



Color Management 101

BY DAVID KING



David King is director of operations for Massachusetts-based Castle Graphics, a large format digital print provider. He has been in the digital printing industry since 1983 and has worked with a number of major manufacturers to help develop new and better technologies. In addition to writing for Sign Business, Dave will present seminars at all Sign Business & Digital Graphics Shows in 2006. He has also produced Inkjet Printing, Laminating and Mounting, an educational video for the Video Classroom series. For more information call 800-691-8047.

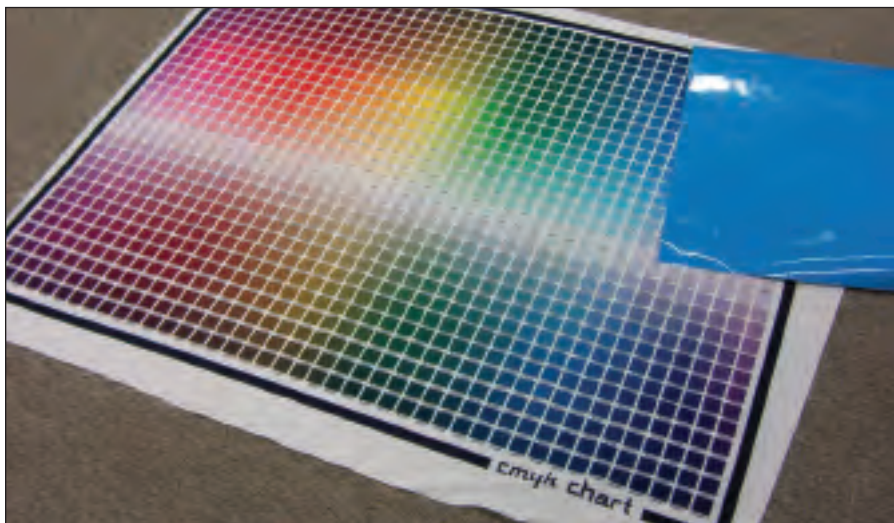
How to do color management for little to no money.

COLOR MANAGEMENT is one of those lines you hear a lot in conversation, but in practice it is much more difficult to understand and even more difficult to execute. Let me start you off with a few basic rules that must be followed before you begin to achieve color correct files with color management:

1. *The ink you use in your printer* —you have virtually no control over this, but you must have a good ink. What I mean is that if you print a cyan block on your media, it better be *cyan*, and the same goes for the magenta, yellow, and black. Many inks are not correct to start, and if this is your case, then you are in trouble from the get-go.

2. *The most important is the media color*—and yes, media comes with tints of color that *do affect the final color* of your graphics. Banner material is the most difficult (in my experience), as so many companies do not make a *pure white* media. All colors are managed on a white media but if your media is a little bit yellow (as many are) then your final colors will shift, your greens will not be bright and your reds will never hit 485 (fire engine red), plus your blues will be more green.

So I am clear as to what I mean by white, if you have Avery's 1005 or 3M 180 vinyl in stock, take this and compare it to your other media, like banner vinyl, paper, fabric, etc. If you take all your products and compare them to find the whitest white, this is the media you want to use for all your color tests at first. Later in this article I will tell you how to deal with the media that you *must use* because you cannot find a white version of the media you need to print to. When you have found your *white* media, use this for all samples that are sent to you for color, so



CMYK Chart to help pick colors for files that do not use Pantone Colors.



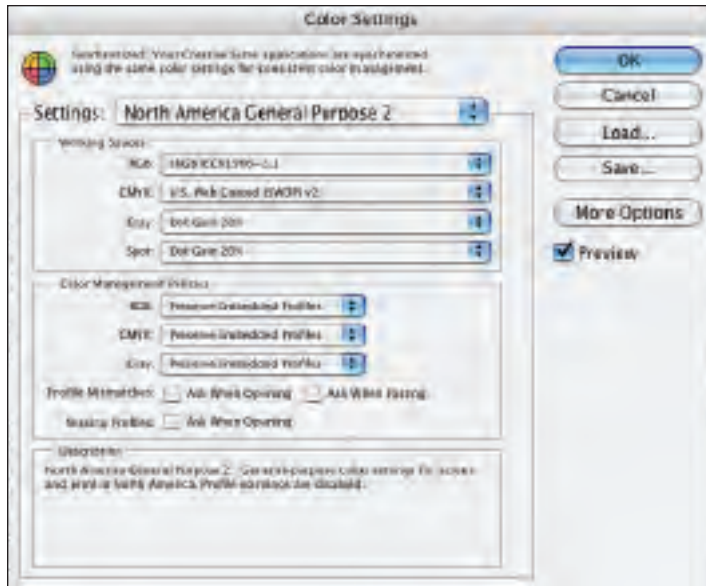
Pantone books and Video Classroom videos are good sources to learn more about printing and color. The book on the top center is the Pantone Process book that EVERYONE SHOULD OWN!

if you get a swatch book from your supplier, look at the media. If they are not white, then move on to another supplier.

3. *Have consistency in your environment*—If you are using a solvent printer, find the right temperature for the media you are running and keep it there. Changing the temperature will affect the colors and can cause banding. The heat also affects the *dot gain*. This is the distance that the ink flows before it stops. If you are having a difficult time understanding *dot gain*, then take a Sharpie marker and touch it to your photocopy paper. You will see that the place you touched will produce a dot that is larger than the end of your Sharpie, this is *dot gain*. If you have your temperature too low, the inks will not dry and will run into each other and cause a very fuzzy image and bad color.

MANUFACTURER PROFILES

Okay, now you have the basic rules for insuring that you are moving forward and not at a disadvantage in doing the color management. In most cases the media you use will be provided by the company that sold you your printer and in some cases the media might be from the same company that makes your printer. In the case of media provided by the manufacturer, they will also provide you with an ICC Profile for the media. (The truth is that they do not manufacture any of the media;



Adobe has shipped Photoshop CS II with a few profiles that work good. We use "North America General Purpose 2", which you can find under the "EDIT" menu called "Color Settings".



Pantone book page showing the correct color for Pantone, this page with the correct color chip being laid on the job to compare color.

they just put their name on it and in most cases, charge more for it than if you were to purchase the same material from your local distributor.) In other cases, the printer manufacturer may provide profiles for other media you use. In most cases the most popular media, like Avery 1005, 3M 180-10, etc., are the ones that you should get profiles for from the manufacture of your printer.

The advantage to using media from the printer manufacturer is that they take the media in and test it, then they create a profile for the media called an ICC profile. This makes it easier for you to use the media with their profile and get the cor-

rect color most of the time. I have been told by many that a number of the profiles from the manufacture do not work very well, but then not all color issues are just the profile.

All printer manufacturers ship profiles with their printers and in a lot of the cases the profiles are close enough for most media.

BALANCE YOUR MONITOR

Let's start at the front end of the system—your monitor. If your monitor is out of balance you will have a very difficult time making nice prints. You need a target to make sure this color process will

work moving forward, so I want you to go to our Castle Graphics Web site and get the target. Go to www.castlegraphics.net, then go to *About Castle* and then choose *Need to Send File*. Scroll down and you will find the *Color File*.

Download this and print it with your printer on the white media with the best profile you have. Now take this to your monitor and bring up this same file. Now adjust your monitor so it looks like your printed file.

This target is used on our Lambda to proof color at 4000 dpi and it offers all the different images to view color. In almost all cases your monitor will be set too bright. This is because most environments that you have your computer in also have bright lights above the monitor (ceiling lights) and your poor monitor is trying to overpower the overhead lights so you can see nice color on your monitor. Real high-end color labs do all the color correction in a dark room with just a high-end monitor. When you have a monitor trying to compete with the overhead lights, it always loses.

To fix your monitor to match the print I am sure you will have to take down the brightness and then the contrast, and when you are done you will find that your monitor looks very close to the print. The problem is that most of the time your monitor is now too dark and you will not be happy with it. But the good thing is it will be very close to color correct. If you upgrade to a LCD flat screen for your computer you will find they are more color correct and are much easier to keep in balance and tend to work better in brightly lit areas.

YOUR PHOTOSHOP SETUP

Next you need to set up your Photoshop for color defaults. To understand color you need to understand gamut. A color gamut is how far color can reach into the depths of the single colors. For example, if you have an RGB device like a Lambda, the red can reach a certain point of brightness but not as far as a CMYK device like our SunJet printer.

The magenta ink in most printers is very hot in color and mixed with yellow, you can get a fire engine red that is just wonderful. If you choose a gamut in Photoshop that is

very small you will have a difficult time getting the colors out of Photoshop you need and that your printer can print (Adobe 98 for example). But if you choose a gamut that is too large, you will also be looking at colors that you cannot print. Adobe has tried to make it easy for all of us and has shipped Photoshop CS 2 with a few profiles that work good. The one we use at Castle is *North America General Purpose 2*. You can find the setting under the *Edit* menu called *Color Settings*.

PANTONE MATCHING COLORS

Okay, so now you should have your monitor close to correct, and your Photoshop running properly. Now what do you do about your printer?

First you must understand that there are only two types of graphics files: *vector* and *pixel*. (*Pixel* is also referred to as raster or bit-mapped.) Vector files are line segments between coordinates and are created from programs like Adobe Illustrator. Most fonts are also vectorized. A vector file can get scaled to just about any size without losing quality or sharpness.

A pixel file is made up of color pixels of an image that in most cases came from a scanner or digital camera.

In the industry there is one color standard that most companies that design graphic files for output know as *The Standard*, and it is called Pantone. The "Pantone Matching System" (PMS) includes a series of color chips that tell the industry what a color is. What is good about the Pantone system is that the Pantone chips are an accepted industry standard. So if your client tells you that they want *Pantone 285* you can pick up your *Pantone Process Guide* and see what color they want you to provide.

Now go get your *Pantone Process Guide* and look through this book so you can get up to speed on the way the book works!

If you look at the top of each page you will see one side is called "Pantone" and the other side is called "Process". Not all colors that are Pantone can be printed on a Process printer. This book will show you the problem colors. Look at the orange and green sections; you will see what I am talking about.

Now that you understand Pantone you can understand that it is easy to make your

printer print a Pantone color and easy for you to make your vector files print properly every time. Go back to my Web site and download the Pantone chart. Now print this chart on your favorite media and now you can see what colors your printer can print in the Pantone family. Now when you get an order from your clients and they call out for a Pantone color, you will follow these steps to making your colors correct:

1. Choose the media you will be running the job on.
2. Set up your RIP for this media, if you have a profile for this media.
3. Set up the heat to match the profile, if you are using a solvent printer.
4. Print the Pantone chart on the media you are using for the job.
5. Take out your *Pantone Process Guide* and find the color on the chart you printed that is as close to the color that the client calls for in the job.
6. Go into your vector file and change the color that you found on the chart in the file so that when you print this file the color the client asked for is printed. If the color on the chart matches the called out color, *great*, you are lucky.
7. Print the client's job and you should have a perfect Pantone match (or as perfect as you found on the chart).

This will always work for your vector files, but not for your pixel/bitmapped files (typically called Photoshop TIFF files). The pixel files are much more difficult to do this fix on. You can also do the same process as above but you must be more careful with pixel files. For example, if you have a hard edge around a red logo, in Photoshop you can use the Magic Wand tool to select the color and change it but this is very difficult and time consuming to do in Photoshop. Be careful and charge for this work as it could take hours.

Finally what do you do if you want to make all your products perfect and have a great color printed on everything you print? Pick up a color measurement instrument such as the X-Rite Pulse for about \$1,800. A color system like this will help you make great ICC profiles for your RIP as long as your RIP can load in ICC profiles.

Good luck, be smart with your money and I will see you on the show floor!