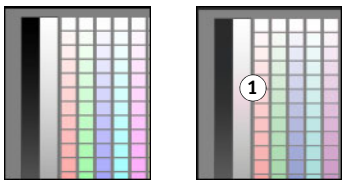
2. **If the reference image is not already EFI Reference Image RGB-1-150ppi.tif, open this reference image.**

   For instructions on opening a reference image, see page 54.

3. **Switch between the Source and Output (Original) tabs to see the effect of the profile.**

   Look at the black-to-white and white-to-black ramps (vertical bars at the left side of the image) and notice a slightly pink area in the lighter gray. This indicates that the neutral gray is printing with excess magenta.

1 Pink area in output gray



Source **Output**

4. **Click the Node Edit icon in the Edit Tools pane.**

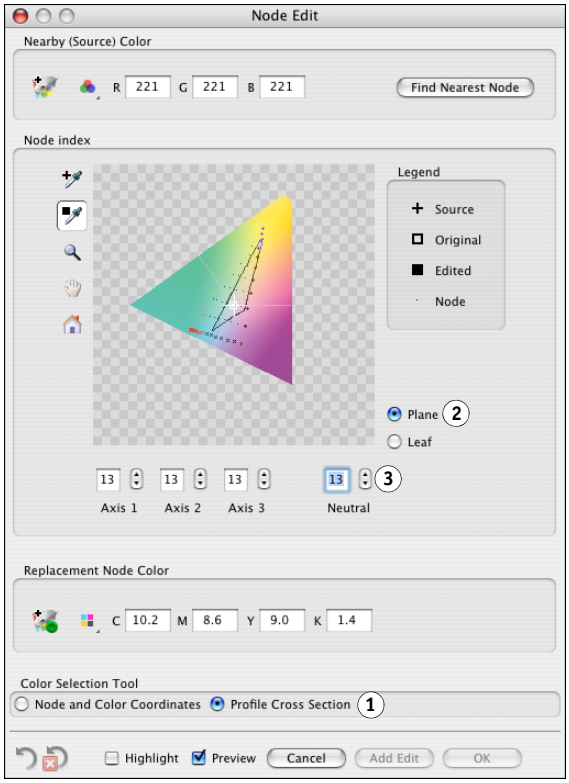
   The Node Edit dialog box appears.

5. **Under Color Selection Tool, click Profile Cross Section.**

6 Make sure that Plane is selected (rather than Leaf).

The window displays a profile cross section in XYZ color space. The Profile Connection Space of this profile is XYZ. If the Profile Connection Space were Lab, the cross-section would be displayed in Lab color space.

1 Select Profile Cross Section
2 Select Plane
3 Click Neutral arrows



7 If the cross-section is too small to see, use the Eyedropper tool in the reference image to sample any color that is not close to pure white or pure black, which will locate a color that is in a larger cross-section.

The cross-section is a two-dimensional slice of the profile perpendicular to the profile's neutral axis (a line through the center of the profile representing the colors where X=Y=Z). The neutral value for any cross-section is a point in the center of the slice.

Cross-sections in XYZ color space become smaller as you approach each end of the neutral axis (pure black at the minimum neutral value and pure white at the maximum neutral value). In Lab color space, all cross-sections are the same size.

8 Click the up and down arrows for the Neutral field to increase and decrease its value.

The window displays the cross-section at each value along the neutral axis. By looking at all of the cross-sections, you can get a idea of the profile shape.

9 Set the Neutral value to 13.

The example profile has a defect near this Neutral value.

10 Select the Zoom tool, and zoom in on the area around the Original (empty square), Edited (filled square), and Source (plus sign) markers.

Notice that the gray around the Original and Edited markers is slightly pink, whereas the gray around the Source marker is a neutral gray.

NOTE: The example profile was created with a very obvious flaw. In practice, the problem will not always be as obvious.

11 Select the output Eyedropper tool, and click a point in the cross-section that is the same distance from the Source marker as the Original marker but on the opposite side of the Source marker.

The Edited marker (filled square) is moved to that point. By changing the replacement node to the node 180 degrees across from the original replacement node, you introduce a "green" bias in the "pink" node, making it neutral.

12 In the reference image, switch between the Output (Edited) and Output (Original) tabs to see the effect of the edit.

13 Click OK to enter the edit in the Edit List and close the Node Edit window.

14 Save the profile, if required.

For instructions on saving a profile, see page 55.

Example: Profile targets a different paper

This example shows a profile that was created for printing on a specific paper. Use Profile Editor to modify the profile for printing on a different paper.

TO VIEW AND CORRECT THE PROFILE

1 **Open the profile called New Media.**

For instructions on opening a profile, see page 53.

2 **If the reference image is not already EFI Reference Image RGB-1-150ppi.tif, open this reference image.**

For instructions on opening a reference image, see page 54.

3 **For Rendering Intent, select Absolute Colorimetric.**

The Absolute Colorimetric rendering intent is the only rendering intent that contains the media whitepoint setting, which allows the profile to compensate for the paper color.

4 **Switch between the Source and Output (Original) tabs in the reference image.**

The white background and lighter areas of the Output (Edited) image are rendered in a more greenish white than in the Source image. This indicates that the paper that was profiled has a reddish component that is compensated for by the profile.

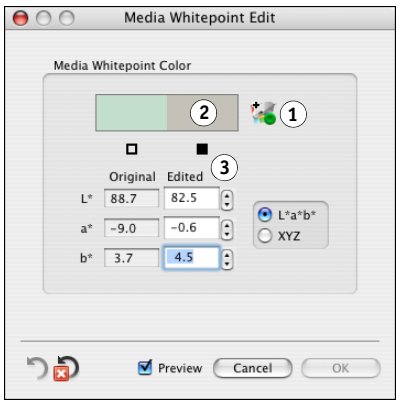
5 **To set a new media whitepoint, click the Media Whitepoint icon in the Edit Tools pane.**

6 **Select the measurement instrument icon, and sample the color of a piece of paper with the spectrophotometer.**

Be sure to initialize and calibrate the spectrophotometer before using it.

The Edited color swatch and index values are changed to the measured color. In the reference image, the white background and lighter areas of the Output (Edited) image change, as well.

1 Measurement icon
2 Edited color swatch
3 Edited color values



7 **Click OK to enter the edit in the Edit List.**

8 **Save the profile, if required.**

For instructions on saving a profile, see page 55.

EFI VERIFIER

EFI Verifier is a color checker tool. It enables you to measure and compare two different sets of color values to ensure that color accuracy is maintained.

Verifier can check the color accuracy of the following different output combinations:

- Profile-to-proof
- Proof-to-proof
- Proof-to-print
- Print-to-print
- Profile-to-print

Comparing profile-to-proof is one of the most useful applications for Verifier. For example, in a normal everyday situation, you can compare the color values of a proof that has been created on your printer with those of the profile that simulates the printing press used for the final print run. If the measured color values are a good match, this indicates that the final print run will also be color accurate.

The measured values can be saved, so that the information can be dispatched to remote environments as well as used in-house.

For more information about Verifier, see the documentation and online help that accompanies the software.

Using Verifier with Color Profiler Suite

This section provides some examples of the types of tasks you can perform using Verifier.

Evaluating spatial variation

You can monitor and evaluate a printer's ability to reproduce the same colors faithfully on every location within a single printed sheet.

1 **Print a strip of predefined color patches along the top and bottom (or left and right) edges of a page.**

2 **Use Verifier to measure and compare the color differences between the two.**

Evaluating temporal variation

You can monitor and evaluate a printer's ability to reproduce the same colors faithfully over a specific time.

1 **Print a strip of predefined color patches on a single page.**

2 **Use Verifier to measure the patches and save the measurements.**

3 **At specified intervals, reprint and remeasure the same page.**

4 **Use Verifier to compare the color differences over time.**

Evaluating calibration accuracy

You can check the color accuracy of a Fiery server before and after calibration.

1 **Load the printer's ICC profile into Verifier.**

2 **Use Verifier to measure a strip of predefined color patches.**

3 **Calibrate the Fiery server.**

4 **Use Verifier to measure the same strip of patches and compare the color differences.**

NOTE: There might be differences caused by spatial variation as well as calibration. You might want to combine this test with the spatial variation test.

CMYK simulation tuning

You can improve the accuracy of CMYK simulations.

1 **Load a predefined set of color measurements into Verifier as a standard.**

2 **Reprint the predefined series of color patches.**

3 **Use Verifier to evaluate the color differences between the printed output and the standard CMYK simulation target.**

4 **Use Profile Editor to edit the simulation profile used for printing.**

FIERY AUTO VERIFIER

Fiery Auto Verifier helps you monitor the color accuracy of one or more Fiery servers, for specific print settings. Auto Verifier prints a test page containing CMYK color patches automatically at scheduled intervals. When you measure the test pages with Auto Verifier, the results are compared with tolerance values for CMYK Color Matching in Color Verification Assistant to produce pass/fail test results.

Test results can be recorded in a report or used to generate a label. You can view the test results in Verifier. Fiery Dashboard can be configured to retrieve and display test results as well, for tracking color quality over time.

NOTE: For more information about Fiery Dashboard, see the Products section of the EFI website.

To use Auto Verifier, you must select at least one Fiery server and configure the settings for printing the test page. Test pages are sent from your computer to the Fiery server at the specified interval (elapsed time or number of impressions printed). After a test page is printed, you can run Auto Verifier to measure the test page and record the data. You may choose to wait until several pages have been printed and measure them all at the same time.

NOTE: Auto Verifier is not available in Demo mode.

Configuring automatic test pages

To print test pages automatically, you configure Fiery Color Profiler Suite preferences to specify the Auto Verifier settings:

- **Fiery server:** The test page is printed to the Fiery servers that you select.
- **Server preset or virtual printer:** The test page is printed with the job settings specified in the preset or virtual printer.
- **Print verification interval:** The test page is sent at the specified interval (number of hours or impressions).
- **Instrument:** The instrument that you will use to measure the test page.
- **Patch layout:** This setting determines the set of patches on the test page. Auto Verifier supports a number of standard control bars.

TO CONFIGURE AUTO VERIFIER

1. **In Fiery Color Profiler Suite, click Auto Verify to start Auto Verifier, and then click Preferences.**

   The Preferences windows opens to the Auto Verifier tab (under Color Verification Assistant).

2. **To add a Fiery server to the list, click the plus sign (+).**

3. **Select the server preset or virtual printer for printing the test page, specify the interval (time or number of impressions) at which to print the test page, and click OK.**

   The Fiery server that you select is added to the list. The check next to the name indicates that automatic printing of the test page is enabled.

4. **Select the measurement instrument and the patch layout.**

5. **Click the CMYK Color Matching tab to view or edit the test tolerances.**

   Tolerances determine the pass/fail criteria for the test.

6. **Click OK to save and close the Preferences window.**

   Test pages will be printed even if you close Fiery Color Profiler Suite, as long as your computer is running and can connect to the Fiery server. You can monitor the test page jobs in Command WorkStation.

Turning off automatic test pages

If the Fiery server is unavailable, you may want to turn off Auto Verifier test pages temporarily.

TO TURN OFF AUTOMATIC TEST PAGES

1. **In Fiery Color Profiler Suite, click Auto Verify to start Auto Verifier, and then click Preferences.**

   The Preferences windows opens to the Auto Verifier tab (under Color Verification Assistant).

2. **Clear the check box next to the name of the Fiery server in the list.**

3. **Click OK to save and close the Preferences window.**

Measuring test pages

In Auto Verifier, the CMYK Color Matching test checks how accurately the printed output matches the CMYK source profile. The test computes the differences between the measured color values and the values that would be expected with the selected CMYK source profile and output profile. A difference that is greater than the tolerance for the test generates a failure. Tolerance values are set in the Preferences for Fiery Color Verification Assistant.

TO MEASURE A TEST PAGE AND CALCULATE TEST RESULTS

1. **In Fiery Color Profiler Suite, click Auto Verify to start Auto Verifier.**
2. **Select the job ID in the list that matches the job ID on the color test page, and click Next.**

   NOTE: A check mark by the job ID indicates that the page has been measured previously.
3. **Follow the on-screen instructions to measure the page.**
4. **In the Measurement Results window, click Results to see the test results.**
5. **In the detailed test results, you can:**
   - Click the link to Verifier to view the test data in Verifier.
   - Print a label that contains a summary of the test results.
   - Print a report that contains the detailed test results.

FIERY COLOR VERIFICATION ASSISTANT

Like EFI Verifier, Fiery Color Verification Assistant is a color checker tool. Color Verification Assistant is designed to help you evaluate the color accuracy of a particular Fiery server printing with specific job settings. Color Verification Assistant is useful when you want to verify color on a Fiery server and do not need the full features of Verifier.

Color Verification Assistant guides you through a set of test measurements and then compares the measurements with tolerance values to produce pass/fail test results. You can adjust the tolerance values for tighter or looser test limits,

Color Verification Assistant requirements

You can start Color Verification Assistant from Fiery Command WorkStation when Color Profiler Suite is installed on the same system as Command WorkStation. You do not access Color Verification Assistant from the main window of Color Profiler Suite. Color Verification Assistant does not require Administrator or Operator privileges in Command WorkStation.

You must connect a licensed spectrophotometer to your computer to run Color Verification Assistant. Color Verification Assistant does not run in an unlicensed (Demo) mode.

Using Color Verification Assistant

To use Color Verification Assistant, you must have Command WorkStation installed on the same computer as Color Profiler Suite.

TO START COLOR VERIFICATION ASSISTANT

1. **Start Command WorkStation and connect to the Fiery server that you want to evaluate.**
2. **Select a printed or held job in Command WorkStation that has the job settings you want to evaluate.**

   Make sure to select only one job. Color Verification Assistant cannot be started if multiple jobs are selected.
3. **In the Actions menu, select Color Verification.**

   Color Verification Assistant starts in a separate window. It uses the settings of the selected job to perform its tests.

   NOTE: The Command WorkStation window is not updated while Color Verification Assistant is running. You must exit Color Verification Assistant to continue using Command WorkStation.

4 **If any message about the job is displayed, read it and click Next.**

5 **Select the tests to run.**

For more information about the tests, see the next section.

6 **Select the measurement instrument.**

7 **Click Settings, select the settings for the measurement instrument, and click OK.**

8 **Click Next to print the patch pages.**

9 **Follow the on-screen instructions to measure the patch pages.**

10 **When the test results are displayed, you can click Results next to the test name to see the detailed test results.**

11 **In the detailed test results, you can:**

- Click the link to Verifier to view the test data in Verifier.
- Print a label that contains a summary of the test results.
- Print a report that contains the detailed test results.

Color Verification Assistant tests

Color Verification Assistant performs the following tests. For a complete description of each test, see the online Help.

Test name	Description
CMYK Verification	Verifies how accurately the printed output matches the output that would be expected using the CMYK source profile
RGB Verification	Verifies how accurately the printed output matches the output that would be expected using the RGB source profile
Output Profile	Verifies how accurately the printed output matches the specified output profile
Printer Consistency	Verifies whether the printed output is repeatable
Measurement Device	Verifies whether the spectrophotometer measurements are repeatable

CMYK Verification and RGB Verification are color matching tests. They indicate whether you can expect CMYK and RGB colors to meet the tolerances you have specified.

The Output Profile, Printer Consistency, and Measurement Device tests check the foundation of the color matching tests. If one of these tests fails, the results of the color matching tests are questionable.

- Output Profile determines whether the output profile is correct for the printer, based on the actual printed output. Failure of this test might indicate that the paper or print settings are different from those used to create the output profile, or that the Fiery server needs to be calibrated.
- Printer Consistency determines whether the printer output is stable. Failure of this test might indicate that the printer is not sufficiently warmed up or that the printer requires service. Also, the tolerances that you set for this test should not be tighter than what is normal for your type of printer.
- Measurement Device determines whether the spectrophotometer measurements are consistent. Failure of this test might indicate a malfunction of the spectrophotometer.

For all tests, the tolerances you set should be realistic. You can edit the tolerance values in the Preferences window. For more information, see the online Help.

Job requirements

If the job is not already processed, Color Verification Assistant duplicates and processes the job before performing its tests.

Although you can select a PCL job and start Color Verification Assistant, Color Verification Assistant does not test PCL jobs because PCL does not support CMYK color.

IMPORTANT

If a job contains an embedded profile, the profile is not reflected in the job settings. Color Verification Assistant tests based on job settings. Tests run on a job that contains an embedded profile are therefore not relevant.

If the selected job is a mixed-media job (that is, not all of the pages of the job have the same media settings), you choose which page or a page range to use for Color Verification Assistant tests.

If the jobs settings for the source profile and output profile specify a device link profile, some print settings, including the source profile and output profile, are encapsulated in the device link profile and cannot be changed. Color Verification Assistant imports the profiles that are associated with the device link profile from the Fiery server to use in calculating expected results.

Print settings for color matching

Certain print settings in a job generally result in better color matching. If the test results in Color Verification Assistant do not indicate the degree of color matching you want, you might consider changing one of the following print settings. Remember that color matching is only one measure of quality, however, and you might choose to accept less accuracy in order to achieve other goals.

Rendering Intent (or Rendering Style): Generally, the Absolute Colorimetric rendering intent results in the best color matching for RGB or Lab colors. However, in this rendering intent, a white background color is printed with toner or ink just as other colors are, instead of allowing the color of the paper to be the background. This simulated white color might appear incorrect to the eye. If this effect is undesirable, use the Relative Colorimetric rendering intent instead.

Separate RGB/Lab to CMYK Source (or RGB Separation): Generally, matching of RGB colors is better if this option is disabled (or set to Output) because there is no additional conversion for CMYK simulation.

Paper Simulation: Generally, matching of CMYK colors is better if this option is on. However, with Paper Simulation, a white background color is printed with toner or ink just as other colors are, instead of allowing the color of the paper to be the background. This simulated white color might appear incorrect to the eye. If this effect is undesirable, turn Paper Simulation off.

NOTE: Not all Fiery servers support the Paper Simulation option. Even in these cases, the best color matching is obtained if you print to a paper with the same white point as the simulated CMYK color space.

RGB Device Link or CMYK Device Link: If the print settings specify a device link profile, most print settings, including the source profile and output profile, are encapsulated in the device link profile and cannot be changed. Specify optimal settings for Rendering Intent, Separate RGB/Lab to CMYK Source, and Paper Simulation when you create the device link profile.

For more information about creating device link profiles using Device Linker, see Fiery Device Linker.

Using EFI Verifier from Color Verification Assistant

From each of the test result summaries in Color Verification Assistant, you can start Verifier to view all the data used by Color Verification Assistant to generate the test results.

The set of tolerance values (from the Preferences window) used for the test is also transferred to Verifier as the Fiery Color Verification Assistant preset.

The two sets of colors that are compared in Verifier are called M1 and M2. The table below shows the contents of M1 and M2 for each test in Color Verification Assistant.

Test name	M1	M2
CMYK Verification	Data computed from CMYK source profile and output profile	Measurements of CMYK patches on Simulated Color Spaces page
RGB Verification	Data computed from RGB source profile and output profile	Measurements of RGB patches on Simulated Color Spaces page
Output Profile	Data extracted from output profile	Measurements of patches on Fiery Printer Color Space page
Printer Consistency	Measurements of patches on rotated page	Measurements of patches on non-rotated page
Measurement Device	First measurements of patches	Second measurements of the same patches

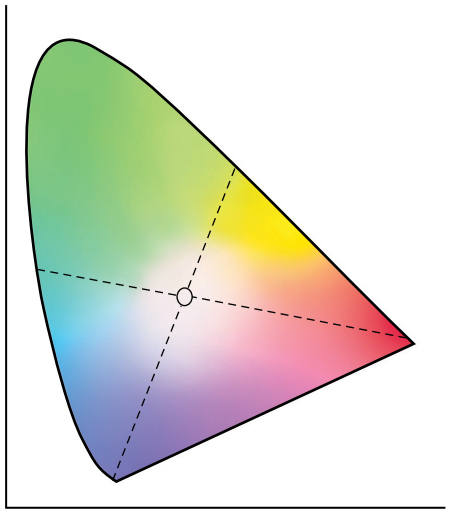
COLOR CONCEPTS

This chapter covers concepts that are basic to digital color processing, including:

- Color spaces
- Color management and color profiles
- Components of an ICC-standard color profile

Color spaces

In the 1930s, the Commission Internationale de l'Eclairage (CIE) defined a standard **color space**, a way of defining colors in mathematical terms, to help in the communication of color information. This color space, called **CIE XYZ**, is based on research on the nature of color perception. The following CIE chromaticity diagram is a two-dimensional model of color vision. The arc around the top of the horseshoe encompasses the pure, or spectral, colors from blue-violet to red. Although the CIE chromaticity diagram is not perceptually uniform, and some areas of the diagram seem to compress color differences relative to others, it is a good tool for illustrating some interesting aspects of color vision.



By mixing any two spectral colors in different proportions, we can create all the colors found on the straight line drawn between them in the diagram. It is possible to create the same gray by mixing blue-green and red light or by mixing yellow-green and blue-violet light. This is possible because of a phenomenon peculiar to color vision called **metamerism**. The eye does not distinguish individual wavelengths of light. Therefore, different combinations of spectral light can produce the same perceived color.

Purple colors, which do not exist in the spectrum of pure light, are found at the bottom of the diagram. Purples are mixtures of red and blue light—the opposite ends of the spectrum.

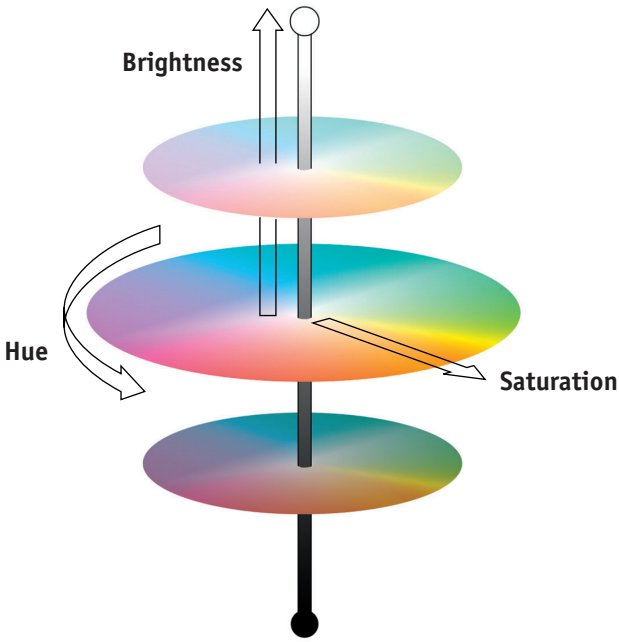
Colors in the CIE XYZ color space are not uniformly distributed. The distance between any two colors is not indicative of how close they appear visually. Another color space defined by CIE, called **CIE LAB** or Lab, attempts to distribute colors more uniformly.

Hue, saturation, and brightness

A color can be described in terms of three varying characteristics, called the **HSB** color model:

- Hue: Tint (the qualitative aspect of a color—red, green, or orange)
- Saturation: The purity of the color
- Brightness: Relative position between white and black

While the CIE chromaticity diagram illustrated earlier conveys hue and saturation, a three-dimensional color model is required to add the brightness component, as illustrated in the following figure.

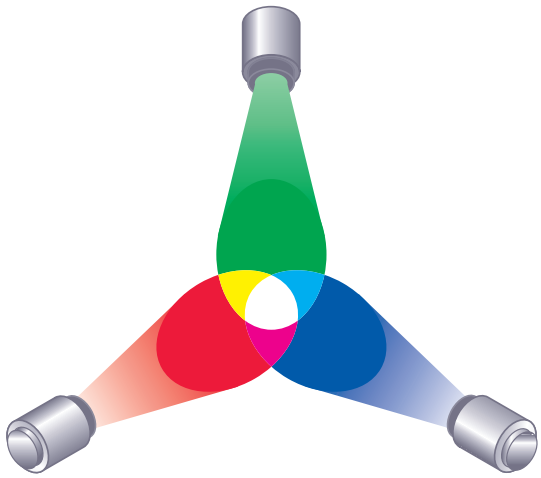


Additive and subtractive color models

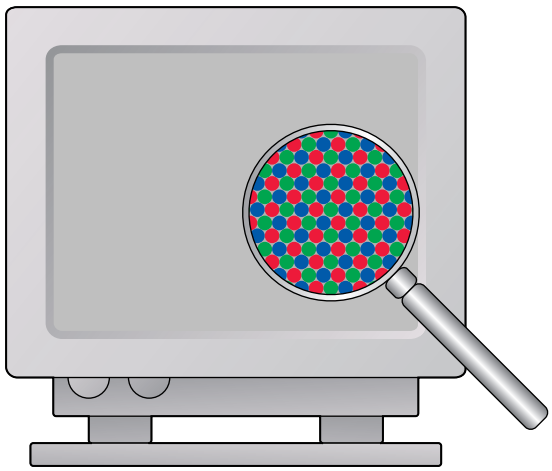
Color devices used in desktop publishing and printing simulate the range of visible colors using a set of primary colors that are combined to create other colors. Two methods are used to create a range of colors from a set of primary colors. Computer monitors and scanners are based on the **additive color model**. Printers and presses are based on the **subtractive color model**.

Additive (RGB) color

Color devices that use the additive color model create a range of colors by combining varying amounts of red, green, and blue light. These colors are called the **additive primaries** (illustrated in the following figure). White is created by adding the maximum amount of red, green, and blue light available. Black occurs wherever all three colors are absent. Grays are created by adding equal amounts of all three colors together. Combining varying amounts of any two of the additive primaries creates a third, saturated hue.



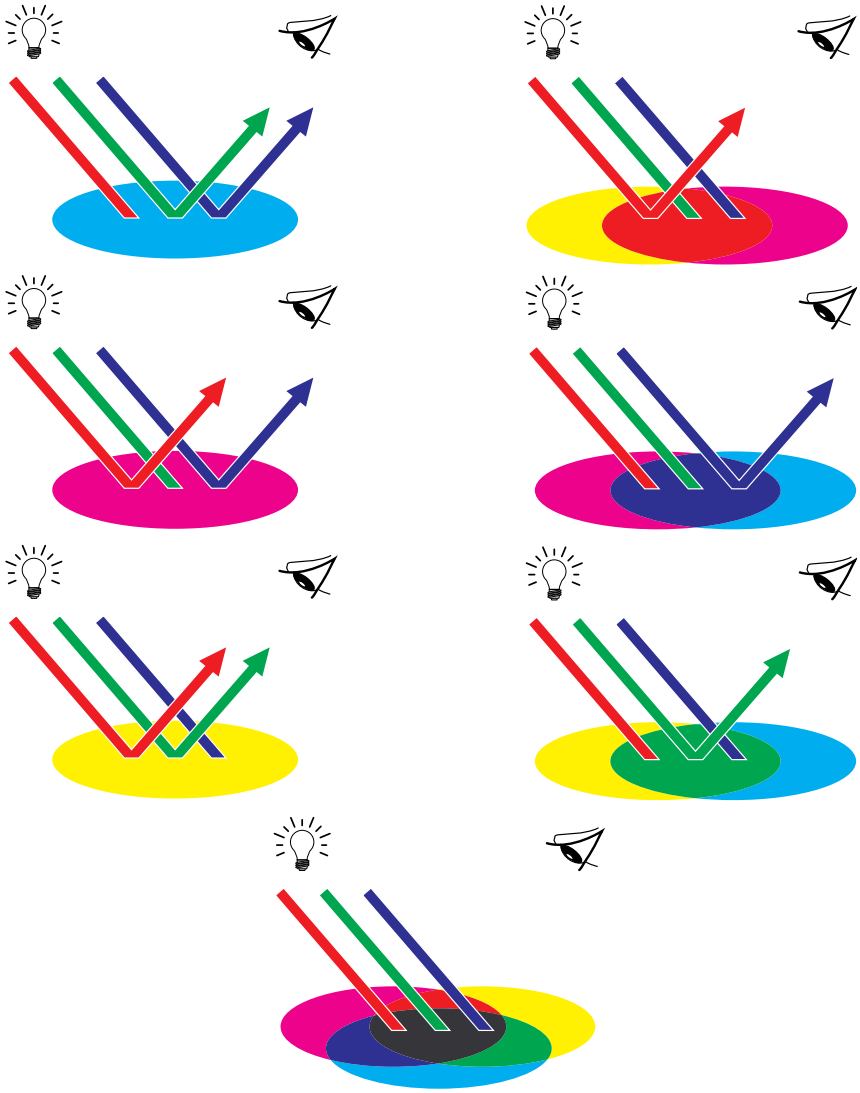
A familiar device that is based on this color model is the computer monitor, illustrated in the following figure. Monitors have red, green, and blue phosphors that emit varying amounts of light to display a given color. Scanners and digital cameras create digital representations of colors by measuring their red, green, and blue components through colored filters.



Subtractive (CMY and CMYK) color

The subtractive color model is the basis for color printing, color photographic prints, and transparencies. While the additive color model simulates the visible spectrum of color by adding light of three primary hues, the subtractive color model starts with a "white" or neutral light source containing light of many wavelengths. Inks, toners, or other colorants are used to selectively absorb (subtract) certain wavelengths of light that otherwise would be reflected or transmitted by the media in use.

The **subtractive primaries** are cyan, magenta, and yellow; they absorb red, green, and blue light, respectively (as illustrated in the following figure). Combining any two subtractive primaries creates a new color that is relatively pure or saturated. For example, you can make red by combining magenta and yellow, which absorb green and blue light, respectively. White occurs when no colorant is applied. In theory, combining all three subtractive primaries yields black, but due to deficiencies of cyan, magenta, and yellow colorants, combining these three primaries actually yields a muddy brown. Black colorant is added to compensate for the deficiencies of cyan, magenta, and yellow colorants. Consequently, color printing uses four **process colors**: Cyan, Magenta, Yellow, and blacK (**CMYK**). The use of black toner or ink produces rich, solid blacks and allows for improved rendering of black text.



In a subtractive color model, some colors are absorbed and others are reflected. The reflected color is what we see.

Using color spaces

You can define colors in several different color models, most commonly RGB, CMYK, and a spot color matching system (such as PANTONE). Depending on the application you use, you may or may not have a choice of the color model.

RGB colors are used when you take output from an RGB device such as a digital camera or a scanner. Another use of the RGB color model is for displaying colors on a monitor.

CMYK colors are used on most printers.

A **spot color** defined by a spot color matching system such as PANTONE is printed using special inks manufactured to run on an offset printing press. Most spot colors can be simulated on a printer or press using CMYK inks or toners, but in many cases, the match is not exact.

The color model used by a particular application determines the methods available for choosing colors in an image, as well as the way color data is stored in the image file:

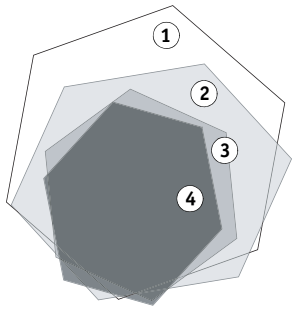
- Office applications, such as presentation, spreadsheet, and word processing programs, use the RGB color model. They typically store only RGB data in an image file.
- Illustration applications use RGB and CMYK color models, but typically store only CMYK data in an image file.
- Pixel-editing applications use RGB and CMYK color models, and can store RGB or CMYK data.

Color management and color profiles

An application that outputs color images "translates" the image from the **color space** of a source device (for example, a monitor or a scanner) to the color space of a destination device (for example, a printer). It compares the color space in which an image was created to the color space in which the image is to be reproduced, and modifies the color data in the image appropriately.

Different color reproduction technologies produce different ranges of color, called **gamuts**. Color transparency films have comparatively large gamuts, as do color monitors. The color gamut that can be reproduced using process inks or CMYK toners on paper is smaller. This is why some colors that can be displayed on a color monitor, especially bright saturated colors, cannot be reproduced exactly by your printer, nor can they be reproduced on a press using **process colors**. Moreover, different printing devices have different gamuts. Some colors a digital printer can produce cannot be reproduced on an offset press, and vice versa. The following figure illustrates this concept of differing gamuts.

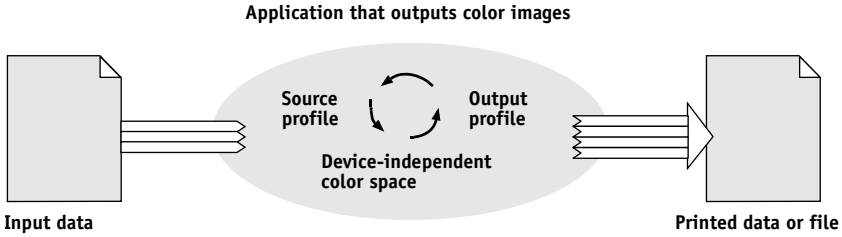
1 Color transparency film
2 RGB monitor
3 Offset press
4 Other print device



When printed, colors that fall outside the printer gamut are "mapped" to printable colors. This process, referred to as **gamut mapping**, takes place when color data is converted or adjusted to meet the gamut requirements of a printer.

To convert the color data of an image to be reproduced, an application needs information about the source color space used to create the image and the **gamut** of the output device. This information is provided through color **profiles**. The **source profile** defines the color space of the device that is used to create the image. The **output profile** defines the gamut of the output device. The application interprets color data according to the source profile and adjusts the data according to the output profile. The end product is a printed image in the gamut of a particular output device.

The conversion is a two-step process. The application uses the source profile to convert color data in the image from the source device color space to a device-independent color space called the **Profile Connection Space** (PCS). The application then uses the output profile to convert the color data from the PCS to the output device color space.



ICC profiles

The International Color Consortium (ICC) defines a standard format for color profiles. Windows and Mac OS support the ICC standard. Profiles created and modified using Color Profiler Suite conform to the ICC standard.

Each profile has a class (such as Input, Output, or Display) and a space (such as **RGB** or **CMYK**) that describe the profile's device. The **Profile Connection Space** (PCS) of a profile is either **CIE LAB** or **CIE XYZ**, which are device-independent color spaces based on mathematical models of the spectrum of visible colors. A profile also has a descriptor, or internal profile name, which is a text string used to identify the profile in applications such as Adobe Photoshop.

Rendering intent

A profile describes four styles of **gamut mapping** called **rendering intents**. When colors in the source color space that are not in the gamut of the output device are replaced with in-gamut colors, it is not possible to completely maintain an exact match to individual colors and the relationships between colors at the same time. A rendering intent is a particular style of gamut mapping that attempts to optimize a certain quality of the output, at the expense of others. The **Perceptual** rendering intent preserves tonal relationships, which results in better reproduction of photographic images. The **Saturation** rendering intent produces more saturated colors overall. The **Absolute Colorimetric** and **Relative Colorimetric** rendering intents both attempt to preserve color accuracy. The Absolute Colorimetric rendering intent also preserves the **whitepoint** (background white color).

Nodes

For each rendering intent, a profile contains a set of data points that are used in calculating the conversions of color data between the device color space and the PCS of the profile. The data points are called **nodes**. Nodes are derived from color measurements spaced across the entire color space and allow the many colors to be represented by a relatively small set of data. When you edit a profile using Profile Editor, you alter the values of one or more nodes.

PCS-to-device and device-to-PCS conversions

An ICC profile includes data for converting from **device-dependent colors** (RGB or CMYK) to **device-independent colors** (the PCS of the profile) as well as for performing the reverse conversion, from a device-independent color space to a device-dependent color space. Internally, the device-to-PCS data are referenced as "A-to-B" data, while the PCS-to-device data are referenced as "B-to-A" data. The data might be organized as a lookup table, depending on the profile's device. Profiles created using Printer Profiler contain lookup tables for data conversion.

Device link profiles

A **device link profile** is a special type of profile that specifies the source profile and output profile used to print a job. Device Linker allows you to create a device link profile by combining existing profiles. For more information, see Fiery Device Linker.

Named color profiles

A **named color profile** is a special type of profile that contains a list of **spot colors**, each identified by name, and their locations in **CIE LAB** space. This type of profile is not associated with any device.

GLOSSARY

A

Absolute Colorimetric

A color **rendering intent** that is similar to **Relative Colorimetric**, but provides no **whitepoint** transformation between the source and destination whitepoints. Whites in an image will be reproduced as printed color rather than left as the paper white, simulating the paper color of the final destination. Often used for situations when exact colors are needed, such as proofing.

additive color model

A system in which colors are produced by combining red, green, and blue light (the **additive primaries**). An **RGB** monitor is based on an additive color model.

additive primaries

Red, green, and blue light used in an **additive color model**. When blended together in proper amounts, these colors of light produce white.

B

black controls

Color management settings that determine how the color black is handled when input color is converted to output color and how the black (K) component of the output is used.

blackpoint compensation

A technique that can be applied to an image when processing the image with a particular output profile. The lightness of all colors in the image is scaled to fit the range of lightness in the output profile, rather than clipped. This technique preserves black transitions, such as shadows.

C

calibration

The process of adjusting the basic setting of a monitor, printer, or other device to standard, repeatable values in order to ensure uniform and consistent results over time. Calibration helps assure predictable and consistent printing results.

calibration goal

Also referred to as calibration target. A set of values that describe the expected density response of a printer. A calibration goal is included in the output profile of a Fiery-driven printer. When the Fiery server is calibrated, the actual density response of the printer is

measured. By comparing the actual response of the printer with the calibration goal, the Fiery server can adjust the color data of a print job to achieve color output that matches the calibration goal.

calibration setting

A specific set of printing conditions that can affect color output, such as media type and halftone (screen). A calibration setting is associated with a Fiery **output profile** and calibration data. The calibration data are compared to the **calibration goal** to determine how to adjust the color data of the print job so that the output matches the calibration goal.

channel

A component of an image containing information about one color used in the image model. A grayscale image has one channel (Black). A CMYK image has four channels (Cyan, Magenta, Yellow, and Black).

CIE

The International Commission on Illumination, abbreviated as CIE from its French title (Commission Internationale de l'Eclairage), is an organization devoted to international cooperation and exchange of information among its member countries on all matters relating to the science and art of lighting. The CIE developed mathematical models to quantify light sources, objects, and observers as a function of wavelength, which led to the development of a basic color space for plotting colors independent of any device.

CIE LAB

Also referred to as L*a*b* and Lab. A uniform device-independent color space in which colors are located within a three-dimensional rectangular coordinate system. The three dimensions are lightness (L), redness/greenness (a) and yellowness/blueness (b). If the a and b coordinates are both zero, the color is a neutral color.

CIE XYZ

Also referred to as CIE 1931 color space. A device-independent color space developed by the CIE, based on experiments with human sight. The X, Y, and Z coordinates correspond roughly to red, green, and blue.

CMYK

A **subtractive color model** that uses cyan, magenta, yellow, and black (**process colors**), and is used in color printing.

color management system (CMS)

System used to match color across different input, display, and output devices.

color model

See **color space**.

color space

A model for representing color in terms of measurable values, such as the amount of red, green, and blue in an image. RGB and CMYK color spaces correspond to color devices (for example, monitors and printers, respectively). Other color spaces, such as CIE LAB, are based on mathematical models and are device-independent (that is, not based on the color response of a particular device). See also gamut.

D

Delta E

Also called ΔE. The numerical difference between any two colors in a color space. Depending on the color space and the method used to calculate Delta E, the same Delta E value does not always represent the same degree of visual difference.

Demo mode

Color Profiler Suite runs in Demo mode when the spectrophotometer is not present or the license is not activated. In Demo mode, all functions work normally, except that in Device Linker and Print Matcher, you cannot save a profile, and in Printer Profiler and Profile Editor, you can save a profile only in a locked format (.xcc). Monitor Profiler, Verifier, Auto Verifier, and Color Verification Assistant are not available at all in Demo mode.

Locked profiles can be used only in Color Profiler Suite on this computer and can be unlocked (converted to standard ICC profile format) only by a licensed version of Color Profiler Suite on this computer.

destination profile

A profile used by a color management system (CMS) to determine the characteristics of a destination device (such as a printer) for reproducing a color image.

device-dependent colors

Colors directly related to their representation on an output device. Color values map directly or via simple conversions to the application of device colorants, such as quantities of ink or intensities of display phosphors. Device-dependent colors are controlled precisely for a particular device, but the results may not be consistent between different devices. Examples of device-dependent color spaces are RGB and CMYK.

device-independent colors

Colors described using a model based on human visual perception instead of being device-specific. Examples of device-independent colors spaces are CIE LAB and CIE XYZ.

device link profile

A single color profile that specifies both the source profile and output profile to be used in printing a job. Device link profiles can simplify printing workflows and eliminate errors caused by selecting the wrong profile combination.

E

embedded profile

A source profile contained in an image file that is intended to describe the color characteristics of the source of the image when it is displayed or printed.

EFI ES-2000

The EFI **spectrophotometer** used in conjunction with Color Profiler Suite.

F

flatten

When a profile is flattened as it is saved, edits made in Profile Editor are incorporated into the profile. Flattening a profile removes the edit list, which is stored in a private tag, from the profile.

G

gamma

Gamma refers to the encoding of the **luminance** value to compensate for the nonlinearity in human vision, in order to achieve the best image quality for a given bandwidth. Gamma is the relationship of the encoded luminance to the desired output luminance.

gamut

A range of colors. A device gamut is the range of colors that a device can produce. The gamut of an image is the range of colors in a particular image.

gamut mapping

The conversion of color coordinates from one device's gamut to another, usually accomplished with algorithms or look-up tables.

GCR

See **gray component replacement (GCR)**.

global color edit

An edit in Profile Editor that affects all colors in a profile.

GRACoL

The abbreviation for General Requirements for Applications in Commercial Offset Lithography. A standard of specifications for the commercial offset printing industry.

gradient

A smooth transition between two different colors or two shades of a color.

gray component replacement (GCR)

A method for improving wet ink trapping and reducing ink costs in process color printing. In shadow, midtone, and quarter-tone areas where all three process colors (C, M, Y) combine to produce gray, the gray component of those colors is reduced and replaced by black.

H

HLC

A **color space** in which each color is represented by its **hue**, lightness, and chroma components. Chroma is similar to saturation. Also known as HLS (hue, lightness, and saturation).

HSB

A **color space** where each color is represented by its **hue**, saturation, and brightness components. Also known as HSV (hue, saturation, and value).

hue

A gradation of colors with one dominant tendency (red, for example). In the three-dimensional view of the **CIE LAB** and **CIE XYZ** color spaces, a hue is represented by a vertical plane at a particular angle of rotation around the central axis.

I

ICC

Acronym for International Color Consortium. The ICC was established in 1993 by eight industry vendors for the purpose of creating, promoting and encouraging the standardization and evolution of an open, vendor-neutral, cross-platform color management system architecture and components. The outcome of this cooperation was the development of the ICC profile specification.

ICC profile

An industry standard color **profile** format developed by the International Color Consortium (ICC) that describes the color capabilities, including the gamut, of a color device based on the differences between an ideal and the current device. ICC profiles are implemented on Mac OS computers in ColorSync and on Windows computers in Image Color Matching (ICM).

in-gamut

A color contained within the **gamut** of a device is said to be in-gamut.

internal profile name

See **profile descriptor**.

IT8

Standards for color patch layouts or patterns designed for a specific color measurement purpose. For example, IT8.7/3 is a standard patch layout for characterizing 4-color process printing.

L

Lab

See **CIE LAB**.

luminance

Luminance describes the brightness of a monitor in candelas per square meter (cd/m^2). Common luminance values range from 50 to 300.

M

media whitepoint

See **whitepoint**.

metamerism

Phenomenon in which two colors composed of different combinations of light wavelengths appear identical under a specific light source, but may look different under other light sources. The colors are called "metamers."

N

named color

See **spot color**.

named color profile

A color profile that contains a set of individual colors, each identified by name, and their locations in **CIE LAB** space.

neutral axis

In the **CIE LAB** and **CIE XYZ** color spaces, the central vertical axis that represents colors with no **hue** and no saturation, ranging from black to white.

node

One point in a set of data points contained in a color **profile**. The set of data points constitutes a look-up table for converting color data between the device color space and the **Profile Connection Space** of the profile. Nodes are derived from color measurements spaced across the entire color space and allow the many colors to be represented by a relatively small set of data.

O

output curve

A two-dimensional graph of input vs. output for each color component in a CMYK device. Together, these output curves describe the color response of the device.

output profile

A profile that describes the color characteristics of a printer. The output profile can be associated with a calibration goal that defines the expected density response of the print device.

P

patch ID

The unique tracking number that Printer Profiler assigns to each patch page it creates. The patch ID is printed on each patch page. All profile information that you selected to print the patch page is associated with the patch ID.

patch page

A printed page containing an array of swatches whose color can be measured using a spectrophotometer.

PCS

See Profile Connection Space.

Perceptual

A color rendering intent that preserves tonal relationships in images for perceptually pleasing color. Often used for photographs, including scans and images from stock photography CDs and digital camera images. Typically results in less saturated output than Saturation rendering when printing out-of-gamut colors.

Photographic

The EFI implementation of the Perceptual rendering intent. The selection Perceptual (Photographic) selects the Photographic rendering intent for an EFI-supplied profile or the Perceptual rendering intent for other profiles.

pixel

The smallest distinct element of a raster image. The term is a combination of the words "picture" and "element."

Presentation

The EFI implementation of the Saturation rendering intent. The selection Saturation (Presentation) selects the Presentation rendering intent for an EFI-supplied profile or the Saturation rendering intent for other profiles.

process colors

The colors used to simulate full-spectrum color images on a four-color printer: Cyan, Magenta, Yellow, blacK (CMYK).

profile

A description in a standard format of the color characteristics of a particular device at the time the profile was made. By identifying a valid source profile and a valid output profile, you initiate the appropriate workflow to maintain consistent color values. See also **ICC profile**.

Profile Connection Space

The device-independent color space inside a color profile. The Profile Connection Space can be based on either the **CIE LAB** or **CIE XYZ** color model.

profile cross section

A two-dimensional slice through a three-dimensional color space (**CIE LAB** or **CIE XYZ**) of a profile. A horizontal slice represents all colors of a particular lightness. A vertical slice represents all colors of a particular pair of hues, each radiating from the central axis.

profile descriptor

Also called the internal profile name. The name that is displayed in an application to represent the profile. For example, if a software program, such as Adobe Photoshop, allows the user to select from a list of profiles, the list displays the profile descriptors of the available profiles.

R

reference image

In Profile Editor, an image that shows the effects of editing a profile. The reference image can be any **CMYK** or **RGB** image in JPEG or TIFF (8-bit or 16-bit) file format.

Relative Colorimetric

A color **rendering intent** that attempts to provide an exact color match between source and destination. Out-of-gamut colors are mapped to the nearest in-gamut color. Provides **whitepoint** transformation between the source and destination whitepoints. For example, the bluish white color (gray) of a monitor is replaced by paper white. Often used when color matching is important (for example, logo color), even at the expense of tonal relationships.

Use Relative Colorimetric rather than **Absolute Colorimetric** intent if you prefer white colors in an image to print as paper white.

rendering intent

The style of color rendering, or **gamut mapping**, designed for a particular type of color job. There are many ways of mapping colors, each of which can have significantly different effects on the output. The ICC specification defines several ways of mapping colors, called rendering intents. When you print using a profile, some applications allow you to select the rendering intent that is most appropriate for the images you are printing.

An example of a rendering intent is **Perceptual** rendering, which is designed for photographic images.

RGB

An **additive color model** that makes a range of colors by combining red, green, and blue light, called the **additive primaries**. Commonly used to refer to the color space, mixing system, or monitor in color computer graphics.

S

Saturation

A color **rendering intent** that creates saturated colors but does not match printed colors precisely to displayed colors. Often used for charts and graphs in presentations. Works well for in-gamut colors in images as well as out-of-gamut colors in presentation graphics.

simulation profile

A profile that describes the color characteristics of a print device, such as a printing press, that you want another print device to simulate.

source profile

A profile used by a **color management system (CMS)** to determine the color characteristics of a device used to create a digital image.

spectrophotometer

An instrument commonly used in the graphic arts industry to measure spectral data according to a specified standard. Sometimes referred to as a spectrometer.

spot color

Also referred to as a named color. A color that is printed on its own plate when separations are specified. A spot color is printed using a custom ink for that color, in contrast to process colors, which are printed using combinations of cyan, magenta, yellow, and black.

substrate

The material upon which a job is printed.

subtractive color model

A system in which color is produced by combining colorants such as paint, inks, or dyes on media such as paper, acetate, or transparent film. All printing devices use the subtractive color model.

subtractive primaries

Cyan, magenta, and yellow colorants used in subtractive color systems for color printing. Combining the subtractive primaries produces darker colors. Black is added to the subtractive primaries to compensate for deficiencies of the toners or inks, and for more efficient black printing.

SWOP

The abbreviation for Specifications for Web Offset Publications. A standard of specifications for separations, proofs, and color printing on a web offset press (*not* a sheet-fed press).

U

undercolor removal (UCR)

A method for improving wet ink trapping and reducing ink costs in process color printing. In shadow areas where all three process colors (C, M, Y) combine to produce gray, the gray component of those colors is reduced and replaced by black.

V

vector graphic

Graphic illustration created on computers where picture objects are defined mathematically as lines or curves between points. These mathematical definitions are interpreted by an image language such as PostScript. Vector images include artwork created with illustration applications (such as Adobe Illustrator or Adobe FreeHand) and page layout applications (such as Adobe InDesign or QuarkXPress).

W

whitepoint

The color temperature of any white light source, typically expressed in Kelvins (for example, 6500 K, typical for the white of a properly calibrated and profiled monitor).

X

XYZ

See CIE XYZ.

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