Last year at the FFTA Forum in Nashville, TN, attendees were introduced to Project FOG (Flexo vs. Offset and Gravure). Since that presentation, flexographic printers have been saying, “Can we do this in our shop? Can we produce offset-quality four-color process color?” The answers are “yes” and “yes”! It can be done.

It is logical to assume that to match four-color offset process printing, we must match offset standards (SWOP). Flexographic printers struggle to achieve SWOP densities with their yellow, magenta, cyan and black. In these struggles we see a loss of production time, damaged plates, bad product and worse. Over time, frustrations set in and attack the bottom line. Although early, identical images can be produced from both offset and flexographic presses – and without matching offset densities – most flexographic printers have not been able to make it happen.

The first key to making it happen is matching the dot-gain profile of the offset press, as we have done for years in analog proofing and now do with digital proofing. This is accomplished by creating the cutback curve through the traditional densitometric characterization process, in effect reinining in the normal flexographic dot gains, which are in line with uncoated offset web printing.

The second key is utilizing that cutback curve to optimize our four-color process flexo gamut. To produce as many colors as possible for the flexo process to look like the offset process, we need to print the widest possible color gamut, as the average offset press has a wider color gamut than the average flexo press.


If you think color management is only meant for pristine laboratory conditions with color scientists in white lab coats working with an unlimited budget, stay with us. We are going to show that color management is neither rocket science nor especially expensive.
If you have a $100 color bubble jet printer, you have a device that is capable of being color managed. If you have any Adobe products (PhotoShop, Illustrator, Acrobat, etc.) in daily use, then you have color management-capable software. In fact, we would argue that if you do not understand color management, then you no longer fully understand PhotoShop, Illustrator or Acrobat. You can’t even open a file in PhotoShop 6.0 without making a color management decision, and if you don’t know how to answer that initial PhotoShop query correctly, you will alter the color of that image before you ever begin to work it.

Your pressroom has presses worth between $250,000 and $1 million dollars each, and you might spend $10,000 in measuring equipment (spectrophotometers) and software (for ICC Profiling) to get into the color management game.

In addition, the color management process is built upon tight and consistent process control. By this we mean calibrated devices running in optimized conditions that are known, measurable, recorded and repeatable.

**The Test at Dunwoody**

Everything discussed in this article is based on actual testing performed at Dunwoody College of Technology in Minneapolis, MN, with students new to the printing process running all the equipment, both prepress and press. Dunwoody is a two-year post-secondary technical college with 18 distinct departments, one of which is the Graphics and Printing Technologies Center. Students graduate with an A.A.S. diploma in either prepress, flexography or offset press. The focus is on preparing students for technical and operator positions in the industry, though some students choose employment with equipment or consumables vendors.

The samples were produced on a four-color, 26-inch sheetfed offset press, a six-color narrow web flexographic press and standard prepress equipment including a Postscript3 RIP driving an imagesetter loaded with 4-mil matte film. Cyrel® plates were exposed and produced conventionally from this film. A digital inkjet proofer output all prepress proofs.

This testing demonstrated our thesis that four-color process images printed on a flexo press can match four-color process images printed on an offset press without adhering to offset printing standards, and have both match the contract proof.

**Objectives for trial:**

- Objective 1: To examine the role of ink density in matching four-color process images produced both by offset and flexography.
- Objective 2: To produce a common contract proof that both the flexographic and offset press operators could run to and match.
Objective 3: To avoid the higher-end workflows that tend to be specific for packaging, such as hybrid screenings and packaging-specific software; and avoid direct-to-Cyrel® platesetting equipment. Our aim was to demonstrate that all shops already have in place most of what it takes to properly color-manage their workflows.

Testing Parameters
We began the testing with a banded anilox roll trial. The anilox roll featured four bands. We determined the 1,000-line, 1.25-BCM, 60-degree band to be optimal for this test, giving us densities in the range of SWOP standards.

Simply stated, that is all we needed to accomplish at the beginning of the project. We agreed that running 175 LPI represented current flexo industry practices, such as in the folding carton and high-end label sectors, and was appropriate for 1,000-line anilox rolls.

Once the anilox rolls were chosen, the students calibrated all the devices to be used in the testing; ran test sheets to fingerprint the presses; ran a second set to characterize the press and proofer color gamuts; and then developed ICC profiles, which were implemented in Adobe Photoshop to original stock color images downloaded from a CD image library. Both the offset and flexo presses ran the final press sheets to the same prepress proof.

Print Contrast
We had a couple of questions that at the outset concerning the side effects of manipulating the ink densities. One of our concerns was that any significant lowering of ink densities away from SWOP standards would result in a lessening of print contrast.

Specifically, print contrast is a numeric factor achieved by measuring the density of a solid patch and the density of a 75-percent tint of that same ink and then running those values through a formula in the densitometer software. Acceptable print contrast numbers start in the mid-30s; the larger the number, the better. The larger the number, the more shadow end detail is perceived in the printed piece. The lower the number, the more the shadow end loses differentiation and detail is lost.
In the actual press trials, we decreased the ink densities four times during the flexo run to see if print contrast suffered as a result. To our surprise, the print contrast numbers held steady in the mid to high 30s, and thus shadow detail was maintained.

**Color Vibrancy**
The other concern was for a significant loss of vibrancy of color due to lowering the ink densities. It makes sense that the higher the ink density, the more vibrant and appealing the colors would be, and the greater the overall contrast between highlight and shadow. As we lowered the ink densities, would our images flatten out and lose all appeal?

In the flexo press trials, we did see some loss of color but not to the expected detriment of the images. We were able to run the job at normal FIRST (Flexographic Image Reproduction Specifications and Tolerances) densities and even lower, and still protect the color integrity of the images.

**Success**
We believe that we were successful in bringing together the three processes of digital proofing, flexography and offset printing. Through normal color management processes we were able to collect data from the pressroom; feed that data back to the prepress area; and produce optimized film and plates from profiled images that brought the disparate device gamuts together into agreement and produced incredibly similar images.

*About the author...*
David L. Brewer is corporate technical manager for Harper Corp. of America, De Pere, WI. He is also a speaker at the 2002 FFTA Forum. The author would like to acknowledge Pete Rivard, Joe Tuccitto and the students of the Dunwoody College of Technology, without whose help this project would not have been possible.