



Large Format Scanning & Printing Solutions

Understanding ICC Color Management Workflow.

As noted in a past issue of the Paradigm Newsletter, ICC color management has become a hot topic within the quick print and large format printing industry. Those individuals and companies that embrace color profiling within their print workflow will obtain more consistent, accurate color from Input to Display, and on through the Print process. Previously, we discussed Linearization and calibration of your print device. However, prior to profiling your "linearized" print device, it's important that your scanner be calibrated and profiled. This month's article will address the profiling of your scanner, with a bit of information relative to why it's important to start with the input before moving onto the display and printer.

But first... A little WYSIWYG crash course...



While the desire for "What You See is What You Get" (WYSIWYG) drives more and more people to incorporate color management into their workflow, it is important to understand that there will always be differences between what you see on your monitor and what you get on your printer, as color management will merely enable the monitor to "simulate" the limitations of the print device. It's important to know that **color management won't make your monitor and your printer produce identical color**, but it will produce a close and consistent visual match that can be used (with a little experience) as a relatively accurate predictor of the final output.

It's best to keep in mind that your monitor will never reproduce a more saturated red than the red produced by its red phosphors. In addition, your printer can't reproduce a cyan more saturated than its cyan ink. The range of color that a device can reproduce—whether it's a monitor or a printer, is called the **color gamut** of that device. (We'll show a visual rendition of a few

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- USB 2.0 interface, ensuring optimum throughput for demanding work flows
- Printing speeds from 296 sq. ft./hr (Draft mode) to 113 sq. ft./hr (High Quality mode)
- Easy media loading design: Double media rollers support large rolls without the need to install media core stock rollers. This eases loading of heavy and wide rolls of media. In addition, a motorized roll feed and take-up system ensures consistent printing quality, job after job.
- Two heating zones, pre-printing and post printing, smoothes the media and makes it more receptive to ink. An external dryer also provides inline drying for faster output on any media.
- User friendly positive pressure cleaning system is designed for hands-free, syringe-free cleaning and maintenance, providing reliable up-time performance.
- Printer output is designed for outdoor signs, vinyl banners, billboard graphics, floor graphics, vehicle wraps, large POP signs, etc.
- Supported by all major RIP software.
- The JS300 is compatible with a variety of sheet and roll media (up to 50 yards) including vinyl, window film, polyester, outdoor banner, backlit, vehicle wraps, and poster sheets.

“gamut’s” later on in this article to further clarify this concept.) Understanding device and color space gamut’s will help you understand why certain colors cannot be reproduced using conventional dye-and pigment-based CMYK inks commonly used with large format print devices.

Input (Scanner/Camera) Profiles:

When you embed or “assign” a scanner profile to an image in Adobe PhotoShop, you are describing where the image came from so the color management system (CMS) knows the actual colors that are represented by the scanner. For example, if we embed the Colortrac 5480e scanner profile into a scanned RGB image (scanned using the Colortrac scanner), we are telling the “color management system” that the RGB information within this image represents the color that the Colortrac 5480e scanner “saw” during scanning. *The embedded profile doesn’t change the values in the image, it simply tells the CMS what colors those values represent. Assigning or embedding a scanner (source) profile is a necessary first step before you can convert the color for output on another device.*

Note: The destination (printer) profile indicates where the document is going so the CMS can figure out the CMYK numbers needed to represent those same “scanned” colors on the print (destination) device.

As an example, let’s say Bob scans an image with a Graphtec CS500 Pro scanner. He now has an RGB image—but not just any RGB image, rather a “Graphtec CS500 Pro” RGB image. So he needs a profile for the Graphtec scanner in order to tell the CMS how the Graphtec “sees” color. Now let’s convert the scanned image from the Graphtec to CMYK so it can be printed onto “photo-gloss paper” using a HP5500. You will now need a profile for the HP5500 (created using the photo gloss paper at the same target resolution) in order for the CMS to know how the HP5500 reproduces color on that substrate at that resolution.

Using these two profiles, the CMS now has the necessary information to figure out which perceived colors the original Graphtec RGB image represents and which CMYK values it needs to send to the HP5500 in order to reproduce those perceived colors.

OK. So how do I create this scanner profile?

It’s EASY... As long as your scanner software has been set up correctly, and you leave it that way. This includes turning off any features that set black or white points, features that remove color casts, or do any other automatic adjustments in response to the image content. Also ensure you turn off any sharpening in the scanner. GretagMacbeth provides an excellent IT8-7/2 target with it’s Profile Maker software (available from Paradigm Imaging). The target IT8 chart shown



below is provided in reflective, transparency and slide formats.

The process of creating the scanner profile is relatively straightforward. A “target” (usually the IT8), is scanned and saved as a full color TIFF.

The TIFF is opened within Profile Maker, where the scanned information is compared to the corresponding known reference target and a profile created to represent the values. The two images on the next page represent an image scanned and saved as a TIFF without a profile; and the same image saved as a TIFF with the scanner profile assigned (embedded).

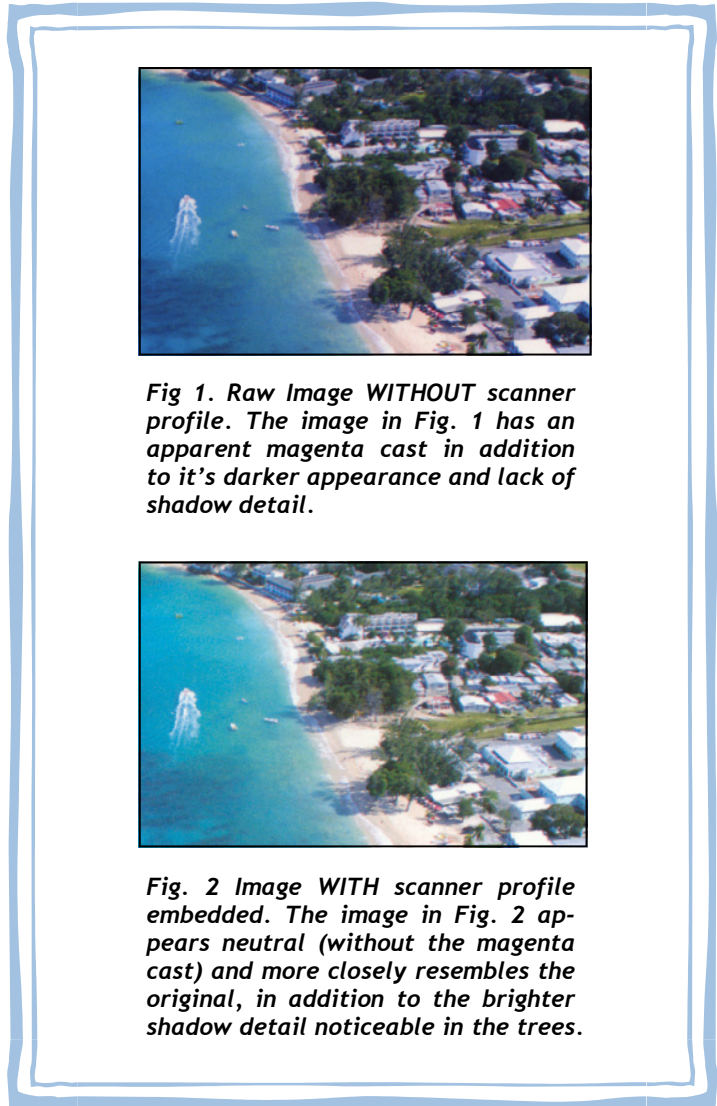


Fig 1. Raw Image WITHOUT scanner profile. The image in Fig. 1 has an apparent magenta cast in addition to it’s darker appearance and lack of shadow detail.

Fig. 2 Image WITH scanner profile embedded. The image in Fig. 2 appears neutral (without the magenta cast) and more closely resembles the original, in addition to the brighter shadow detail noticeable in the trees.

Neither of these images were altered using any color adjustments in PhotoShop. The only difference between them is the embedded profile.

So what is this Gamut thing?

The gamut of any given device, whether it is a monitor, printer or scanner, is basically the range of colors that is reproducible

by that device. A scanner obviously will have a larger gamut than a color laser printer, and your monitor will have a larger gamut than your printer. In addition, scanner gamut's will differ from one model to the next, the same way print devices differ.

The following two figures display screen captures of the gamut of a Graphtec scanner and a Colortrac 5480e scanner. The range of colors for each is markedly different.

Ascertaining the gamut of a specific print device with a selected media will save time often wasted ascertaining "how close" the printed piece is going to be in relation to the scan and whether there are colors that are "out of gamut" and not able to be reproduced.

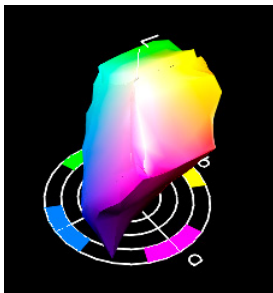


Fig 3. Graphtec CS500 Pro

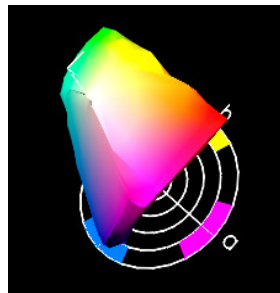
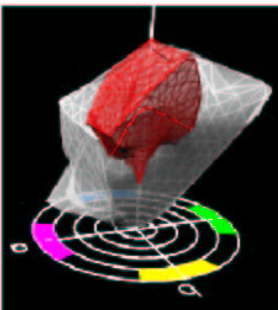


Fig 4. Colortrac 5480e

Take a look at the following gamut comparisons. The first image (Figure 5) shows the gamut (in red) of a typical high quality matte paper when printed using an HP5500 6-color print device. The gamut of the Graphtec scanner (transparent white) is obviously far greater than that of the paper and ink. One may conclude that this device will not necessarily print all the colors that the scanner is capable of capturing.



6 Fig 5. Typical matte Inkjet paper (red) compared to Graphtec scanner (white)

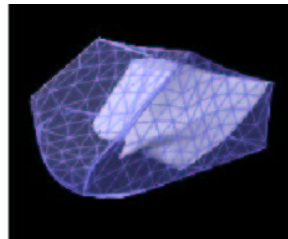


Fig 6. The gamut of a CRT monitor (blue) compared to the output on bond (white).

shows the comparison between a typical CRT monitor (shown in transparent blue) and the gamut of an inkjet print on bond paper (white). Note why your monitor can display colors that are unable to be reproduced on certain device/paper configurations.

Figure 7 displays the comparative gamut's of photo gloss output in relation to the output of a typical heavyweight bond paper

(both using 6-color ink-jet printing).

Note that the photo gloss (shown in transparent white) has a much larger gamut than the heavyweight bond (in red), and will more than likely reproduce certain colors with more accuracy than the bond.

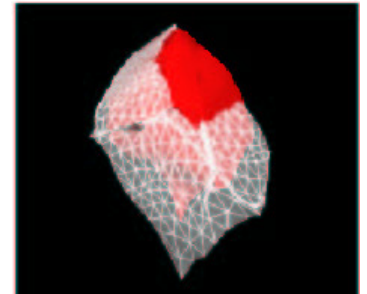


Fig 7. Gamut of photo gloss (white) compared to heavy bond (red).

Hopefully, this crash course in scanner profiling has helped simplify the concept of ICC workflow. Paradigm Imaging is a supplier of Gretag-Macbeth's complete line of colorimeters and spectrophotometers, in addition to the Profile Maker suite of ICC profiling software. Call your local Paradigm Representative for more information.

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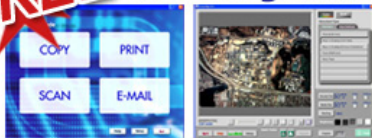
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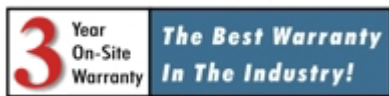
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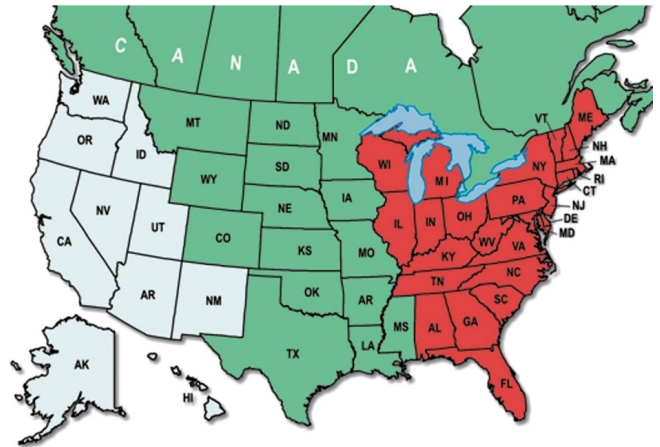
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