

A guideline for using source spaces, profiles, soft proofs and print drivers to achieve great color output.

BY TOM HAUENSTEIN

In-house printing

DEMYSTIFYING COLOR MANAGEMENT

As the benefits of in-house printing are becoming clear, photographers and fine art print-makers are asking similar questions about color management for output. After handling tech support for LexJet for the past couple of years, I can offer some basic guidelines and advice.

The most important step in output is the image capture. Even with the sophisticated photo-editing tools available, one fundamental of photography remains: Set up the shot correctly the first time. The subject matter, composition, exposure and aperture still determine the quality of a photograph. Color management is the process that safeguards image integrity on the trip from the mind's eye to the printer.

SOURCE SPACES. You can profile your camera, but it's not crucial to the process. You can use one of the generic color source spaces in the camera's capture settings, such as Adobe RGB 1998 or sRGB, or create a color profile for the camera. If you do profile your camera, I recommend using X-Rite Eye-One Match, ProfileMaker Publish, or ProfileMaker PhotoStudio software. The profile will be the *source space* of your capture files. If you shoot in RAW, assign the profile as the source profile when you convert to a compressed file format, such as JPEG or TIFF. When shooting JPEGs, assign the profile to the image in Photoshop. (Be sure to select *edit > assign profile*, not

edit > convert to profile.)

Scanners in the workflow should be profiled. An ICC profile helps your image processing software understand exactly how the scanner *sees* color. The color profile becomes your source profile. For profiling scanners, I recommend using the intuitive, wizard-driven X-Rite Eye-One Match or ProfileMaker Publish software.

Create separate ICC profiles for reflective and transmissive media you scan, and use different targets. The resultant ICC profiles will be the *embedded RGB workspace* for scanned images. This ensures that other applications you use to view a scanned image will understand how the scanner interprets color, then display or print the image accurately.

For accurate color control, every image *must* have an embedded source space profile. You can't get where you're going if you don't know where you are. Once you determine an image's source space, never change it. Check the color settings (**Figure 1**) in Photoshop (Edit > Color Settings). The most important part of this dialog box is the Color Management Policies; set them all to Preserve Embedded Profiles. An incorrectly converted or erroneous source space in an image file will make it impossible for your monitor to display an accurate soft proof, and subsequently get a usable print.

DISPLAY PROFILE. I've run into photog-

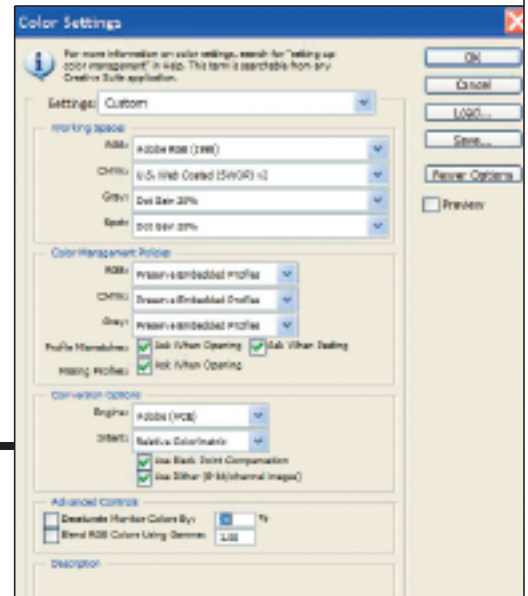


Figure 1

raphers who have invested more than \$40,000 in cameras and lenses, but do all of their color correction on a sub-par monitor. Older CRTs are susceptible to color shifts. The monitor is the window through which you view and correct files before printing them. How can you possibly correct a file when you don't know if the color you see is true to the file or added by the monitor? Your system is only as strong as its weakest link.

A good monitor doesn't have to break the bank. There are decent selections in all price ranges, but a professional-grade monitor will likely cost at least \$1,500. I enjoy using the LaCie 300s and the Eizo Color Edge series displays, which range in price from \$700 to \$5,000, depending on size and model.

Calibrating your monitor is *the* most important part of color management. Display calibration hardware and software costs about \$250, so there's no excuse not to do it. Calibrate weekly to monthly, depending on the age and stability of the monitor. I prefer X-Rite's Eye-One Display 2 because it seems to be superior in setting brightness and contrast during the calibration phase, making my monitor significantly more accurate.

THE GOODS: COLOR MANAGEMENT

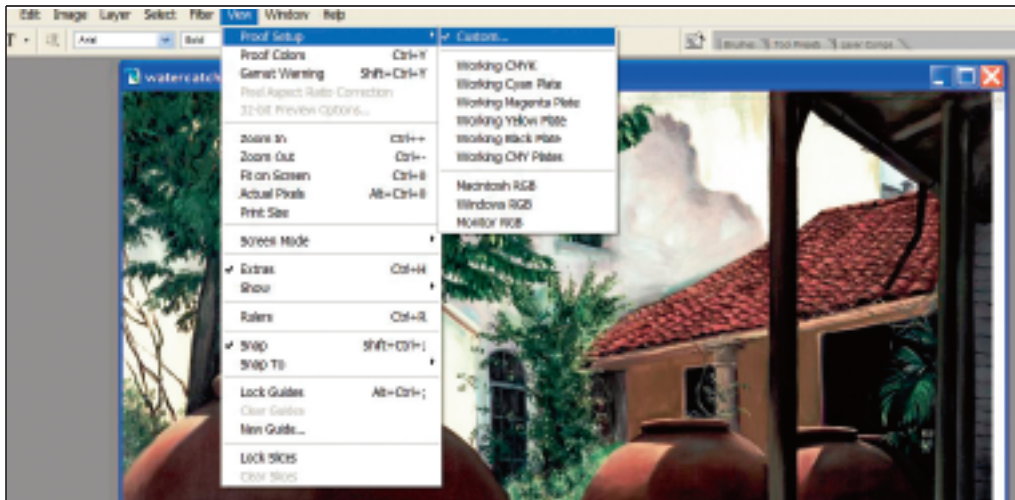


Figure 2

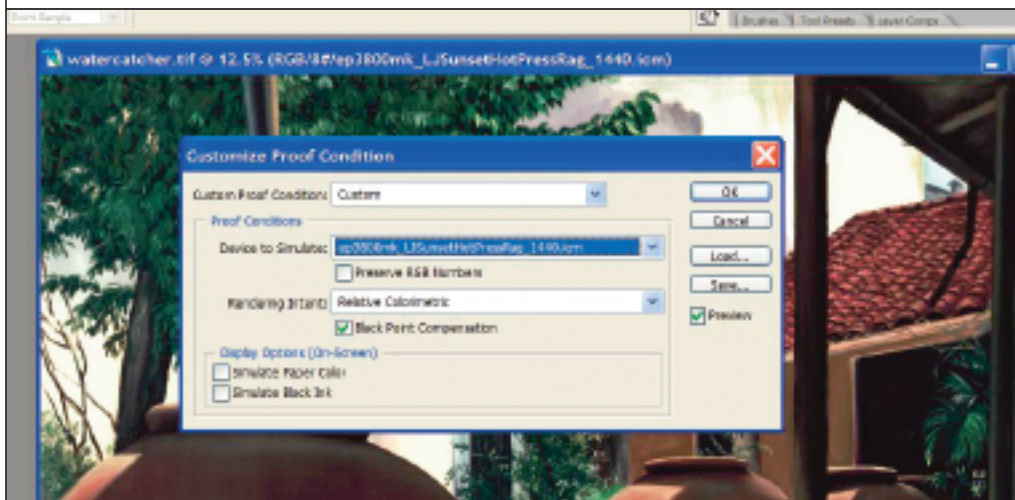


Figure 3

SOFT PROOFING. A soft proof is a preview of a print. The specified rendering intent determines how out-of-gamut colors are handled. Every print medium has a unique color gamut. The same image printed on the same media but output with different rendering intents can look completely different. In Photoshop, go to View > Proof Setup > Custom (Figure 2) to open the Customize Proof Condition dialog (Figure 3). In the Device to Simulate section, choose the profile that you will use to print. The profile will be built for the combination of a specific printer, ink set, and medium, and will reflect the available gamut for that

combination. The only way rendering intents would not affect your final output is if the file is completely in the gamut of the paper/printer/ink profile.

Almost all media manufacturers provide profiles for their papers. The ImagePrint RIP provides profiles for just about every single paper and professional printer combination available. You can certainly build your own custom profiles (but this isn't the place for a printer profiling how-to). A good color profile system, such as one of the X-Rite Eye One series, will walk you through the process. (See sidebar on page 66 for more information on ICC profiles.)

The two rendering intents are perceptual and relative colorimetric. Perceptual tends to desaturate colors in order to fit them within gamut, but handles gradients well. The relative intent may make gradients look a little choppy, but does maintain saturation well.

Use a soft proof preview to decide which rendering intent will work better. Also check the effect that the black point compensation will have on the print. Compare the effects of both rendering intents with the black point compensation on and off to see which looks best. You will be choosing the rendering intent and black point compensation when you print, so it is important to determine which combination works best for each image.

For black-and-white printing with an OEM driver, you must use the printer's driver to color-manage the file after you've converted the image to black and white. One of the limitations of printing through the driver is that you will not be able to soft-proof the actual image. Instead, the effects of the rendering intent and black point compensation will be illustrated on a sample photo or a three-dimensional ball. That's one of the many reasons I recommend ImagePrint for anyone who's serious about printing—it allows you to soft-proof the actual image you're printing.

Ultimately, color management is all about cutting down on color *correction*, which is the work you do in each file. You *manage* color by properly profiling and calibrating all your equipment, and paying attention to detail during capture. ■

Tom Hauenstein is LexJet's technical director. He will discuss the printing process and more during his seminar tour, starting in Miami, September 10, and wrapping up in New York on February 27. For more on the Great Output Seminar Tour, Printing for Profitability in the Digital Darkroom, call a LexJet specialist at 800-453-9538, or visit greatoutput.com.

PROFILES, PUDDING AND PRINT DRIVERS

When I tell photographers about a new printable material, they often ask if there's an ICC profile for it—a sign that they recognize the importance of a color-managed workflow. But I seldom hear the important follow-up question: "Do you have a list of settings used to create this profile?"

Just using a profile somewhere during the print process is no guarantee of perfect results. It's kind of like looking up the recipe for pudding and finding only "sugar" or "Cosby". The profile is just one part of the solution.

Assuming that your workflow is sound from capture through Photoshop, you need an ICC profile for the combination printer, ink, and media you'll be using. These are often available for download on the Web site of the substrate or printer manufacturer. If there is no profile for the specified combination, you have to build your own or hire someone to build it for you or expect to struggle with accurate color rendering.

With a downloaded profile, you also need to know the settings that were used to create it to get consistent results. The printer driver dialog box asks you to enter specifications for four main settings:

MEDIA: With the Epson driver, as in the example below, the media setting determines the ink saturation (linearization) and media feed adjustment. If you do not select the same media that was used to create the profile, the results will be drastically different.

RESOLUTION: I create profiles based on 1,440dpi because it gives the best visible resolution without wasting time and ink. If you use a 1,440dpi profile but actually print at 720- or 2,880dpi, the chances of getting perfect color are greatly diminished.

HIGH SPEED CHECKBOX: This tells the printer to use bi-directional or uni-directional printing. Bi-directional printing reduces the amount of time needed to finish a print, but usually by

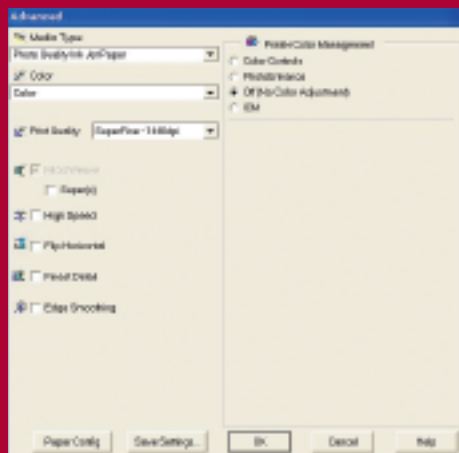


A typical printer settings document from LexJet

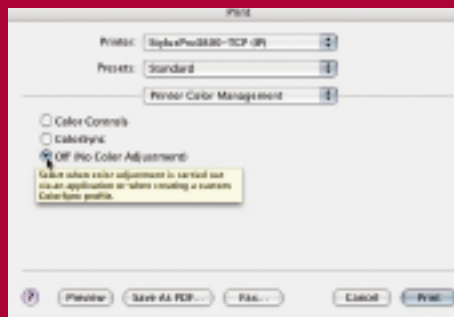
trading speed for fine detail and image sharpness. I will never compromise quality for speed. All of my profiles are created with high speed unchecked.

NO COLOR ADJUSTMENT: Checking this button disables the printer's color management. Photoshop (or your RIP) will color-manage the image with the ICC profile. If your printer also manages color, the image will be double color-corrected, and the result will be dismal.

—Tom Hauenstein



In a Windows interface, the Media Type, Print Quality, High Speed and Color Management settings are available in a single printer driver dialog box.



In the Macintosh Interface, a pull-down menu provides access to Print Settings, which include Media Type, Print Quality and High Speed. The same pull-down menu accesses Printer Color Management controls, where you can turn off the printer's color adjustment.

