

## Advanced Color Management

Have you ever scanned a slide into your computer, then looked at it on the monitor and printed it and noticed that the color of all three images is different? That is exactly what happens without Color Management and Color Profiling systems.

Adobe has rewritten the Color Management System in PhotoShop 6.0. It is a major advance over the Color Management system in earlier versions. In my opinion it is the major reason to upgrade to Version 6.0. When you combine this feature with other manufacturers Color Profiling Systems you have the solution for obtaining consistent color on your devices. I use a Monaco Systems Color Profiling System called EZcolor and have found it to be very accurate and easy to use. (Sometimes it involves a little work to set it up but the results are well worth the effort.)

The concept is easy to understand. Each device displays color differently simply because it is a different device. Even two of the same model of a device will display color differently due to manufacturing tolerances. Have you ever walked into an appliance store and seen a wall of different TVs all tuned to the same channel and noticed the difference in color? That is what is happening in your computer.

Color Profiling Systems will calibrate each device to normalize its color to be true and accurate.

The first thing you need to profile is your monitor. There are two ways to do this. One a visual method and one that uses a device, called a Colorimeter, that measures the colors displayed on the monitor. In using the Colorimeter method, software sends various known shades of red, green, blue and grays to the monitor and the Colorimeter reads the color from the monitor (the Colorimeter is suctioned cupped to the monitor during this process). The software then knowing the color hues that it sent to the monitor compares them against the color hues that the Colorimeter read and generates a Color Profile curve to correct the colors to true values. This Monitor Color Profile is then installed in your Operating System (Windows etc.) and whenever colors are sent to the video card the Color Profile is applied first to true up the colors. This operation requires a video card that supports Color Lookup Tables. If you want to find out if your video card supports Color Lookup Tables you can call the manufacturer. I however have found them to be clueless. I have found the best way is to watch the monitor when the system boots up. If the monitor colors change when the Color Profile is loaded your video card supports Color Lookup Tables. If not you need to buy a new video card and believe me the expenditure is worth it.

You then need to generate a Color Profile for your input devices such as film and flat bed scanners. In order to generate these profiles you need what is called a target. The target is nothing more than an accurate color chart designed to fit each device. For a slide scanner it is a slide and for a flatbed scanner it is a Reflective color chart. The flatbed scanner target comes bundled in the basic EZcolor package but you will have to purchase a target slide. You can purchase that target slide from Monaco and is built for Kodak Ektachrome film. (I have not been able to find target slides for other films.) The color profile generation is fairly simple. You put the target with its known colors into the device, perform a scan, and then the EZcolor software knowing the true colors on the target slide builds a color profile for that device. The Color Profile is saved and then used by PhotoShop as described below.

The next set of devices to be profiled are the output devices that you use, such as a printer. The printer Color Profile is generated not only for the printer but for each different paper type used. The operation to generate the Color Profile is fairly simple. You print a copy of the Reflective target on your printer equipped with the paper you are profiling and then scan that print using your Color Profiled flat bed scanner. The software knowing what color hues are on the Reflective target compares the scanned copy of the print to the colors that it knows should be there. It then generates a Color Profile to establish true colors. The Color Profile for that printer/paper combination is saved for future use when printing.

Now for the use of the generated Color Profiles.

The monitor profile installation was described above and is installed in your Operating System and video card.

When an image is scanned into PhotoShop the best way to use the scanner Color Profile is to Assign the Color Profile to the image through the Image/Mode/Assign Profile pull-down menu. By Assigning the profile rather than Converting to a Profile, PhotoShop will simply imbed the Profile into the image using it to adjust the colors. This will leave the scanned pixels with the colors as your scanner saw them. If you ever need to change the profile you can. If you converted the pixels through the Image /Mode/Convert to Profile pull-down menu the original color values of the scanned pixels are lost. (In handling any type of data it is always better to preserve the original data and simply change the view of it.) Once you Assign the Profile you will generally see a significant color shift on the monitor and at this point the image on the monitor should be very close to the original slide. You may have to adjust the contrast/brightness since the Color Profile does not adjust those values. You will always see some color differences because different media cannot display all the possible color variations. They all have different color characteristics but you will be MUCH closer than without Color Management and Color Profiling.

The next use of Color Profiles comes when you print an image. The Printer Driver software has the capability to allow you to select the correct Color Profile for the printer/paper combination you are using. The Printer Driver then uses the Color Profile to adjust the colors in the image sent to the printer so that they are printed accurately. There is no need to Convert to the Printer Profile through the use of the Image/Mode/Convert to Profile pull-down menu. The use of the Color Profile by the Print Driver saves you from permanently converting the pixel images to account for a particular device and paper. This way if you are going to print different copies on different printer/paper combinations you always have the original pixels in your image.

If you use a commercial lab to generate slides or negatives from your digital files there is no current method that I know of to generate a Color Profile for their film recorder. The film recorder is a device that converts the digital file to an image and then takes a film picture of the image. The film is then processed into a slide or negative. I have found that by running some simple tests with your lab you can find the correct Color Model to use for that lab. This is the one case you are forced to Convert to a Profile and change the original pixels. Before you do this save the original image and then convert it so that you can always get back to the original pixels. I have found that with the Imagers lab that I use the best color match is obtained by using the Color Match RGB Profile built into PhotoShop.

The last issue is the Color Model to use as your working Color Space in PhotoShop. The best one I have found is Adobe RGB (1998). You can set that as your default color working space through the Edit/Color Preferences pull-down menu in PhotoShop.

These Color Management and Color Profiling systems are rather new, being introduced in 2000. They will continue to mature throughout their life cycle so you can count on them getting better over the years.