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# Understanding color management

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A color management system reconciles color differences among devices so that you can confidently predict the colors your system ultimately produces. Viewing color accurately allows you to make sound color decisions throughout your workflow, from digital capture through final output. Color management also allows you to create output based on ISO, SWOP, and Japan Color print production standards.

## Why colors sometimes don't match

No device in a publishing system is capable of reproducing the full range of colors viewable to the human eye. Each device operates within a specific color space that can produce a certain range, or gamut, of colors.

A color model determines the relationship between values, and the color space defines the absolute meaning of those values as colors. Some color models (such as CIE L\*a\*b) have a fixed color space because they relate directly to the way humans perceive color. These models are described as being device-independent. Other color models (RGB, HSL, HSB, CMYK, and so forth) can have many different color spaces. Because these models vary with each associated color space or device, they are described as being device-dependent.

Because of these varying color spaces, colors can shift in appearance as you transfer documents between different devices. Color variations can result from differences in image sources; the way software applications define color; print media (newsprint paper reproduces a smaller gamut than magazine-quality paper); and other natural variations, such as manufacturing differences in monitors or monitor age.

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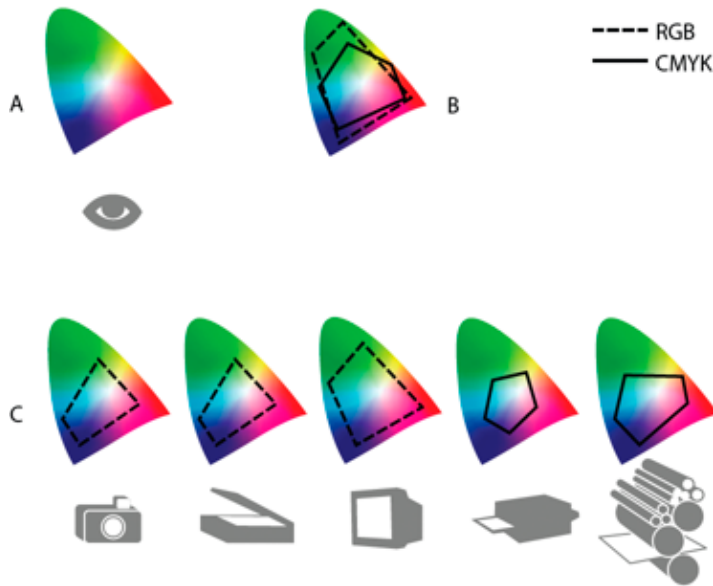
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Applies to: **Photoshop**

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*Color gamuts of various devices and documents*

**A.** Lab color space **B.** Documents (working space) **C.** Devices

## What is a color management system?

Color-matching problems result from various devices and software using different color spaces. One solution is to have a system that interprets and translates color accurately between devices. A color management system (CMS) compares the color space in which a color was created to the color space in which the same color will be output, and makes the necessary adjustments to represent the color as consistently as possible among different devices.

A color management system translates colors with the help of color profiles. A profile is a mathematical description of a device's color space. For example, a scanner profile tells a color management system how your scanner "sees" colors. Adobe color management uses ICC profiles, a format defined by the International Color Consortium (ICC) as a cross-platform standard.

Because no single color-translation method is ideal for all types of graphics, a color management system provides a choice of rendering intents, or translation methods, so that you can apply a method appropriate to a particular graphics element. For example, a color translation method that preserves correct relationships among colors in a wildlife photograph may alter the colors in a logo containing flat tints of color.

**Note:**

Don't confuse color management with color correction. A color management system won't correct an image that was saved with tonal or color balance problems. It provides an environment where you can evaluate images reliably in the context of your final output.

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## Do you need color management?

Without a color management system, your color specifications are device-dependent. You might not need color management if your production process is tightly controlled for one medium only. For example, you or your print service provider can tailor CMYK images and specify color values for a known, specific set of printing conditions. The value of color management increases when you have more variables in your production process. Color management is recommended if you anticipate reusing color graphics for print and online media, using various kinds of devices within a single medium (such as different printing presses), or if you manage multiple workstations.

You will benefit from a color management system if you need to accomplish any of the following:

- Get predictable and consistent color output on multiple output devices including color separations, your desktop

printer, and your monitor. Color management is especially useful for adjusting color for devices with a relatively limited gamut, such as a four-color process printing press.

- Accurately soft-proof (preview) a color document on your monitor by making it simulate a specific output device. (Soft-proofing is subject to the limitations of monitor display, and other factors such as room lighting conditions.)
- Accurately evaluate and consistently incorporate color graphics from many different sources if they also use color management, and even in some cases if they don't.
- Send color documents to different output devices and media without having to manually adjust colors in documents or original graphics. This is valuable when creating images that will eventually be used both in print and online.
- Print color correctly to an unknown color output device; for example, you could store a document online for consistently reproducible on-demand color printing anywhere in the world.

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## Creating a viewing environment for color management

Your work environment influences how you see color on your monitor and on printed output. For best results, control the colors and light in your work environment by doing the following:

- View your documents in an environment that provides a consistent light level and color temperature. For example, the color characteristics of sunlight change throughout the day and alter the way colors appear on your screen, so keep shades closed or work in a windowless room. To eliminate the blue-green cast from

fluorescent lighting, you can install D50 (5000° Kelvin) lighting. You can also view printed documents using a D50 lightbox.

- View your document in a room with neutral-colored walls and ceiling. A room's color can affect the perception of both monitor color and printed color. The best color for a viewing room is neutral gray. Also, the color of your clothing reflecting off the glass of your monitor may affect the appearance of colors on-screen.
- Remove colorful background patterns on your monitor desktop. Busy or bright patterns surrounding a document interfere with accurate color perception. Set your desktop to display neutral grays only.
- View document proofs in the real-world conditions under which your audience will see the final piece. For example, you might want to see how a housewares catalog looks under the incandescent light bulbs used in homes, or view an office furniture catalog under the fluorescent lighting used in offices. However, always make final color judgements under the lighting conditions specified by the legal requirements for contract proofs in your country.



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