REPRODUCING INK COLOR

HOW TO MATCH BLENDS, RUN AFTER RUN

By Frank Burgos

Among the most stubborn challenges that flexo press operators face, reproducing color—run after run—has to rank close to the top. It seems as though somehow, even when we use the same ink color formula or the very same ink that w's left over from a previous run, a given color doesn't always match from one run to the next. Very often, ink color has to be adjusted at the expense of press time. That's not good.

If you face similar challenges, consider some procedures and ink formula-naming methods that will enable you to more consistently blend ink with fewer color adjustments needed to subsequent batches. You will have less downtime and waste resulting from color adjustments; create less surplus ink; and even be able to reduce your base ink inventory. Diligence will be required documenting ink base quantities used to create formulas, as well as other color-production variables. You may even need to develop a few new habits. The effort, however, will be well worth it.

The process of matching ink color involves weighing and blending ink bases, making ink drawdowns with a hand-proofer, printing the color at press, making color adjustments and comparing color—either by eye or color-measuring instruments—at various times. Each step has its own set of procedures, and they can vary from shop to shop, as can the instru-

ments used. The process discussed here, however, can be adapted to any flexo shop.

To demonstrate the concepts, imagine a scenario where we will print a simple two-color job (two colors so that we can look at a custom ink name.as well as an industry color standard name in the same example). We'll use PANTONE® as our standard for one of the colors, but if you use another standard in your plant, you can just substitute that for anywhere the term "PAN-TONE" is used here.

The customer communicates the colors desired. You blend ink bases and match the colors away from the press, ahead of time, using a handheld ink drawdown device to save press time. Based on the weight of each of the base colors in the blends you make, you calculate the formulas of each color. You send the ink to the press. The printed colors are slightly off. You make one or more adjustments to shade and/or strength of each color at press. (This occurs because the hand-held drawdown device does not mimic press conditions precisely.) You match the colors at press and you print the job. At the end of the job, you store the surplus ink for re-use.

Sometime in the future, your customer requests more of the same printed item. This time, you use the same ink that was left over from the previous run, and it's in perfect condition. One or more of the following variables affecting color, however, has changed:

- The press.
- The anilox geometry.
- •The specific' anilox, even though the geometry is the same as before.
- The substrate.
- •Overprint coating has been added, omitted or modified.

You start printing. The colors generated-using the same ink you used previously—are slightly off-shade, requiring you to make adjustments to the color at press. You match the colors again and start printing. Because it's a long job, additional quantities of ink become necessary. You blend more according to the formulas vou calculated the first time you ran the job, guessing at the additional amounts of base colors you added at the press. You add it to your press's ink system and discover that the color is slightly off-shade! You shake your head, grit your teeth. You match color. You print the job a third time. The colors don't match!

If this sounds familiar, you are not alone. Fortunately, very little needs to be added or changed to the process outlined above to close some of the gaps and greatly improve your inkblending success. Now, let's go into greater depth, stopping along the way to discuss some of the critical points.

Customer Communication

There is more than one way that your customer can communicate a color. He may provide you with a sample that your competition is printing for him; refer to a color in a standard guide, such as a PANTONE color book; or direct you to a color on a business card, letterhead or article of clothing. He may even provide numerical data from a colorimeter or spectrophotometer.

Regardless of the method, you need something to go by so you know exactly what each color should look like when printed. Whether it's a sample, guidebook, or numerical data, we will refer each of the colors we are to match to as the Printed

Color Standard for that color. It is the standard against which you will compare the printed color.

For each color we develop, we will create at least two standards: the Printed Color Standard described above and the Drawdown Color Standard. The Printed Color Standard, or PCS, will assume the name given to it by the customer. The Drawdown Color Standard, or DCS, will assume the longer ink-formula name that will aid in the management of ink-color blending and matching. In our twocolor example, the customer calls the colors "ABC Blue" and "PANTONE 185 Red." The blue is a custom color name, so we will automatically include "ABC Blue" in the formula name of the ink blend we develop for this color on this job. The PANTONE 185 Red is a well-known and recognized color. It looks like we will be using "185 Red" within the formula name of the second blend.

However, when the sample makes it to the press with the work order,



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the operator compares the color of the sample to his current PANTONE color guide and notices that the red on the sample is not a good match against the color standard in his color book. IT IS TIME TO ADDRESS THIS RIGHT NOW!

If it is not an exact match to a PANTONE color or any other standard color, you must clear the matter up. There are only two choices: 1) The customer (authority) agrees that you will create a custom color name (ABC Red, perhaps) and that you will match the sample provided; or 2) the customer agrees that you will match to the standard color guide.

If you decide to disregard the matter and match the sample while still calling it PANTONE 185 Red, you and/or the customer will run into all sorts of color-matching and consistency problems down the road. It is critical to be clear on this first step.

Fortunately, in our scenario .the customer suspects that the shop that printed the sample did not match the color correctly, and confirms that his plastic bag and folding carton printer also are

matching to PANTONE 185 Red for his logo. Therefore, we will indeed be using 185 Red within the name of the blend we create for the red.

Match Color in Advance

Ink should be blended to color ahead of time, away from press, whenever possible. Adjusting color at press is bad enough; creating a new ink formula from scratch at the press is worse. That said, it is not feasible to predict and draw down in the lab or away from the press the exact same film thickness that will be generated by the press. There are simply too many variables involved to mimic press conditions, no matter how expansive your inventory of handheld anilox rolls. Therefore, at this stage, you match the ink batch you are creating to the PCS and hope that it comes close when finally on the press. You should have some idea of what to blend together, but expect to make adjustments at press.

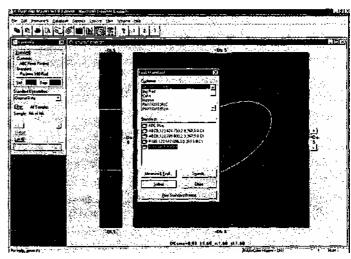
When blending, carefully record how much of each ingredient you add to create your first batch of ABC Blue and 185 Red. Record the quantities by weight, keeping track of each addition so that you can total each base weight once you're satisfied with thie colors. Whether you work with ounces, pounds, grams or kilograms is not important, as long as you are consistent with the weight units throughout your calculations. From the base weights, calculate the formulas for the blends. These will be the initial formulas for these colors.

Ink Goes to Press

Remember not to be surprised if you need to adjust the colors at the press now. The hand-held drawdown device does not mimic press conditions precisely. You ink your press and pull up color. Then you add a few ounces of reflex blue, an ounce of yellow and a couple of pounds of extender to' the ABC Blue and make similar adjustments to the 185 Red.

The adjustments done, you make notes to the color formulas for the next time you blend the color. You will have to edit the formulas the next time you mix this color, but it is not necessary to do it yet. You will do this as you weigh out the bases again the next time you blend this color. For now, simply note the approximate

his image shows a folder for customer "ABC" the customer in our scenarios. Included are the PCSs and DCSs, with their respective short and long names. Photo courtesy of X-Rite Inc.



amount of each ingredient you added to match the color and add comments to your formula notes.

Create Drawdown Standards

This is, perhaps, the most significant part of the process. As soon as you are satisfied with the color match at press, take wet samples of the blue and the red ink from the press and make drawdowns with a hand-held drawdown device (proofer). These will be the Drawdown Color Standards, or DCSs, for these colors, and they will become the standards you match to in the lab when blending subsequent batches of these formulas. They may differ in appearance from the press color standards, but they were created by the same inks that matched at press. This solves the problem of hand-proofers not mimicking press conditions, as now you will match a drawdown to a drawdown made with the same hand-held device.

It is important to document which device you use to drawdown the ink film. You'll want to use the same device—or one that produces the same ink film thickness—each time you blend a given color. This is important, as different hand-proofers with variations in ink film thickness can result in varying color densities.

To make it easy to always know which device was used, incorporate

its description within special nomenclature for your ink blends. Each ink blend name should include as many variables involved in the production of color at press as possible, and the hand-proofer is one of those variables. I like to incorporate color name; press ID; press anilox ID and geometry; hand-held anilox ID and geometry; and substrate type. In our example, the blend names will be:

- ABCB, 123, 789, 800, 2.3, 360, 5.0, C1
- P185, 123, 542, 600, 3.0, 360, 5.0, C1

Where:

- ABCB = Custom color name
- 123 = Press number or ID
- 789 = Anilox ID or serial number
- 800 = Anilox line count, press
- 2.3 = Anilox volume (BCM), press
- 360 = Anilox line-count, hand-proofer
- 5.0 = Anilox volume, hand-proofer
- C1 = "Coated 1-side" substrate

And:

- P185 = PANTONE 185 Red.
- 123 = Press number or ID
- 542 = Anilox ID or serial number
- 600 = Anilox line count, press
- 3.0 = Anilox volume (BCM), press
- 360 = Anilox line count, hand-proofer
- 5.0 = Volume, hand-proofer
- C1 = "Coated 1 Side" substrate The names above look cumbersome, but they serve a valuable function in accurate color reproduction. They communicate to the press operator and ink blender important variables that influence color. These folks will have some idea of what to expect, should there be a change in any of the variables.

For example, if one of the pressrelated variables above changes the next time you print this color, you will likely need to modify your formula to achieve correct color. By comparing the current variables to the previous ones, you can often predict the direction of color change. Additionally, by creating a new color formula name that incorporates the new variables, you will have two formulas for this color, one for each set of variables. If you again print with a different set of variables, create yet another formula name. Each unique set of press variables requires a new formula name, even though the final printed color is always the same.

Ultimately, you end up with formulas for most of the configurations you are likely to use to print the color. Depending on the number of presses, aniloxes, etc. that you have available to print a given job, this can mean a great deal of scheduling flexibility and reduced 'downtime, because you have an arsenal of formulas to choose from that can suit more than one set of conditions.

Also, the cumbersome blend names are the formula names, not the color names. The PCS names remain brief, and all communication with the customer or anyone else will use the PCS names only, and there is only one PCS for any given color. The blend or formula names are for the person blending the ink -and the press operator; they aren't used in conversation. They are used to correlate ink formulas to specific sets of press variables.

Print Job a Second Time

Because you had ink left over from the first run, this is the ink we start with. This time, however, the anilox roll you used to print the blue color the first time is not available. You select a similar one from inventory, but the volume is a little higher. Therefore, you have to adjust the blue color a little by adding some extender.

A wet sample is drawn down, with a new formula name that reflects the different anil.ox roll used this time. You now have two formulas and drawdown standards for ABC Blue printed with two sets of conditions. That's good. (Note: You still have only one Press Standard for ABC Blue.)

Print Job a Third Time

This is where you will start to reap the benefits of these procedures. When you print the job the third time, it just so happens that the anilox roll you used to print ABC Blue the first time is available, and the one you used the second time isn't. You inform the person who blends the ink for you, and they produce a batch of ABC Blue, matching it to the DCS created the first time.

Notes from the first time the job ran show what was added to the initial batch at press. The ink technician is not surprised that it took a slightly different formula to match the DCS, and edits the formula based on the new weights. You put it in the press, and it matches the PCS well. That's good.

Summary

For every color formula you create, you want to end up with at least two standards:

- Printed Color Standard, or PCS: The standard you match the printed product to, every time.
 Brief name, such as "ABC Blue."
- Drawdown Color Standard, or DCS:
 The standard you match to when blending all but the initial blend of an ink color. Long, informative name, such as "ABC Blue, 123, SN789, 800, 2.3, 360, 5.0, C1S." Each time a different set of variables is used to print a color, a new DCS is created. Only one PCS is maintained for a given color. Adjustments to color at press or in the lab should be communicated between press operator and ink technician.

Precision at every step of the procedure cannot be overemphasized. Ink bases should be carefully weighed. Drawdowns should be smooth. Variables should be diligently documented. Calculations should be double-checked.

The minimum requirements for implementing the above procedures are: a place to keep formulas (index file, log book, spreadsheet, or batching software); a place to keep standards (folders, binders, job-history

Base Colors	Welghts	Percentages	Pettes
Partex Blue	12.45	63 61%	0 638
Process Blue	456	23 37%	(वरक
Trensposers White	2.5	12.81%	0 128
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	,		-
Total Weight	119.509		
	Calculate	Clear	

This on-line calculator allows users to calculate ink-blend formulas based on the weights of the constituent ink and additive bases. Formufas are presented in both percentage and ratio formats.

documents, colorimeter/speetrophotometer database); hand-proofer or similar device for drawing down ink; and discipline and perseverance!

Sometimes you may have to blend ink using bases from different manufacturers than called for in a formula. Sometimes our base strengths vary from batch to batch. It can be an aggravation. However, as long as we' match to drawdown standards in the lab, even these challenges are minimized. If you find that your matching process is perfectly executed; that you are in control of your variables other than ink base strength; and that you are constantly making changes to your formulas, agree to a quality standard with your ink vendor. In addition, possibly make incoming quality checks on your base colors. Explain to your vendor what you are doing so that he can appreciate the need consistency.

Ink management can be addictive, especially when you start to see results. Additionally, the discipline required to execute these procedures effectively develops other good habits with respect to ink inventory management, documentation and order. The above procedures coupled with an effective ink work-off program can go a long way in reducing many of the frustrations associated with reproducing color in the flexo pressroom, and you already have everything you need to implement them. By adding a little luck, hard work and persistence, you can dramatically reduce downtime and other waste associated with color reproduction in the flexo pressroom. That's very good.

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