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What is color management?

Part 2: First, it's what's on display

We need profiles in order to capture, view and output files with accuracy. It's important at this point to understand the difference between *profiling* and *calibration*.

Calibration in the process by which we adjust devices into known and consistent behavior.

Profiling is the process of fingerprinting or describing how digital devices actually behave. We need profiles for all of our devices, and we need to calibrate those devices that do not exhibit consistent behavior. If a printer's behavior is constantly changing (the output is always unpredictable), profiles will be useless, since the very nature of a profile is to describe how a device produces color.

Devices that are regularly changing require calibration before they can be profiled. A display is a prefect example. You might think that monitors come out of the box with "correct" color display, but nothing could be further from the truth. If you've ever seen a multitude of TVs on display in an electronics store, all tuned to the same channel, you must have noticed how inconsistent those displays were. Even two monitors of the same brand, made on the same day, will exhibit deviations. Therefore, it is not only necessary to calibrate a display to a known and repeatable state, but to do it on a regular basis (a few times a month is a good idea). Once the display is returned to the desired state, we can profile its behavior to get an ICC profile for that specific device.

The display is the window to our files

The imager's display is the first critical piece in the imaging chain. Every user who expects predictable and accurate color has to calibrate and profile his/her display. The only "reality" we have when viewing our digital files (actually just a series of numbers) is what we see on our display. If an image appears to be too yellow, is this really the case or is the display incorrectly previewing the numbers? We can't afford to guess here. The display is the first device to color manage.

There are two ways in which we can calibrate and then profile a display. One is to use your eyes and something like Adobe Gamma, which in the past shipped with Adobe Photoshop. This isn't a very sound method, because while our eyes are excellent at some tasks, they can be fooled. Our eyes are not consistent in how they see color, and consistency is key in calibration and profiling devices.

Far better are instrument-based solutions that are highly consistent and accurate. We want the preview we see today to look identical tomorrow and a year from now. Unfortunately, this means spending some money. The good news is there are a number of products that provide excellent hardware for only a few hundred dollars. This money can be recouped in short order, in print savings alone.

A *colorimeter*, hooked up to a computer and display, works with host software that sends color values to the screen as the colorimeter measures the results. The software calibrates to an *aim point*, and after doing so will build an ICC profile that describes to the CMS how that display produces color. Once the display is calibrated and a profile of this behavior is created, applications like Adobe Photoshop have the information they need about the condition of the display to allow proper and correct image previews.

Gamma and white point

Calibration for a display requires two conditions be specified; the *white point* of the display and the *gamma*. White point is specified in a value such as 6,500 degrees Kelvin (color temperature). This is the color temperature of the whitest white a display can produce. While it's true that the standard for viewing reflective prints is on a light box at 5,000 degrees Kelvin, over the years most color geeks have found that calibrating a display to 6,500 degrees produces a better print-to-screen match. I recommend most users try calibrating to this color temperature.

Gamma is more platform-specific than anything else. Macintosh users usually calibrate the display to a 1.8 gamma while Windows platform users usually calibrate to 2.2 gamma. (In the future, I'll discuss the options for both OSs.) The idea here is to understand that we need to calibrate our display systems to a specific condition (e.g., white point = 6,500 degrees Kelvin; gamma = 1.8), and then profile that behavior so that an ICC profile can be applied.

Once our display is both calibrated and profiled, ICC-savvy applications can identically preview images for users on multiple systems and platforms. The numbers in the file can be viewed correctly, which makes editing so much easier, accurate, and predictable. This requires setting up Photoshop correctly, which I'll cover in my next article. If you are considering the process of calibrating and profiling your display, budget at least a few hundred dollars for an instrument-based package. ❑