



## Color Management Overview

Color management is a double-edged sword. When used properly, it can help you achieve pleasing and consistent color throughout your workflow, but it can also leave the door open for problems that make color worse instead of better. Color management is inherently complex, and gaining the benefits while avoiding the complexity can be challenging.

Corel® Paint Shop Pro® X has implemented a careful balance between complexity and power, providing the benefits of color management without the pitfalls. Although default settings have been used to accommodate less technical users, advanced users can configure color management by changing the settings to suit their taste.

This document provides insight into six topics in which color management plays a role. By understanding these six topics, advanced users can make the most of the new Paint Shop Pro color management features.

### Working Color Spaces

Imagine displaying a particular RGB (Red Green Blue) image on two computers located side by side on a desk. The image on the left looks brighter than the image on the right. Which one is correct — left, right, or neither? This question cannot be answered because there is no definition of correctness or no standard against which to make a judgment.

This ambiguity can be resolved by introducing the concept of a color reference standard. A color reference standard gives unambiguous visual meaning to an image's pixel values. It also allows the possibility of objectively answering the previous question of correctness.

The **File ▶ Color Management ▶ Color Working Space** command opens the Color Working Space dialog box that lets you set a color reference standard by selecting a preset color working space. By default, Paint Shop Pro X is configured to use the sRGB color space. This is the default for many devices, such as monitors and printers, making it the recommended choice for most users. However, you can select other working spaces to meet special needs.

For example, many photographers prefer to use specialized working spaces such as *AdobeRGB*, *BetaRGB*, or *eciRGB*. These working spaces support wider gamuts (range of colors) and provide less compression of saturated colors in the photo at the expense of a less vibrant appearance on non-color-managed monitors. Before you select a different working space, run a test to make sure that it works well with your printer or photo lab.

### Monitor Calibration

Once you have associated a color working space with the RGB pixels of an image, you have unambiguously defined the intended colors in the image. But are these intended colors what you actually see on the monitor? Probably not, unless the characteristics of the monitor are also taken into account. The behavior of the monitor is described by the monitor profile, and this profile, along with the color working space, allows the proper display of color.

Where do monitor profiles come from? Some users may have invested in specialized calibration hardware and software that use a color measurement instrument to create the profile. This

method of creating a monitor profile is the most accurate, but it can cost several hundreds of dollars.

Since the option of creating a monitor profile with calibration equipment is out of reach for most users, Paint Shop Pro X offers an excellent alternative. The **File ▶ Color Management ▶ Monitor Calibration** command can create a profile for your monitor with a simple, step-by-step wizard. This tool now includes several mid-tone calibration steps, making it the first of its kind to effectively calibrate both LCD and CRT screens.

Surprisingly, monitor profiles also help improve your print quality. With a profiled monitor, you are better able to make meaningful color judgments and adjustments. The first thing that all Paint Shop Pro X users should do is calibrate their monitor!

## Profile Embedding

Given that the colors in a photo have meaning only with respect to the color working space used to edit it, it is important that the association between these two components be preserved. You can accomplish this when saving a file by including (or embedding) the color working space definition in the image file's header. Subsequently, when the file is opened on a different computer, the proper interpretation of the pixel colors is preserved. This embedding capability is available only for TIFF, JPEG, and PSP image formats.

If you open an image with Paint Shop Pro X that includes an embedded color profile, it is compared with your current working space. If the two are different, you are asked if you want to convert the pixel colors to your working space or to leave them as they are. For most users, conversion is recommended.

## Color Adjustments

The use of a color working space gives visual meaning to the pixel values of the image. Many Paint Shop Pro adjustment commands have been improved on the basis of how the colors appear to the human eye. Rather than blindly operating on the pixel numbers themselves, the adjustments are based on the actual visual appearance of the pixel values.

## CMYK Support

By default, Paint Shop Pro uses the RGB color space commonly used in photography and on the Web, but you can also choose to open and save images with the CMYK (Cyan Magenta Yellow black) color space used by commercial printers. These color conversions are controlled by industry-standard ICC profiles, which allow for professional-quality separations.

The **File ▶ Color Management ▶ Color Working Space** command lets you select a CMYK profile from the CMYK Profile drop-list in the Color Working Space dialog box. The CMYK Profile drop-list displays all installed CMYK profiles. Paint Shop Pro includes two Kodak® proofing profiles: one designed for North American standards (*Kodak SWOP Proofer CMYK-Coated.icm*) and one for European standards (*European Print Medium GCR 320 UCR.icm*). Alternatively, you can install a custom CMYK profile provided by your printer or separation service bureau by right-clicking the file in Windows® Explorer and selecting Install Profile.

## 16-Bit Images

By supporting images that contain 16 bits per channel, Paint Shop Pro X allows much greater color precision. While 8-bit RGB photos use 256 shades per color, 16-bit RGB photos allow thousands of shades. This wider range of colors is especially important for photographers who use the Camera Raw option offered by many digital cameras, which stores photos at higher bit depths. Unlike programs that offer a limited implementation of 16-bit support (32,769 levels per channel), Paint Shop Pro X provides the full 16-bit range (65,536 levels per channel).

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