Proofing Accurate Color Matching: Ink Lab to Press

by Bill Poulson, Harper Corporation

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The flexo printing process has many variables that can act as moving targets if they are not in control when you initiate the flexo manufacturing process. The anilox is the heart of the flexo process so that is where we will start. The anilox roller determines ink color at press as well as in the ink lab which is where the color translation starts.

When I speak of managing color in this article I am talking about color matching or proofing in the ink room or ink company’s lab. The process starts by getting a color specification from the customer. 199 red, Coke red, P&G Blue, no matter what the color is the ink technician has to formulate an ink system to match color to the substrate the printer is using. Color is controlled by the amount of ink film that is transferred to the substrate. In press we control that by using a variety of volumes with the anilox rollers or anilox sleeves that the printer is using. The ink room can use meyer rods, chrome anilox rollers and ceramic anilox rollers as the instrument for delivering the ink. The variables on the lab side are mostly related to instrument type and delivery of ink volume. Each instrument may delivery the ink differently and that will create a variation in ink film thickness resulting in color variation.

The variables on the press side can happen when not using the proper line screen and volume. Other variables that come into play on a daily basis are, normal wear of anilox and ink plugging which is a byproduct of poor housekeeping. Anilox Basics tells us that we first need to have a standardized inventory for the market segment that you are running for on a daily basis. This standardization has proven itself over the years to work if it is done properly and maintained. As we all know it can be a tiring task keeping our anilox inventory clean and accessible for the task at hand every day of the week.

I would like to speak of some of the areas that may help you keep a tighter control of your anilox inventory. We need to make sure that the target is not moving. The target here is color consistency. If the press condition cannot print the same color consistency day to day, the ink lab will have problems formulating ink that can go to the press and run with little or no color adjustment needed.
1. Stabilizing the Press Condition:

Let's start with the pressroom first. Make sure that you have a standard anilox inventory selected for your process. There are many ways to fine tune your inventory. Over the past few years there have been advancements in plate materials that have directly affected ink release efficiency from plate to substrate. This improvement has allowed the printer to cut back on the amount of ink specified for a specific line screen of the anilox. Press speeds have improved and this is another area that warrants new anilox specifications to be set. Here is what we suggest to insure that you have your anilox volumes optimized.

2. Anilox Certification to Existing Inventory:

Have your anilox supplier do an anilox audit for you to determine the condition of your existing rollers. We want to sort through what you have to see what rollers will be able to be used as we move forward. As the illustration below shows, you will find that there are many line screens with over lapping volumes, in accurate volumes and these variations in volume do play a part in the ongoing color variation and downtime trying to match color on press. This just shows what we all struggle with from time to time with the anilox inventory. What is in control today can be out of control a few months down the road so following this path will show how to get the inventory back in control if it goes out of control over time.

Once the audit is done, go over the results with your anilox supplier and decide which rollers in the inventory can be kept as you move forward into the next phase. As you can see in the illustration above, there are too many variations in volume as well as line screens based on the audit results. Clean it up and you will have a good anilox selection to work with on a daily basis. All of these variations are not just related to wear of the anilox roller. Determine which rollers were plugged due to lack of cleaning or a cleaning program. Evaluate what is needed here to support the anilox inventory in your printing process. Do you need a management program, cleaning regiment or a person that is dedicated to handling the anilox roller responsibility daily. Utilize your resources within the pressroom and make the changes needed to be successful as you move forward.

3. Care & Maintenance:

FIRST: Have a anilox management system in place that can track all anilox rollers in the inventory. To do that you will need a controlled inventory that is compiled of the information that is set when a roller is placed into the inventory after it is purchased. Keep an ongoing list of the rollers.
Second: Set S.O.P.'s for cleaning rollers whether it is basic cleaning from job to job at press side or having offline cleaning systems in place to clean your anilox rollers. You need to keep up with the cleaning of the rollers on a daily basis. You also need to be able to visually inspect the anilox rollers readily.

4. Visual Inspection:
Keep a handheld microscope as seen below is the most affordable way to do this, or you can purchase some more advanced instrumentation to keep inspect your anilox rollers when loss of volume issues arise. This saves a lot of time from having to pull anilox rollers in and out of press to find one that works properly. Isn’t it better to view the roller, evaluate whether it is production worthy and then put in press or put the roller away knowing it is production ready. That would be the byproduct of a valid anilox management system.

Theoretically with all these systems in place and the anilox inventory standardized you should be able to maintain a consistency when going to production with color matching and or color density when running process color. This last subject we talked about is what will make or break a pressroom. You have to maintain control of the anilox rollers daily. Train your personnel on the value of the anilox inventory and the investment your company makes when they purchase them.

5. Banded Roll Testing:
There are 2 levels of ink volume ranges in setting standards that need to look at for the packaging segments for flexo. There is the process printing range and the combo screen to solid range. This should be approached by running 2 separate banded rollers. One for the process into combo screen range and another layout for the combo screen to full solid print range. The banded roll testing for process printing should be evaluated based on solid ink density (S.I.D.) using a proper plate layout that will allow you to measure the tonal ranges from 1% to 100%. Make sure that you use all the substrates that you use on a regular basis to insure that you get the S.I.D.’s set for each substrate. This is an area that over time tends to get overlooked and there are many changes that can slightly affect the ink layout or adhesion and that also affects S.I.D.

Once you have run these layouts interpret the results. As mentioned, run S.I.D. on the process printing results to determine the lowest volume needed with the least amount of dot gain sacrificed. Run the solid ink test range by spectrodensitometry against existing customer samples to insure you set the volume level high enough to sustain the life expectancy of the anilox. This way you will have a
volume level set that hold up even as normal anilox wear develops and the ink lab can adjust to any variation over time. This should yield a lesser amount of anilox rollers and allow for less down time due to color matching.

Printing by the numbers above shows that when the variables change, our dot gain can move up or down as well so please interpret your data properly so that you get the best possible print.

6. Stickyback?

Stickybacks do affect solid ink density, they are the foundation for the printing plate’s performance, so if you have changed plate materials, ink suppliers, substrates or any other variable you may want to re-optimize by checking out your stickyback performance while you are at this phase of the process improvement.

Ink Room Correlation to Press The Final Step: Coming Full Circle

After the anilox inventory is set you are ready to implement the new inventory to be used as the standard on press. This is where you want to bring in the ink room or lab in the process to insure they have the proper tools that match the newly revised anilox volumes.
Now the ink room correlation phase is at its implementation phase. The ink technician needs to have a tool or anilox roller that correlates with the press volumes that have been chosen. This is where there are many different methods for testing or doing draw downs. Meyer rods, anilox rollers, and all the different proofing methods that are available need to be standardized so you can correlate to the exact volumes on press.

There are many ways to proof ink at the lab level. Meyer rod, chrome proofer rollers and ceramic rollers as well as a number of different provers that are available. They will all get the job done but correlation will vary slightly between all of this different methods.

The method that has worked well for me in the field is the ceramic anilox roller method with a doctor blade. A ceramic anilox roller can be engraved to match the exact volume on press. If the proofer is metered with a doctor blade, the proofer correlation should match the press volume and if not, the slight variation can be adjusted after you proof and see whether adjustment is needed.

The best way to do this is:

1. Take a printed sample from press that has been approved for run.
2. Retrieve a fresh wet sample of ink from press. Take it out of the ink pump or pan that is running on press.
3. Take the proofer that you are using and install an anilox volume that is the same volume as the press volume. If not using a volume rated roller, correlate using spectrodensitometer until you get a correlation.
4. Do a drawdown on the same substrate that is running on press and compare pres sample to proofed sample.
5. Volumes should correlate 1:1 but if not this may be due to ink dry rate so make slight volume adjustments until you hit the perfect match for the ink color your are testing.
6. Once the volume is a match of at least 1de, record what the anilox volume was on the proofer and mandate that as the volume to be used for that particular press volume.

I recommend that you use full strength PMS colors that do not have any white or transparent white in them. Also use an array of colors, reds, greens, blues, yellows etc... You want to use this variety of colors so you get a good look at how your colors translate across the color spectrum. If this is done thoroughly you will insure that you are getting a consistent color translation from proofer to press. When this is achieved you have finished your proof to press standardization. There is a range of volumes available for the proofer so you should have plenty of flexibility to get the right volume needed.
Conclusion:

There are many methods and ways to run your color matching process. This is just one way that has worked well for many flexo converters. The main reason that color gets out of control usually starts on the pressroom floor and can possibly be an issue for the ink technician as well.

When you start seeing downtime increase due to color matching, go to the ink technician first to ensure that he has control of his formulation process and instrumentation. The management and care of the anilox rollers can get out of control over time and that is the start of the snowball. It will get bigger and bigger over time unless you control the care of the anilox rollers. Keep your system audited once a year. Lean on your anilox supplier’s technical team to help you maintain control and use their expertise when things start getting out of control.

The flexo process and its needs to be maintained can be an ongoing process improvement but once you have a system in place that works, work that system and you will maintain a level of consistency that will make you successful.

About the Author:

Bill Poulson has been employed by Harper Corp. of America for the past 13 years. He is the Northeast Technical Advisor for the HGS, the technical division of HCA. Bill has been in the flexo industry for 30 plus years and has seen the growth of flexo over those years playing a roll in positions from press operator to pressroom management.
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