# Digital Color Balance

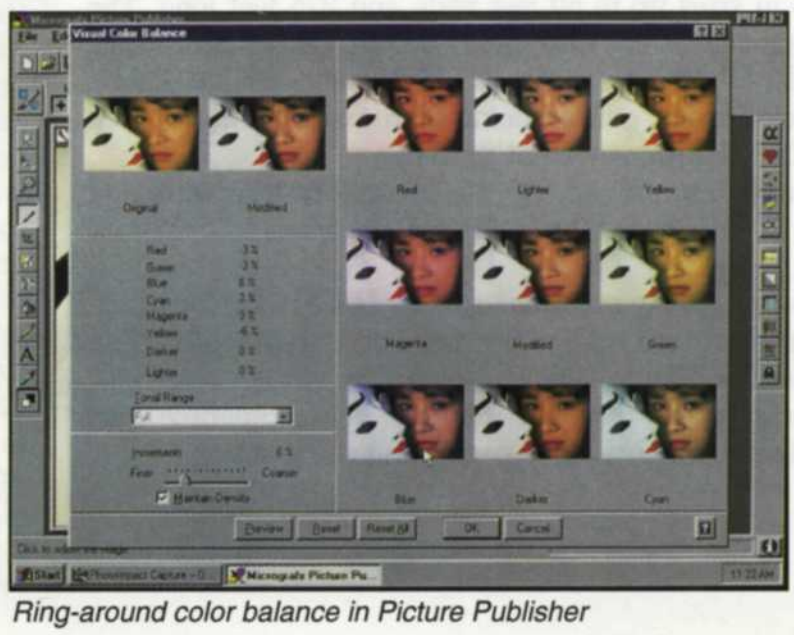
Jack & Sue Drafahl

*Incorrect color*

*Auto color balance*

*Uncorrected color*

*Corrected*




*Ring-around color balance in Picture Publisher*

*Scan image to balance scanner with color monitor.*

*Use RGB color and grayscale to find color bias.*

You would think that with all the fancy digital tools available, color balancing would be easier in digital color printing. Well, the tools are there, and it is more flexible than any traditional color printing method, yet many labs still have trouble getting a good digital color balance.

THE TRANSITION FROM traditional photo to digital lab services certainly has its share of problems. One critical part of traditional lab services has always been to achieve good color balance when printing images on all the different photo papers. We took a look at the current causes and cures for digital color theory confusion, and we think we have found some simple solutions to share with you.

When photo labs first started to produce digital color prints, the lab techs responsible for color printing had backgrounds in balancing color prints using balanced color light boxes, gels, and even video analyzers. When the switch to digital was made, these technicians transferred their traditional skills to the same types of tools on a computer screen.

But digital printing has been around for awhile now, and we are starting to see technicians who have never balanced a traditional color print. Since the basics of many digital tools are derived from the traditional photo process, this new lab tech is lacking the necessary color theory skills that existed in the traditional process.

The second major source of color balance problems is the scan-edit-output in the digital process. Many people assume that when they set up a digital imaging system, they plug in the scanner, attach the monitor and printer, and are then ready to create color balanced images. Not so.

The image may look good when it is scanned into the computer, but when it is output to a digital printing device it is way off-color. The problem could be the printer, the monitor, or even the original scan. In other words, your whole system may be out of whack.

If you start at the beginning, you will find that most scanners have a test image for balancing the entire system. The scanner itself will have some minor adjustments that can bias all images scanned into your system.

Most editing software programs today have a monitor setup that lets you adjust the gamma of the screen for red, green, blue, and gray. When you go to monitor setup, you merely match the colors of the inner square to the outer square, and save that information as the default.

Once you have this all set, load the test scan into your system and see if it matches your scan. Most monitors today have adjustments on the front that also allow you to tweak the viewing system. Keep in mind that if you balance your monitor for a specific lighting setup, you should keep it constant. If you use several editing programs, you should load the same image into each and compare them, using a split-screen function.

Now that you have your software and monitor matching each other, it's time to run some output images. Match each with the screen image and the image originally scanned into your computer system. When you have the scan, monitor, and printer output matched, you should try a variety of different images. You may find that even more tweaking is necessary.

Human color bias is another source of color balancing problems. Most people naturally lean toward a specific color when trying to achieve a neutral color balance. Having others look at your color balance may not help, because their bias may be in the opposite direction. For example, Jack has a bias towards magenta, while Sue leans to cyan. The best way to find your color bias is to load in a 24-bit color image of a grayscale that you have scanned. Try to balance the image as best as possible. Make a copy of the image, convert the copy into a grayscale image, and then back to a 24-bit color image. The color bias will become very apparent. Try this test several times to be sure. If the bias is consistent, you will know which way to test when you do a digital color ring-around or "variations," as it is now called.

OK, let's assume your system is balanced, and your lab techs know their color bias. The next problem is that they still have to balance the images, using a variety of software tools that often scares away most beginning image editors. The tools are much the same as traditional photo tools, just more sophisticated. Color, contrast, gamma, exposure and curve controls can all affect the color balance of the final image. Unfortunately, each piece of editing software attacks the problem differently or uses similar tools under dif-


*Manual Color*


*Using gamma curves to correct color*


*Using level equalization to color balance*

ferent names. Some of the tools use manual adjustments, while others use an "Auto" function. Image editors need to learn how to use both types before they start editing large quantities of images.

The most common manual tool is the red, green, blue color balance tool. A slider moves from one color to its opposing color and the changes are displayed as they affect the final image. Once you have moved one or two of the sliders, thus obtaining a proper color balance, you can save that change to the image. This type of color correction can be very time consuming, which can cut into the lab's profit margin.

A second system for color balancing is called visual color balance. It's not fully automatic, but it does cut down the editing time considerably. When you activate this function, the program makes a digital ring-around. The original is in the center and variations of red, green, blue, cyan, magenta and yellow circle around it. In addition, there is another set of three images with light, normal and dark variations. The entire screen can be fine- or coarse-adjusted. To make a color correction, just pick the color shift around the original. When you do, it moves to the middle and a new set of images circle around that image. If the image gets dark or too light, you can jump over to the exposure variations, and then back to the color variations. When the image in the center is balanced, exit and those changes are automatically made to your image.

When editing software first came on the scene, most had an auto-color correct function that rarely worked. Today, software has improved, so try this function before making a manual edit. If it does not work, undo and try the visual balance method. Only the most difficult images will require a full manual edit of the color balance.

The latest and greatest auto function is called "Level Equalization." This auto function can adjust color balance, exposure, and contrast with one press of a hot key. We have found that more than 50% of the images we edit can be fully corrected using this function. It saves time, and makes life easier. Remember too that the faster the editing, the higher the profit margin.

Until now, we have been concerned with images that have pure linear color shifts. What about those images that have color cross-overs? No amount of color correction will provide a good color balance. These images require corrections to the red, green or blue gamma curves. For example: If your image has a red shadow and cyan highlight, an increase in the red curve will drop the shadow density and increase the highlight density. Generally these adjustments will not fully correct the color, so the image will still need overall color correction once the crossover is removed. a more advanced method would be to select an individual RGB channel, and edit either the highlights or the shadows.

Another function appearing in some of the new software is a white, gray, and black eyedropper balance. With this eyedropper, you can assign a specific area to a pure white, black, or 18% gray tone. When the eyedropper touches a specific area, the rest of the image falls in line.

For example, if you find an area in the image that you want to be pure white, simply take the white eyedropper and touch that area. The image automatically shifts to accommodate that change. You can do the same with a black eyedropper. If your image has an area that is supposed to be 18% gray, touch it with a gray eyedropper it the whole image shifts accordingly. Only a couple of software programs have a gray eyedropper. Corel Paint 7 even has a target gray eyedropper that lets you pick any area in an image and make it any level of gray. The rest of the image will shift to match the change.

We found that no one editing program can do it all. We switch between programs for those images that refuse to easily come into balance. We try all the editing tools and practice on the clip-art images that often come with the editing programs. Surprisingly, many of these images are off-color and thus good candidates for helping improve your color balancing skills.

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