Controlled lighting is critical to print viewing

The right light

When I speak to groups of photographers, I usually ask: "How many of you have daylight-balanced light boxes for viewing your transparencies?" Most of the audience raise their hands. Then I ask, "How many of you have daylight-balanced light boxes for viewing your reflective prints?" Few hands remain raised. Why is this? Isn't viewing a print properly as important as viewing a transparency?

A color management system is only as effective as the weakest link in the chain. When photographers who have calibrated and profiled their displays and output devices tell me their screen-to-print matching isn't perfect, I ask them how they're viewing these prints in relation to the display. Rarely do I hear that they're viewing them under controlled lighting, and that's the problem.

Clients will be viewing your prints under various types of lighting, so why should you view your prints in a particular type of light? Because it's still necessary for photographers to define a standard approach to viewing our prints, especially for evaluating how closely they match a calibrated and profiled display. Nearly all ICC output profiles assume that the resulting prints will be viewed under D50 illumination, an exact definition of a color that correlates to daylight (see "The color of white," December 2005). D50 is known as one of the Standard Illuminants, defined by the CIE, as International Commission on Illumination. An illuminant is a real or imaginary light source described by what scientists call a spectral power distribution curve (SPD). This curve is a graph of the intensity of each wavelength in the visible spectrum. Defined this way, an illuminant is an absolute, unambiguous measurement of a light.

An ICC display profile used in conjunction with an ICC output profile for a printer (or for soft proofing) is based on the assumption that the final print will be viewed under D50, unless the user specifies otherwise. At least one high-end profile package, ProfileMaker Pro from GretagMacbeth, allows you to measure any light source with the Eye-One Pro Spectrophotometer; you can then use that value instead of the default D50. This can be quite useful if you view your final prints in non-standard lighting conditions. If, for example, you wanted to build printer profiles for a gallery showing of your work, you measure the light in the gallery with an Eye-One Pro, then build that data into your printer profile for that set of prints.

Assuming you are working with printer profiles geared for D50 viewing, what options do you have? The most commonly used light source in daylight-balanced boxes is fluorescent. There are some drawbacks to this. Not all so-called daylight-balanced lights are created equally. In comparison to natural daylight, all fluorescent lights produce a spiky spectral response (**Figure 1**) because the bulbs are manufactured with mercury, a nasty and dangerous chemical element. With some photographic papers, this spiky spectral response often makes paper white appear to be slightly pink.

Nevertheless, fluorescent daylight boxes are commonly used in prepress, photo labs, and apparently every light box photographers use to view transparencies. So, if others in your imaging chain are using such lighting, you should use a fluorescent box as well, so you are viewing your prints as they do. I'm very pleased with the light box I'm using now, the GTI desktop SOFV-1e (www.gtilite.com; see **Figure 2**). Spiky SPD

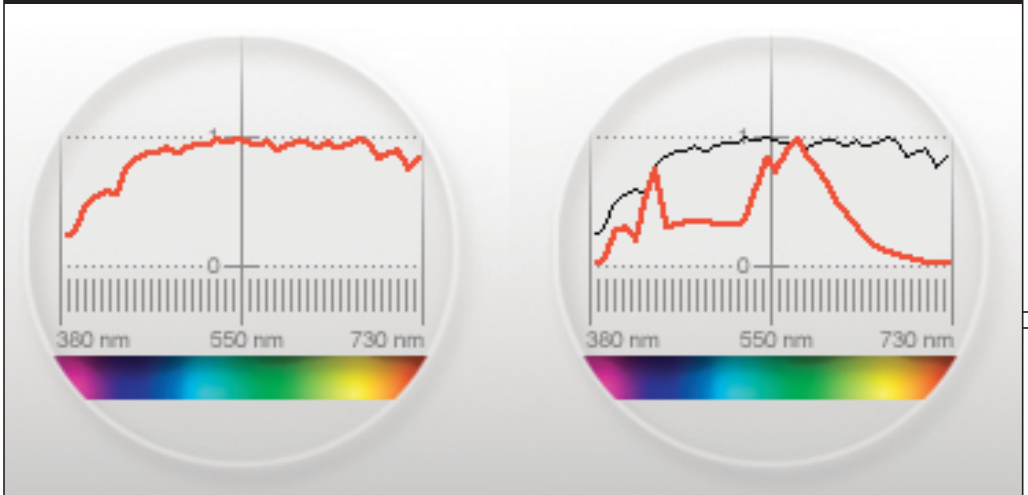

Figure 1: Using an Eye-one Spectrophotometer, I was able to measure a daylight-balanced fluorescent bulb (right) and compare it to D50 (left). The spikes in the spectrum are obvious.

and all, fluorescent daylight is still superior to standard desk lamps or some undefined illuminant for viewing images.

If you want a light source far closer to the spectral response of daylight, try a halogen bulb from SoLux (www.soluxtli.com). Of the manmade light sources I've seen, these bulbs come closest to producing a smooth, full-spectral response simulating daylight. They're are available in several correlated color temperatures—the 4,700K bulb correlates closest to daylight—and can be fitted in standard track lighting systems.

Halogen lighting systems do generate more heat than fluorescent light boxes, and can be harder to control with respect to light spill. If your viewing area is near your computer monitor, you don't want the light to hit the display. Also be aware that you might not be able to fully control the intensity (luminance) of these lights to match the luminance of your display. For the best screen-to-print comparison, the two should come close to matching. My GTI SOFV-1e fluorescent daylight box and many other high-end boxes have a dimmer to control the luminance while retaining the same color of light. With my box's digital dimmer, it's easy to set up multiple boxes to produce the same luminance values. For viewing large prints or for the ultimate in daylight simulation, though, SoLux bulbs can't be beat.

Fluorescent bulbs, among others, are usually rated by a Color Rendering Index (CRI), which is a bit of a marketing ploy to make a light source appear to be closer to daylight. Daylight has a CRI of 100; the closer the bulb's CRI to 100, the closer it's supposed come to simulating natural

Figure 2: The GTI GTI SOFV-1e light box I use near my display. The rest of my office is illuminated by SoLux 4,700K bulbs.

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daylight. CRI was developed in large part to aid the sale of fluorescent tubes. The rating is based on how the light affects the appearance of a set of eight small colored tiles. The bulb manufacturers pick the tiles, so it's easy for them to create a spectrum that renders the eight tiles well. But it doesn't tell us that the light source has the full spectrum of daylight, as in **Figure 1**. And it doesn't tell us how the light will render other colors.

With this measure, a standard tungsten bulb and perfect daylight could both have a CRI of 100. A standard cool white fluorescent bulb typically produces a CRI around 62, although you might find a so-called daylight fluorescents with a CRI closer to the idealized value of 100. As such, a high CRI is a decent gauge of how well a light will perform in your home, but not such a great indicator of how well it will work for photography and proofing. Both a SoLux 4,700K bulb and a "full-spectrum" fluorescent tube from the hardware could have a CRI of 97, but I can assure you that the hardware store bulb has a giant mercury spike and some spectral dead spots.

Next month, more info about of print-to-screen matching, and a recipe for building your own SoLux lighting system. ■

For an in-depth discussion of light and color management, read "Color Management for Photographers," by Andrew Rodney (Focal Press, $44.95).