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## COLOR MATCHING

### Proceed With Caution

Pantone Solid to Process book is much improved but unexpected pitfalls lurk

*by Stephen Beals*

This past year, Pantone issued a landmark new color swatch sample book that was meant to bring the company's color-matching system into better sync with the digital production process.

Over all, they did a great thing, but, as with all things related to digital print production, there are some anomalies that should be known when you go to work with the new system.

Some of the confusion that the new swatch book created in the online forums can be seen as a measure of how far many of us still have to go to really understand color management. And actually, what Pantone did not do may be just as important as what they did do with the new swatch.

Pretty much every problem relating to matching colors on the press, whether with the old Pantone system, the new one or without Pantone colors, is caused by the wide divergence of equipment, software, workflow and know-how employed by the myriad printers around North America. In spite of all the calls for industry standards, almost every printer employs a unique combination of materials and process: inks with different hues, different printing orders and different line screens. The printing world is awash with diversity and that causes a significant problem when manufacturers attempt to adopt or establish standards.

#### **That Handiest of Tools - The Pantone Matching System**

For many years - long before the age of desktop publishing and digital printing - Pantone has published those familiar color swatch books for matching color. In the early days, the concept was fairly straightforward. If you print a book of ink colors under very close tolerances, and you assign a number to each color in the book, you have provided a way for printers, designers and ink manufacturers to communicate color. The idea was (and remains) that if you print 1,000 books, color number 485 looks like the same shade of red in each and every one of these books. The designer can confidently predict that when he specifies Pantone 485, the printer will order Pantone 485 from his ink supplier, and the color of the finished piece will look very much like the sample swatch of color in the designer's book.

Of course, nothing is ever quite that easy. For example, the same ink color can look very different on different paper stocks. Inks will invariably print brighter on coated stock than uncoated. And most importantly, with the rise of four-color process printing, many of the colors in the Pantone Matching System books simply could not be matched with process color inks. It was physically impossible.

Back in 1982, Pantone responded to this by printing the first Pantone Process Color Simulator showing the closest available matches to established Pantone colors using CMYK inks. The book effectively demonstrated the difference between solid Pantone colors and the closest simulation of that color achievable with process color inks. By today's digital standards, that book has become a bit of a dinosaur. It was printed using 133- line screens on a yellower paper stock than is used today using a now-seldom-used YMCK ink rotation on the presses.

Because standard screen packages commonly used by printing companies came in 5 percent increments which severely limited the number of colors that could be matched, Pantone worked with screen manufacturers to develop a unique A-Z screen tint system. These special screens were designed to take into account the limitations of the human eye, which does not see color in a linear fashion. This accounts for the somewhat odd percentages including fractions found in the early books. The A-Z books provided a closer color match and also provided the screen manufacturers with a new market for their screens.

In 1990, Pantone updated its book by increasing the line screens from 133 to 150, the predominant line screen used at the time by high-end commercial printers. Further, Pantone produced the book using digital imagesetters to more accurately demonstrate the process color result using a laser-generated dot pattern. The A-Z screen tint percentages remained the same to provide compatibility with the software applications.

### **Time for a Change**

Two years ago, Pantone brought its Solid to Process book up to date, reprinting it with 175 line screens, brighter paper, a KCMY ink rotation and digital screening. The fly in the ointment, in the minds of many users, is the fact that Pantone also had to modify some of the screen percentage formulas used in the book. The smaller screen tint increments available in digital screening allowed for more accurate process matches to solid Pantone Colors and provides users with closer color matches than previous versions of the book. This meant the actual hue of the ink swatches also changed in some cases.

Because by 2000 almost all prepress work and a substantial majority of proofing was being done digitally, this meant all of the tables supplied by Pantone to partners like Adobe and Quark also had to be updated. But it is not obvious to the users of these software programs which version of the Pantone color tables are being used.

### **Danger!**

There is some danger lurking for inattentive users. For example, Quark 4.0 uses the old Pantone formulas and Quark 5.0 uses the new ones. Adobe InDesign 2.0 and Illustrator 10 use the new color tables, but in Illustrator 10, there is a range of colors where the data used was incorrect. Adobe acknowledged this early on and posted a support document referring users to the Pantone website, [www.pantone.com/support/support.asp?idArticle=73](http://www.pantone.com/support/support.asp?idArticle=73), for a free update. CD ROMs with the new data were also shipped with the product during the initial launch for almost an entire year to enable the software applications to get updated.

Where changes have been made, the new formulas will be closer to the actual Pantone color than the old ones. However, many users are not as concerned with matching a specific color as matching last year's press run. The differences can be particularly noticeable when light screen tints of a solid color are used.

### **Other Issues**

There are a few additional issues printers and designers who want to use the Pantone Solid to Process tables need to be aware of:

1. Pantone has also renamed the colors in the tables. Pantone 485 is still the same red you've always known, but older versions of the various tables used in typical publishing programs like Quark, Illustrator and PhotoShop may have added different tags to the color. You are no doubt familiar with the fact that Pantone 485 has for many years had a coated and uncoated version, logically called Pantone 485C and Pantone 485U. But, you may encounter Pantone 485CV, CVC or CVU in the tables of older versions of the publishing programs. CVC and CVU were suffixes for "Computer Video Coated" and "Computer Video Uncoated" to signify that this was a video simulation of a Pantone Color. This suffix would sometimes be truncated by the publisher, which is why it would sometimes be represented as 485 CVC in one software program and 485 CV in another.

Once again, what Pantone attempted to do is make things simpler and more logical. The printed color guides and the color in the digital tables now match. The color tables in the latest versions of Quark, Illustrator and PhotoShop reflect this. Because the new guides are printed on Coated, Uncoated and Matte papers, the codes are either C or U or M. In the short term, of course, this adds to the number of possible codes since many programs which have not yet been updated are still in wide use.

If you print many spot colors, you are probably aware that most high-end Raster Image Processing (RIP) devices will see each different name as a different color. This can lead to major output problems. Since the default name for a coated Pantone ink in Illustrator 9.0 is CVC and in Quark 4.1 the default name for the

same color uses the extension CV, most RIPs will print them on two different pieces of film. While there are fixes like Creo's spot color extension for Quark, which will marry those colors together on output, it seems like a problem that never should have occurred.

2. Using color profiles in programs like PhotoShop can play havoc with Pantone colors. PhotoShop stores Pantone Colors as L\*A\*B\* and CMYK, so when the rendering intent is changed, the ink percentages in the Pantone formulas change along with them. That makes sense, of course: profiles are intended to adjust the input from any source to match the specific output printer. When you profile a printer you are not measuring dots at all, but using a spectrophotometer to measure the saturation and hue characteristics of that printer.

Since all printers and presses have different printing characteristics, selecting colors by dot percentages and ink density is really a poor way to do it. The folks at Pantone will readily admit you should not apply a profile to a Pantone Color specified in CMYK color space. But in the real world of printing, a lot of folks are still reading ink dot percentages to "control" color.

Try this: Create a Pantone 287 block in PhotoShop, and then apply different color profiles to it. The percentages of that color block will shift, sometimes dramatically depending on how different your profiles are. What happens in the real world is this: people are applying profiles when they shouldn't. A profile should really only be applied on final output. It is fine to view a photo in the output profile so you can see what the output device will do to the image, but if you actually apply that profile, you are already creating the color transformation. When the output device gets hold of the image, it will apply the transformation again. The fact that you want to know what the output device will do to the image is the reason for creating the profile in the first place. You don't want to apply that twice. It's sometimes referred to as "double profiling" and can completely ruin an image. The chances of having a Pantone color survive double profiling and look anywhere like it should are "slim" to "none".

3. If you are printing by GRACOL guidelines, or by SWOP standards, you should be aware that Pantone used neither standard when printing the new books. The company says "We evaluated both the GRACOL guidelines and SWOP standards to achieve a well-balanced process printing publication that falls within commercial printing tolerances to ensure achievable color reproduction."

The fact is that both SWOP and GRACOL standards would not allow nearly as many accurate color matches as Pantone was able to achieve. The color gamuts achievable under these standards are simply far too limiting when you are trying to show the ability to match as many Pantone solid colors as possible using CMYK inks. Pantone was opting for press settings that could achieve the largest range of good matches while staying within a tight tolerance window to match the solid colors in the book.

#### **The Long Road - A Possible Solution**

Some have suggested that the best way to handle the color-matching dilemma is to use your client's Pantone color book, but to haul out your handy spectrophotometer and read the L\*A\*B\* values of the swatch. You can then export those values to many RIPs, which can take responsibility for getting the values right for your presses. Once you're sure you have hit the color, you can revise the look-up tables in your software to correspond to your own workflow. It may be worth the time and hassle to get the right color for an important customer or a special color that will be used many times.

Pantone says: "We tested this so-called device-independent workflow across virtually all popular RIP/profiling combinations. Almost without exception, we view the color results as it pertains to Pantone color matching to be unacceptable. Only the best color scientists have been able to demonstrate acceptable results to us."

Some posters to online message boards have flamed the company pretty badly. The truth is, Pantone is not entirely responsible for the types of problems discussed here. The conversion from analogue to digital has taken place over a long period of time and the demand not to change is often stronger than the push to enact changes. Additionally, some software developers have been slow to implement the changes and have constructed user interfaces that are at best confusing and at worst more likely to cause more problems than they solve. And in spite of the chat board comments, Pantone says they have not received complaints on their various help venues.

The fact that GRACOL has yet to become a clear industry standard has severely limited its usefulness. Perhaps it is reasonable to say that if Pantone had adopted it

as a standard for its books, it might have come a long way to solidifying it as an industry standard. The standards controversies could be a separate article entirely.

The new Pantone Solid to Process book is certainly an improvement over the old one, but users need to be aware of the possible pitfalls. Most of them will go away over time as software developers and users adopt the new tables. It is not the digital reference tool many would like it to be. It is a very handy tool for understanding color communication in process and solid color. **D**

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