

## **Color Management, Color Gamut, Color Space, ICC Profiles**

What does it all mean and why should I know?

Color management is the science/art that determines the look of photography and reproduction in the digital age. If you shoot digital or scan film you are a color manager like it or not.

Color gamut is the fundamental but commonly misunderstood component of color management. Color gamut is essentially a description of the range of "color" that a camera, display, printer, press or scanner is capable of simulating. "Color" is really an incomplete description. The "gamut" of a device includes brightness, contrast, hue and saturation. The brighter the white, the darker the black and the stronger the saturation, the larger the gamut. Color gamut can be described in mathematical plots. These plots are three dimensional (luminance, hue, saturation) and have come to be known as "color spaces" (e.g. Adobe RGB). Color spaces are described by data known as "ICC Profiles". ICC profiles are the data that allows the camera, display and printer to produce consistent, matching color in a color managed system. Color gamut, color space and ICC profiles are essentially synonymous.

The application of color management is actually simple once your camera, display and printer agree on how to render color. The goal is to get all your devices to work within the same color space (i.e. gamut) using ICC profiles as the guide. What you see on your display will match what you get from your printer. The quality of your output will be limited by your printer's gamut and more importantly, your editing choices.

Here's a greatly simplified outline of a color managed system:

- 1.) Choose a color space (usually Adobe RGB 1998) for your camera or scanner in the camera/scanner settings or when processing the RAW file.

- 2.) Calibrate your display using a hardware based system such as the Monaco Optix xr. This will create an "ICC profile" that describes the "color gamut" of your display. This profile is used by your computer to display accurate color within the limits of the display's "gamut".

- 3.) Use an ICC profile that describes your printer/paper for output. This profile can be a custom profile you create using profiling product such as the X-Rite Pulse or Greytage's Eye-One system or a "canned" profile provided by the paper manufacturer. Printer/paper profiles are usually applied in the Print dialog within Photoshop or other image editing application.

(Note: each paper/printer/ink combination requires it's own profile)

### **Canned vs. Custom Profiles**

In the past, creating your own custom printer profiles was necessary to achieve any degree of accuracy. Many canned profiles have been greatly improved and will meet most needs. However there are differences in the quality of profiles. A poor profile may offer accuracy at the cost of restraining gamut unnecessarily. In the worst case profiles can be "broken" resulting in inaccurate color, banding and other artifacts.

If you are using an inkjet printer to simulate a press proof or require the richest possible color (largest gamut) you'll want custom profiles and possibly a software RIP to replace the software supplied with the printer.

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