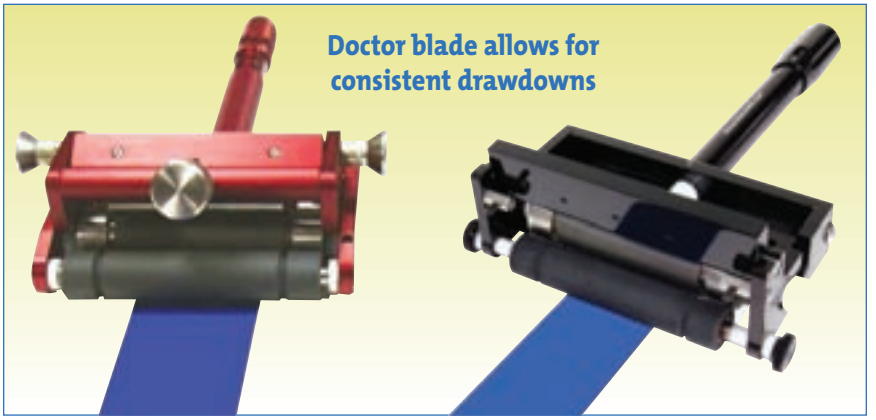
Correlating Ink Lab Drawdowns to Press

By Bill Poulson and Kurt Hudson

Ink technicians know that as helpful as the conventional hand proofer has been over the years it is not a perfect solution for color matching UV and EB inks and coatings. The conventional hand proofer has a mechanically engraved anilox and a rubber transfer roller, and the metering of the rubber roll has the same inconsistencies that it did years ago when the flexographic industry used rubber-metering rolls on press. Technique, pressure and speed of drawdown, as well as the durometer of the rubber roller, are all variables that the ink technician must take into account when using the conventional proofer.

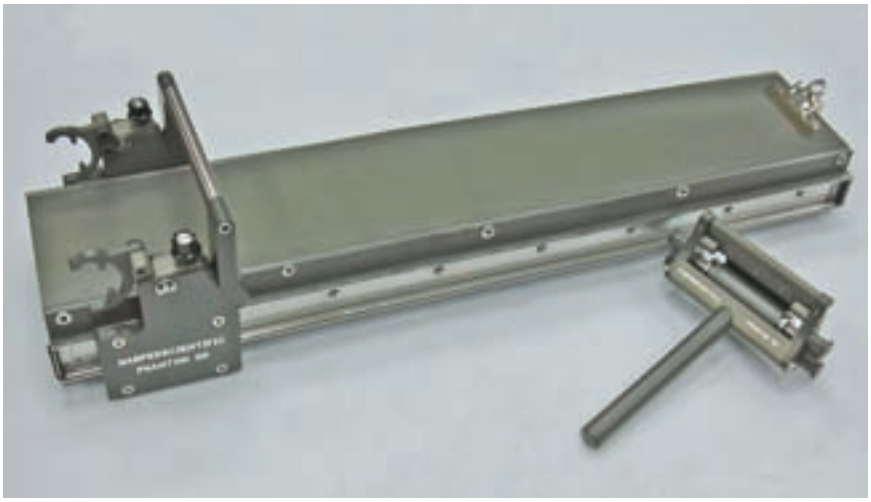


When doctor blades were introduced to the flexographic printing industry, they changed the future of flexography. Modifying a proofing device so that the anilox roller can be metered with a steel doctor blade will allow the ink technician to better correlate the lab drawdowns to the print that is run on press. The doctor-bladed hand proofer in this article uses a 45 and 55 durometer transfer roller to lay down the ink. It is equipped with a laser-engraved anilox roller that can range from 1 to 25 billion cubic microns (bcm) and line screens from 100ls to 1,000ls, thus the proofer simulates the same conditions as the pressroom environment.

Since this device has been implemented, there have been even more improvements to the hand proofer. There have been a couple of recent modifications made to the proofing device. An impression table has been added to the proofing device that will hold the proofer at a 25 psi impression while doing the drawdown—this insures a constant pressure. The most recent modification is a variable-speed motor that moves the proofer carriage. These modifications can be customized to accommodate the 8-inch wide proofer as well. There were also a few parts that have been simplified in order to make the proofer device easy to maintain and clean.

Quantify Aniloxes in Press Are Production-Ready

The proofer is the tool ink technicians need to formulate the ink



Harper's QD proofer system.

correctly and consistently. It is also important to implement and maintain pressroom procedures in order to reproduce color on press as well as can be done in the lab. But once the ink lab can consistently deliver drawdowns to the press room for production ink, the problem is not solved. In many flexo pressrooms, there are issues with color matching when the ink gets to press—issues that are directly related to the press environment. There are many variables that can create a moving target for color matching. Some of those moving targets are anilox volume variation. Volume variation can come from a number of things. Plugged anilox rollers, wrong anilox specification and anilox rollers that are worn out are the three variables that can create havoc and increase downtime on press. Using a basic handheld microscope will allow the pressroom personnel to view the anilox condition before the roller goes into the press. This allows a production-ready roller to be placed in the press and give users the best chance to match the ink technician's color swatch.

The following procedures are needed to insure that the anilox rollers in a flexo printer's inventory are all within acceptable guidelines and will be press-ready:

Standardized Anilox Inventory

It is critical that the converter has a standardized pressroom anilox inventory. This means having a systematic and methodical approach to specifying anilox rolls for every job that goes on press. Below is a suggested anilox inventory. Volumes can vary based on the substrates being used. Every substrate should be standardized so that users can proof and match volumes from 1.3 bcm all the way through the line color volumes needed in the 4-6 bcm range.

Certify the Anilox BCM

One of the main issues with flexographic pressrooms is that the anilox inventory is not standardized and the inventory is not maintained properly, which can cause volume variation from roll-to-roll and press-to-press. A roll audit should be conducted on all of the press rolls in the converter's shop. Standardizing the inventory does not mean that the printer will need to get all new anilox rollers. They will need to have their existing anilox inventory audited and certified so they know what volumes they have and what rollers can be used as they move forward with this process of standardization. The audit/certification can be done by an anilox supplier. For our process, we used a 3DQC interferometer for the volume certification.

Sampling Procedure

To insure that the proofer volumes in the lab and the press volumes on press correlate, I conducted a brief study with the help of an ink manufacturer who was using this proofing device. The ink supplier did drawdowns with the same ink that I used on press. The ink supplier had sent me ink for this testing from his lab. I went to a customer's pressroom and certified their anilox inventory using UV inks. Once the inventory was certified, I ran samples on press with specific inks that we formulated using a pantone 485 red and reflex blue. We tested all samples with a spectrodensitometer comparing lab drawdowns to PMS book swatches and lab drawdowns to samples run on press. See Figure 1.

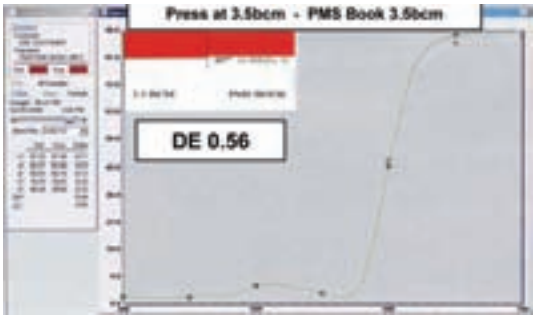
Final Results

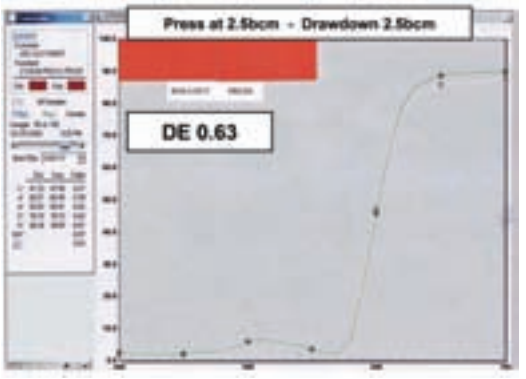
As you can see from Figure 1, all the lab samples compared to press

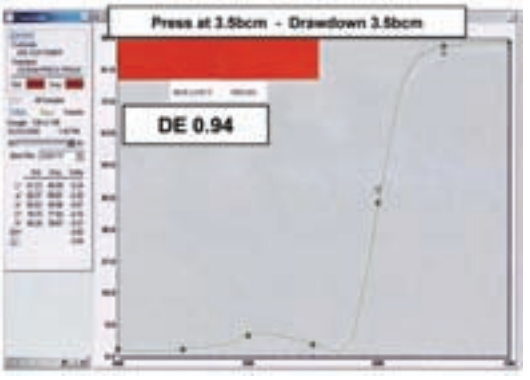
Comparing lab drawdowns to PMS book swatches.

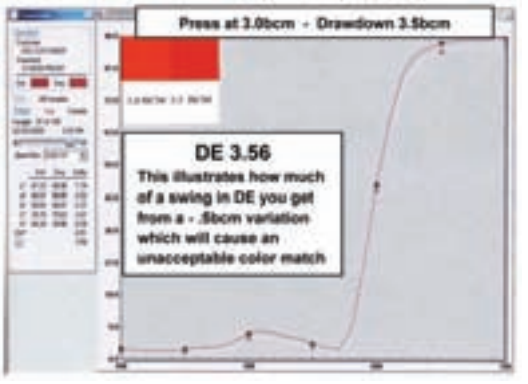
Figure 1

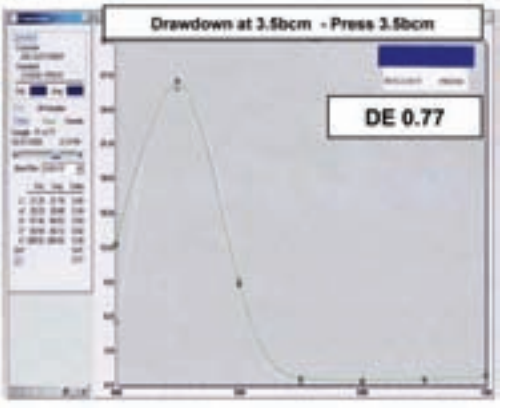
Spectrodensitometer readings

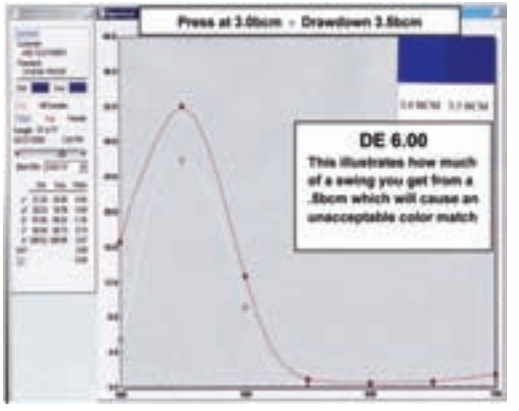












samples were < 1 Delta E (DE) on all print samples. No ink reformulating was done. It was basically a blind test in which the samples were run on press in a regular pressroom environment and the lab drawdowns were done in Charlotte, N.C., at Actega – Water Ink Technologies. We would have been satisfied getting numbers from 2DE and less. Coming in at <1DE is next to perfect. This proves that the proofer device is laying down the same ink film thickness as the press. The anilox volume numbers correlate with each other.

The quality of the laydown is as good as the press pulls that were taken. The last two illustrations show a .5bcm variation in volume that yielded a 3.56 DE for the 485 red and a 6.00 DE for the reflex blue. As little as .5bcm can create a huge shift in color. This quantifies the importance of having a standardized anilox inventory. Anilox suppliers need to insure that customers get the consistency needed to create the same scenario.

Summary

The conventional hand proofer has a mechanically engraved chrome anilox which is limited to the volumes available that can be produced with the mechanically engraved process, as compared to a laser-engraved ceramic proofer roll which has a better defined volume range. The release characteristics of the chrome roller are much different than a ceramic roller that makes that proofer obsolete for today's standards. This makes it less flexible and volumes cannot be customized. Ink technicians have worked with the conventional proofer for years with much success, but technique is the key and this makes it a moving target. The transfer rate of the conventional proofer roll is different than the laser-engraved ceramic anilox roll. Correlation is difficult because the engraving process alone does not correlate with the ceramic engraving process at all.

Since almost all press rolls used today are laser-engraved ceramic rolls, it makes more sense to use the same rolls in the lab and on the press. As shown by the documented results, the doctor-bladed hand proofer matched the press samples using the same anilox bcm range.

The combination of (1) using a proofer that meters with a doctor blade and (2) being equipped with laser engraved rolls that are made of the same material and engraved using the same method as the press rolls gave us a tool that produced a repeatable result with minimal variation.

Correlation Procedure

1. Have a standardized anilox inventory on all presses.
2. Start with a new anilox or an anilox that has a certified bcm.
3. Go to press and run the color needed.
4. Sign off on the color for final production.
5. Take a press pull or sample from the sign off.
6. Save a wet sample of ink from the color needed.
7. Go to lab with the same bcm in the doctor bladed proofer.
8. Do drawdown and qualify with your spectrodensitometer.

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