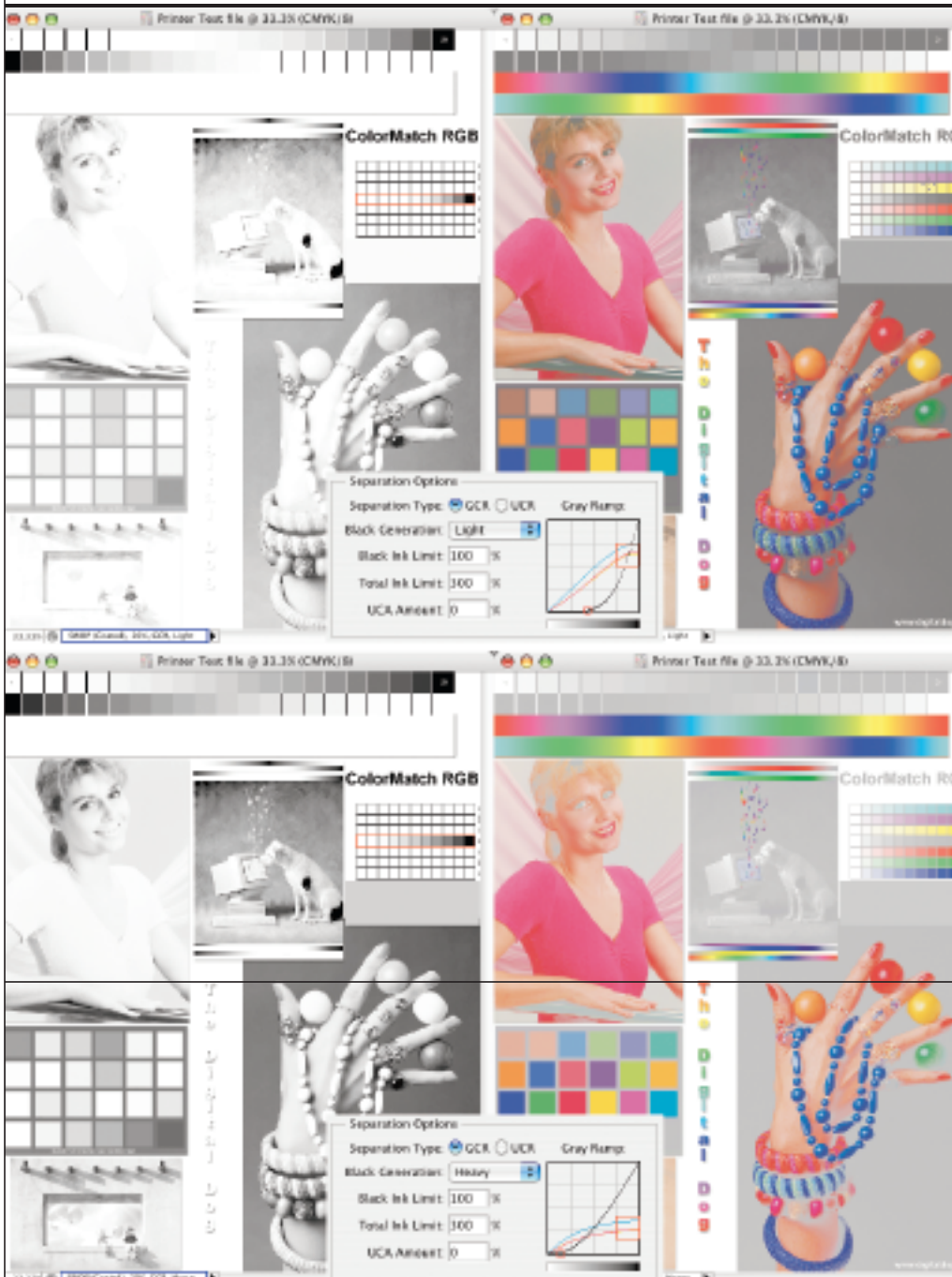


If your work's destined for press, you should understand the process of CMYK conversion, even if you don't do it yourself.

## CMYK: The devil you know...



The effect of GCR on the black channel and CMY channels in Photoshop. Notice how a light GCR produces a fainter black channel, indicating that more CMY inks are used to produce the same colors. The opposite is the case with high GCR. You can use Photoshop's Custom CMYK engine to test this yourself once you set the Separation Options as pictured.

*Editor's Note: This is the second in Rodney's two-part series on CMYK conversion. The first article appeared in our March 2007 issue.*

Imagine loading 100 sheets of paper into your inkjet, printing the same image on each, and evaluating the color of the prints, and finding that you'd selected the wrong media settings in the driver. Magnify that expense by a hundred times, and that's what it costs to make the same mistake on a printing press.

To prevent such surprises, you can output a single proof on a secondary output device that's designed to match the colors reproduced on the press. Both print buyer and print shop can evaluate the proof for accuracy before proceeding. That print is called a *contract proof* because it represents an agreement between the two parties that the color on the proof is acceptable, and if the press output matches the proof within a reasonable tolerance, the buyer will pay for the job. If something unforeseen happens and the output is a mismatch, the printing company will accept the cost to fix it. For your conversions, it is often best to target the contract proofing system rather than the actual printing press.

There are many contract proofing systems available, such as Kodak Matchprint, Kodak Approval, Fuji Color-Art, and DuPont Cromalin. Many photographers and designers call process simply "Matchprint," which is incorrect for any system other than Kodak's. When you discuss contract proofing with your print shop, don't use the term "Matchprint" unless you know it's the Kodak proofing system it uses. Say, "Which contract proofing system are you using?" and you'll sound like you know what you're talking about.

One standard output behavior, TR001, is based on SWOP standards. If the press and the contract proofing system can conform to

this behavior, you can use the Photoshop U.S. Web Coated (SWOP) v2 profile in converting your RGB files for the contract proof. Be sure to ask the printer if their contract proofing system conforms to TR001 SWOP before using this profile.

If you must create your own CMYK ICC profiles, you'll need a few specifications from the printer. There are different methods for profiles to separate RGB into CMYK. One is known as *Total Ink Coverage* or *TAC*. If a printing process uses four colored inks and the maximum amount of each is applied, the TAC would be 400 percent. In reality, no press can handle this much ink. The correct total percentage of ink is defined by the press, the print process and the paper used. For example, high-quality printing on glossy paper may call for a TAC of 300 to 340 percent. Newsprint,

which is absorbent, may require a TAC of 200 to 240 percent. Ask what TAC the printer prefers. If this information isn't available, estimating a value based on the figures above will generally produce acceptable results.

Other common options for building CMYK separations are *GCR (Gray Component Replacement)* and *UCR (Under Color Removal)*. Different mixes of CMYK inks can produce the same colors. Ideally, the less ink used, the better. By substituting the less expensive black ink for CMY inks to produce the same color, the press sheets will dry faster and the printer will save money. GCR and UCR both work this way.

UCR identifies neutrals in the separation and substitutes black ink for colored inks where possible. GCR, a more sophisticated process, works with many colors in addition to neutrals.

This process is possible with an inkjet

printer, but the print driver must be able to handle CMYK data. Many third-party RIPs support CMYK data, and so allow you to use CMYK paper profiles to control ink usage and, in some cases, control color purity in neutrals. Less CMY ink means more consistent gray balance. Using high GCR values is an advantage on press. For heavily saturated images, though, you would want a lower GCR value. Users who cannot separate images by content may choose a medium GCR.

Most profile-building software will allow you to define the amount of UCR and GCR for your CMYK conversion, using terms like *light*, *medium* and *heavy*. Ask your printer if they prefer one over the other, and how much of each. If in doubt, a medium GCR setting should work well for high-quality color reproduction.

You won't see the effect of GCR or UCR on a composite digital image unless you view the individual color channels. The illustration (p. xx) shows the effect of two GCR settings on a single image in each color channel. You can see the effect on the black channel when GCR is set to light versus heavy. Because this unique mix of inks happens only on the press, you won't see the overall effect of GCR or UCR settings on an in-house or contract proof.

Knowing the recipe for creating a CMYK conversion for a contract proof or the press, you can produce an in-house proof that closely matches this process. The color gamut of inkjet printers is large enough to contain and reproduce the color gamut of CMYK data for the press. You'll need a good ICC profile for this proofing inkjet printer,

as well as the profile for the contract proof or press. It's a far more effective way to work than simply sending the RGB data to the inkjet and hoping someone at a print shop can massage it into an acceptable CMYK file. The key is having good ICC profiles to produce a CMYK to RGB conversion for the inkjet printer. Since most inkjet print drivers can only handle RGB data, the process looks like this:

- Original RGB document in [for example] Adobe RGB (1998) is converted to CMYK for press.

- CMYK file is converted to RGB for Epson 3800 printer.

If you have a print driver or RIP that *does* support CMYK data, when you send a file through the RIP, the data will be converted to the color space described by the

proofer's paper profile, essentially producing a CMYK to CMYK conversion.

Photographers who control the final CMYK conversions for print has finer control over the appearance of their images. They can bill for CMYK conversions plus color proofs, and might find they have a competitive edge over photographers who can't offer such services. None of this comes without an investment in learning about prepress, and likely an investment in hardware and software to build your own profiles.

Even if you prefer to spend your time shooting and handing off RGB files to your clients, if your work is destined for a printing press, having an idea of how the process works can make you more valuable to your clients. ■