



Reviewing the basics

A beginner's guide to consistent color

Okay. You've finally bought that digital SLR now that they're reasonably priced.

You've used it alongside your film camera on a few portraits and a wedding. You've had your lab print some of your digital captures, and you've output some of them on your own printer. You like the idea of saving time and money on film and processing, and you especially like knowing that the shot you just took looks good and is correctly exposed. There could be a place for this technology in your business. However, you've noticed the potential for problems you never encountered when shooting film. For one, the prints that you made in-house didn't quite match the color and contrast of the prints from your lab, and neither batch really matched your computer screen.

Even when you do shoot film and have your lab digitize the images and return them on CD, those files displayed on your computer screen don't look the same as the proof prints. You wonder if you need to use another lab or a different digital camera, or if you just need to hold off on digital until everybody gets their color right.

What you've discovered is that your digital camera, monitor and printer all reproduce color differently—the color reproduction in your digital flow is *device dependent*. Fortunately, there's a way to get the colors to closely match from device to device, to the utmost capability of each device in the chain. It's called *color management*.



Color management used to be a complex, expensive process that worked only so well. Not anymore. Now there are simple, cost-effective ways to improve the color consistency among your input devices (digital cameras and scanners) and your output devices (your in-house printer or your lab's). Most of them require that you simply do what you've always done in photography—reduce the number of variables in the process.

The first step is to situate your computer system in an area away from windows or any light source that could cause reflections on your screen. Having the back of the monitor facing an exterior window is not the answer, either. Your eyes will

adjust to the bright exterior light, not the brightness of the monitor. If you must use a room with windows, cover them with heavy, neutral-colored shades. Any other lighting in the room should be very dim.

As your monitor is the window to your digital world, like any window, it should be clean and without distractions. Yes, you need to lose that favorite image that's become your screensaver, and set your desktop background to a simple midtone gray in your monitor preferences interface.

In order for the devices in the imaging chain to communicate with one another, you need to define or characterize the color response of each. This characterization is

product roundup: color management

BY BRYAN LINDEN

As photographers, most of us are at least familiar with the concept of color management, monitor calibration, and printer profiles. But if you haven't yet implemented an effective color management solution, the prints from your lab or inkjet printer probably don't match the images you see on your monitor.

But there is good news—now it's easier than ever to implement a color management system, and the tools to make it happen are cheaper and more accurate as well. These tools include software to custom build profiles for LCD and CRT monitors, printers, cameras, projectors, and scanners and even tools to measure ambient light.

Here is a roundup of the latest additions to color management products for professional photographers.

The **GretagMacbeth ProfileMaker 5 Photostudio Pro** includes everything you need to calibrate and profile your monitors, digital studio cameras, printers and scanners. With a \$1,495 price tag, PM5 Photostudio Pro can also measure ambient light to generate profiles for specific viewing environments. Its many other new features include the Digital Camera Module, which smoothes color transitions and optimizes skin tones and high- and low-key images.

GretagMacbeth's new **ColorChecker White Balance** card (\$49) is a full-size version of the white reference square in the standard ColorChecker chart. The card is a perfect tool for generating custom white balance camera settings, and it's guaranteed to be spectrally neutral under any lighting. The three-step **ColorChecker Gray Scale** card (\$59) provides quick reference points to help you balance color and establish optimum lighting from the start of a photo session. By photographing the chart in your setup, then selecting the 18-percent gray patch, you

can quickly color correct a batch of photos taken under the same lighting.

Not as new but not widely known, the **Eye-One Beamer** profiles LCD projectors, so your presentations and slide shows closely match the presentation monitor. It helps you achieve color accuracy previously impossible with projected images. It sells for \$1,595. www.i1color.com

ColorVision released the new **SpectroPRO Suite** this year for professionals who need advanced printer profiling on top of monitor calibration. If you use several types of substrates and/or multiple printers, you should build your own printer profiles. The suite includes the SpectroPRO Spectrocolorimeter for calibrating inkjet printers, color laser printers, dye-sub and photolab printers, along with PatchReader software, ProfilerPRO printer profile building software, DoctorPRO profile editing software, and the SpyderPRO Colorimeter with OptiCAL software. The SpectroPRO Suite sells for \$999.

If you already own ColorVision calibration products, check the support section of the Web site for upgrades of **PhotoCAL**, **OptiCAL**, **PrintFIX** and other software.

ColorPlus by **Pantone ColorVision** is an affordable new home-version of the ColorVision monitor calibration package. Windows-compatible, it includes a colorimeter that works with CRT and LCD displays and wizard-based monitor calibration software. According to ColorVision, it produces a wide range of colors, enhances flesh tones, and defines shadows and highlights. Selling for about \$99, ColorPlus is the lowest priced colorimeter-based monitor calibration product available now. www.colorvision.com and www.pantone.com.

X-Rite's MonacoOPTIX profiling package includes a new state-of-the-art colorimeter, designed to produce highly accurate ICC profiles for CRT and LCD color displays. Integrated with X-Rite's next-generation Monaco color management software, the package is a complete monitor calibration solution. According to Monaco, the colorimeter simulates human eyesight for the highest quality profiles of current and future display technologies. It also features precision colorimetric filters to provide the closest CIE values without correction, and chromaticity accurate within a



value of .003. There is also a MonacoOPTIX Pro Edition for workgroup situations. Starting at \$299. www.monacosys.com.

CHROMix supplies a wide range of color management equipment and services from many leading color management hardware/software manufacturers, as well as its own **ColorThink** profile graphing and management tool and the **ColorValet** custom print profile building service. ColorThink software (\$149) is a valuable tool for comparing the color gamut of a printer to a monitor or even to images, which helps solve tricky output problems.

The ColorValet profiling service is a great way to get professionally built custom printer profiles without investing in spectrophotometer-based solutions, and is ideal for users who typically print on only a few kinds of media. The photographer simply downloads a kit with instructions and a color target file for printing, then mails the print to CHROMIX, which in turn e-mails the customer a professional profile. At \$99 each, the profiles are backed by a money-back guarantee. www.chromix.com.

At the minimum, every photographer should regularly use a colorimeter-based display profiling product before making critical color adjustments to files. The potential for achieving the highest quality output lies in using a spectrophotometer-based product yourself, or engaging a professional profile building service or qualified color consultant to do the profiling for you. You can save time and money when you tame that color beast. All products mentioned except Pantone ColorVision ColorPlus are available for both Mac OS and Windows environments.

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called a *profile*. The profile of each device in the chain needs to be accessible to the color management operating system. The system will use this information to adjust the color response of each device in the chain.

Two components are needed to make a device profile: hardware to read the color response of the device, and software to interpret the readings as a profile, then store the profile in the operating system. A number of companies provide low-cost hardware and software for monitor profiling. All of these products walk you through the initial setup, or *normalizing*, of your display before you can profile it. You will set the brightness, color temperature and gamma of the monitor.

The hardware component in these packages is a *colorimeter*, which measures red, green and blue values, and passes these values on to the software. Higher-end packages come with a more sophisticated and expensive measuring device called a *spectrophotometer*, which measures the spectral properties of a surface.

The software compares these color values with a set of standardized values and generates a *look-up table*, which it stores in the operating system. The system will use this stored table to translate incoming color information to the video card so that the color information will be displayed accurately on the screen without the user taking any action. By nature, the color response of the monitor will change as it ages, so it's necessary to re-profile the display periodically. Professionals do this at least once a month. It's advisable to set-up a schedule to do this, like the first day of the month, or the first day of the odd-numbered months, or some such. It takes less than five minutes to refresh a profile.

Now you need to profile the other devices in the chain. For scanners, you scan a given *target*. The profiling software compares the color values of the scan with a set of standardized values, and stores the information from that comparison in the operating system as the profile of that scanner. Typically, you need to re-profile your scanner just a couple of

times a year, more often with heavy usage.

Color printers require a profile for each paper on which you print. Fortunately, the process is straightforward, though more time-consuming than profiling a monitor. The approach to printer profiling varies from solution to solution, but they all can achieve excellent results.

There are products on the market for profiling digital cameras, but in reality, any camera profile is valid only for the specific lighting under which the target was photographed. Unless the lighting conditions under which you shoot never vary, don't worry about profiling your digital camera.

With each of your devices profiled, you can at last feel confident that what you see on your monitor is very close to what you'll get when you output it. And as you become comfortable with this level of color man-

agement, you'll be able to speak knowledgeably with your lab, and take custom color management to the next level.

Now, if this still sounds like too much work, there's another option. Let your lab do the work for you. Most pro labs will scan your film, color correct it, make proof prints, and write the files to a CD. If you shot digitally, the lab will color correct your image files, make proof prints, and write the corrected files to CD. All you need to remember then is *not* to adjust the color or contrast of your monitor, no matter how the files look on the screen. Perform whatever other adjustments you like in the files, then send them back to the lab for final output.

Whether you perform the color management yourself, or leave it to your lab, color-correct prints are a reality from both film and digital files. □