

Why your Photoshop color separations are wrong – and how to fix the problem

by Brian P. Lawler

Recently I got involved in a project studying the gamut of color available printing in with CMYK (cyan, magenta, yellow, and black) inks versus the colors that of several expanded-gamut printing processes. Expanded-gamut processes are those that use more than the typical four colors of ink to express color images with brighter greens, reds, and blues. Pantone's *Hexachrome* is one example of an expanded-gamut printing process.

When we queried the printer who will be testing the colors in the study about how he wanted the color separations made for traditional CMYK pigments, he responded that we should “just make them with Photoshop.” When I asked for additional detail, he said, “Just pull-down from the *Image* menu, then to *Mode*, and then pick CMYK.”

And right there is the crux of a problem that besets our industry: most of us are converting to CMYK with the wrong default CMYK profile set. The fact that he did not know exactly how to make a separation for his own process indicated to me that he was working with the default settings in Photoshop.

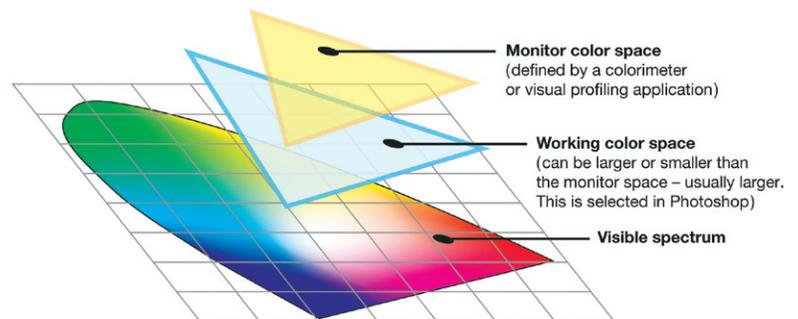
The SWOP Meet

I am going to stick my neck out here and estimate that as many as 90 percent of Photoshop users in North America (I'll stick to this continent for my assertions in this essay) make their color separations incorrectly. That's because Adobe Photoshop is set *by default* to make SWOP color separations. And, I will also bet that fewer than one percent of Photoshop users *should be using* SWOP for their separations when there is a better way to do it located in the same folder of available Photoshop color profiles.

It's possible that some of you don't know what SWOP stands for (thereby adding to the problem): SWOP is an acronym for *Specifications [for] Web Offset Publications*, a North-American standard supported by the advertising industry, the prepress industry, and a number of publications printers. It is specifically directed to *Web Offset Publications*

– and I'm not talking about the World Wide Web!

I know we all *read* web offset publications (*Newsweek* and *Sports Illustrated* are two good examples), but *almost none of us* prepare artwork for web offset publications. Of all the designers in my circle of friends and associates, *only one* produces artwork for web offset presses. Most are busy preparing for sheet-fed offset, which is where the largest number of jobs are printed in the world (web wins in the volume category, but certainly not



Adobe Photoshop's Working Color Space allows the image to exist on a parallel plane with its own color characteristics and gamut that is independent of the monitor and the output device.

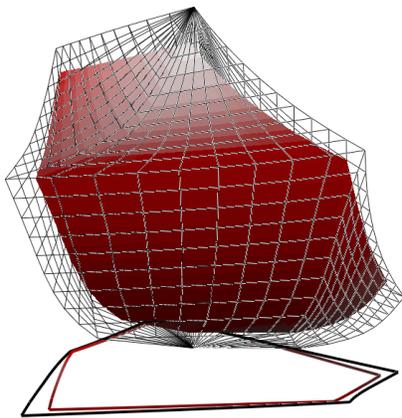
in the number of jobs). Some others produce work for flexography, which is even less suited to SWOP.

Yet, I'd wager that most of them prepare files for web offset presses, and don't even realize it's a problem. Let's look at the history of this problem:

Photoshop's Dark Ages

Way back in the Very Dark Ages (defined as 40C, 30M, 35Y and 100K), Adobe *Photoshop* assumed that all the color that was reproducible in a document had to be within the gamut of color *that could be displayed on the computer display*. This was an assumption that was not only incorrect, but which caused Photoshop to be derided by prepress professionals (especially those with who had access to high-end equipment including drum scanners and proprietary prepress computers to that could handle the full gamut of CMYK for quality printing). These experienced craftspeople observed that the color that came from Photoshop was not as good as the color produced by their more advanced prepress technologies.

Several people on the Photoshop team noticed it, too. Led by Chris Cox, a member of the software development staff for Photoshop, the team came up with a plan to give Photoshop a better relationship with color. The result was *Photoshop 5.0*, which, in October, 1998, decoupled the color in the image from the color on the computer display for the first time. They developed the first version of Photoshop that used what is called the *Working Color Space*, effectively an ICC profile, that describes a color space inside of which an image's colors reside while the observer looks at a display with an often-smaller gamut of colors.



Further proof: The black wireframe represents the colors of the U.S. Sheet-fed Coated v.2 profile, while the red shape represents the colors available in SWOP. The sheet-fed profile provides for a significantly larger gamut of colors as well as better highlights and shadows. SWOP intentionally clips the highlights and shadows (viewed from the cyan side. Blue is on the right, green on the left).

Instead of heralding this achievement, most of us were left befuddled. It took me *months* to get a clear picture of what had taken place, and according to one friend at Adobe, their tech-support lines nearly melted in the weeks after Version 5.0 shipped. Adobe had unleashed a monster, and the industry wasn't prepared for it.

Of the several settings added when Photoshop 5 shipped was the default conversion to CMYK into the SWOP color specifications. The default RGB color space was set to sRGB (also inappropriate for professional graphic arts purposes). The Photoshop team adopted SWOP and sRGB as defaults because they were established standards at a time when no others existed. (To date there is no sheet-fed standard, though one is under development; the Adobe CMYK profiles mentioned later are the closest thing we have to an accessible standard today.)

The changes to Photoshop caused a problem for

creative professionals, but once we learned how to use the new tools, we saw that the qualities of color from Photoshop are superior.

Once I was able to grasp the meaning of the change in Photoshop, I became a bigger fan of the program, extolling the virtues of the program now that the color in the image is *independent of the color of the display*.

I also applauded the developers for adopting the ICC standard for *all* color conversions in Photoshop, including RGB, CMYK, and the internal Working Color Spaces. For the first time it was possible to make accurate and correct color separations using Photoshop. Anyone can do it, and all you need to know is how to set the color settings correctly for the kind of work you do.

I don't print magazines – do you?

Stop and think about SWOP for a moment, and you'll join me in the realization that *SWOP ain't us* (at least not very many of us)!

Most Photoshop users print their work on sheet-fed presses, but most Photoshop users are blindly making color separations for a process *by which their printing almost certainly will not be done!*

Let's look at the details: The SWOP standard includes the following assumptions:

- ✓ Web-offset printing at high speed
- ✓ Heat-set drying with chillers
- ✓ 55 lb. semigloss pulp-based paper stock
- ✓ 133 lpi halftone frequency
- ✓ elliptical dot halftone patterns
- ✓ 95 percent maximum shadow dot

Hmmm. When I look down that list, I notice that *not even one* characteristic is common to the work I prepare. I create art for high-quality sheet-fed offset with these characteristics:

- ✓ Sheet-fed presses (typically less than 10,000 impressions per hour)
- ✓ very tight register (<.003 in. error)
- ✓ fine gloss or dull-coated papers
- ✓ high-frequency halftones (usually 150, and occasionally 175 lpi)
- ✓ modified round-dot halftone patterns
- ✓ air-dried ink

No wonder my SWOP separations don't look as good as they could!

How to do it correctly

There is a lot to be said for making a proper CMYK color separation for sheet-fed printing. When you use the right separation profile, you will get better highlights, measurably deeper shadows on glossy

paper, and a slightly larger color gamut. Making the right kind of color separation will yield a result that will make you – and your clients – feel better about the printing you produce.

Adobe has made it easy to get it right in the more recent versions of Photoshop (CS and CS2). As a result of feedback from users, and to clarify the many color settings, recent versions of Photoshop classify the settings into categories of work. This makes much more sense, and helps people choose settings that match the work they do.

These are some of the available presets in the current version of Photoshop:

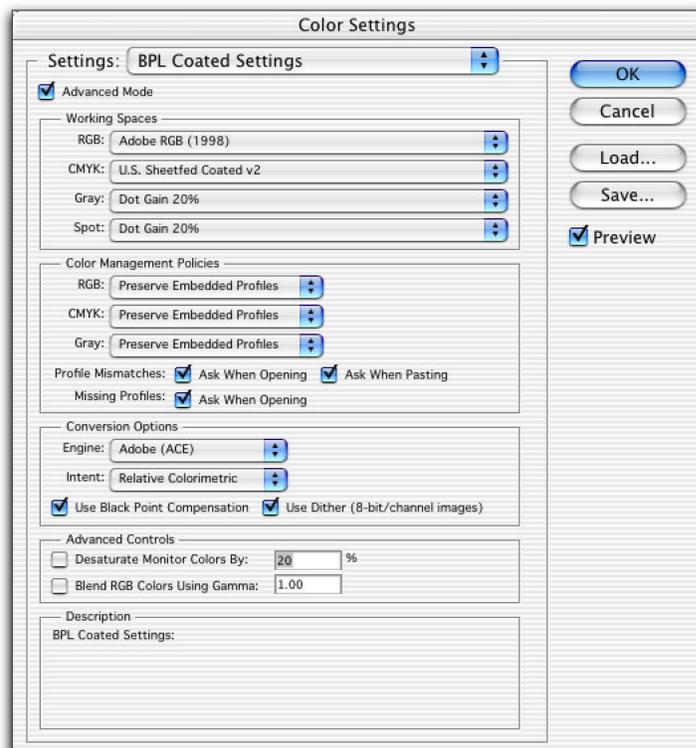
- Color Management off
- ColorSync Workflow
- Emulate Acrobat 4
- Emulate Photoshop 4
- various European Prepress Defaults
- various Japanese Prepress Defaults
- North America General Purpose
- Photoshop 5 Default Spaces
- U.S. Prepress Defaults
- Web Graphic Defaults
- etc.

By choosing from the list the kind of work we do (primarily prepress or Web-based graphics), the basic settings are closer to being correct than allowing the program to default to an unknown or incorrect set of defaults. And, by changing one of the defaults in the prepress default settings, we get a very good combination of controls that serves our needs well.

Changing the settings

Open the *Color Settings* in your Photoshop application in the *Edit* menu.

- ✓ Check *Advanced Mode*
- ✓ Choose *U.S. Prepress Defaults* from the pull-down menu entitled: *Settings*
- ✓ Change the Working Spaces: CMYK to *U.S. Sheetfed Coated v.2* (if your work is designed primarily for uncoated sheet-fed printing, you should choose *U.S. Sheet-fed Uncoated v.2* as your Working Space).
- ✓ Save your settings (which until you save it will be called “Custom” – give the settings a name like “Gloss Prepress Defaults.” Choose the *Adobe ACE* engine if you prefer Adobe’s software; choose *Apple ColorSync* (called *Heidelberg* on Windows machines) if that is your preference. Some people



The *Color Settings* palette in Adobe Photoshop has the settings for various color conversions. The best recommendation for most prepress people in North America is to use *U.S. Prepress Defaults*, then change the CMYK to *U.S. Sheet-fed Coated v.2*.

argue that these color engines make a big difference, but I don’t see any difference.

- ✓ Click *OK*
- ✓ Take the rest of the day off

The two available sheet-fed profiles that come with Photoshop are quite effective. Though I prefer to use a custom profile for a press and paper combination if one is available, these profiles do a much better job for sheet-fed printing than SWOP will ever do.

And, next time you convert from RGB (digital camera, scanner, original art) to CMYK, from *Image>Mode*, you’ll get a better separation from Adobe Photoshop. The results are visibly better, and should please everyone in the reproduction chain.

And, for the one percent of you who are preparing art for heat-set web-offset printing – use *U.S. SWOP Coated v.2* – that’s what it’s for.

■ This is one of numerous essays I have written for practitioners of the graphic arts. You can see more at my Web site: www.thelawlers.com.

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