Proofing

ICC based colour management can produce results that are so good it's almost scary, for a relatively low amount of money. Certain factors need to be in place for the results to materialise, and accurate proofs can be produced.

Reference CMYK

Before we can even touch on the subject of proofing or proof printing we need to be able to define exactly what we are proofing or simulating. Or in other words we need to know a lot about the print we are to simulate. Let's call this, the object we are to simulate, the "reference" print.

To be able to produce optimal CMYK print, multiple things must fall into place: Our images and graphics must be adjusted correctly in regard to colour balance and contrast. They need to be separated/converted correctly to the type of print to be produced. The (offset) printer must be in its optimum state – the state where the relative print contrast for each colour is highest. If the printer is run at higher or lower ink levels, the gamut and colour contrast of the print will suffer.

For us to be able to make the best possible separation (to get optimum results on print), we need to know the characteristics of the printer, paper and ink, which is typically found by producing an ICC profile. This profile describes the combined result of the printing machines settings (density) with the actual paper, ink, dampener, blanket, humidity, temperature, Image setter or CTP's TIC curve and a few other things as well.

If for instance we have a 50% grey colour in RGB which we convert to our "reference" profile, this colour will be printed as 50% grey, provided the printing circumstances (all of the above) is similar to when the profile was built.

Perfect simulation

If we are to proof a document which is separated with our "reference" profile we simply need to tell the RIP (or Photoshop) that this is the profile we are simulating and have either convert to the proof profile and voilá, a perfect simulation.

Erroneous CMYK

Suppose our offset printer (this is a practical example from a Komori 6 colour A0 machine) with the type of paper and ink we use, need to use CMYK numbers of 48, 40, 40, 3 to produce a 50% grey. If you use a Euroscale Coated v2, Profile to convert this 50% grey, you will end up with CMYK 55, 42, 42, 9. Supposing the printer prints in a similar manner as when we profiled it, our 50% grey will end up on print as 54% and be a bit too cyan. And this is exactly what the proof will show!

However, if the print manager alters the behaviour of the press, so the 50% grey is reproduced correct (by altering the ink balance on press) the proof will no longer be accurate, and the press will run at a less than optimum state. But unless the printer compensates for the wrong separation, the print run will be wrong, and might have to be reprinted.

The reason for this hard dilemma is that the profile used to separate (Euroscale Coated v2) isn't appropriate for the printer, paper and ink to be used. As a result, the printer needs to alter the behaviour of the press, which again is why the proof doesn't match the print. The proof is correct, but due to choosing a profile, which isn't appropriate for the printer, the printer needs to play catch-up to compensate for our wrongdoings.

Had we used the Euroscale Coated v2 profile as the reference profile in our RIP or Photoshop, the proof print would display the 50% grey as 50% grey. For this to match, though, we are absolutely dependant on the printer to alter his machine to a less optimal state. If he does though, we will have a good match.

Matching a reference print

As you hopefully understand after reading the above a few times, it is essential to separate images and graphics via a profile that accurately describes the print to be produced. It's quite common, unfortunately, to use a "standard profile" for the colour separation, which results in proofs of dubious quality (possibly because the proof is set up to simulate something else entirely). Then the printer tries to match the proof visually by altering the ink-balance. This sometimes succeeds but it takes time (read MONEY) and it requires running the press at a setting, which can't exploit the full potential of the press.

If one doesn't have a reference profile describing the press behaviour, it is unlikely that a proof will match the press (it would require a one in a billion guess). If it is a requirement to match this print, you will have to adjust the reference profile, or the proof profile. Not because the proof profile is wrong, but because the reference profile used as a base for the simulation doesn't accurately describe the press.

In short, to be able to simulate anything accurately, we need to know (as in having a profile describing) the state the printer is in when doing the print run. If the printer is unknown, or doesn't have a custom profile, the only sensible solution is to use a standard based profile. This profile should be used for making colour separations and as a reference profile for proofing. Equally important, it should be clearly communicated to the printer which standard was used for the job. This will give him a fighting chance to match the proof.

Standard based profile appropriate for print jobs could be based on the ISO 12647-2:2002/2004 (Europe) or SWOP TR001, GraCOL (US) or similar.
