Proper preparation results in a mountain of data and a world of knowledge.

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PRESS CHARCTERIZATION

(AKA FINGERPRINTING)

Some may refer to it as "fingerprinting" while others prefer to use the more formal name, a "press characterization test." Regardless of which name you choose, what you are really performing is a statistical experiment with the goal of collecting as much information as possible.

As with any "experiment" it is extremely important to control as closely as possible the variables and process as well as the reading and interpretation of the measurements. To ensure best control of all aspects of the test, and therefore the validity of the results, very detailed preparations are required prior to running the test.

A thorough discussion of goals and expectations are necessary and should take place long before the first steps are taken. It's important to know why you're doing the test. Is it to determine the limits of the process, find the optimum operating envelope, or simply to set a benchmark for future reference? Each of these situations may require a different approach to the process.

The name "press characterization" suggests that it is a test of the printing press. While it is true that the characteristics of the press will be measured, so much more information will be collected and analyzed making this a test of not only the machine, but the entire process including materials, consumables and craftsmanship of the operators. When the characterization is performed properly and with great attention to detail, not only can you define what you do best, but you can also determine the limitations of the process.

An important aspect that must be in place before the test begins is a standardized means for measuring and recording the data you collect. Yes, honest to goodness measuring. A true characterization is built from factual data, not just an educated eye and opinion. Save those for judging figure skating competitions.

Developing The Test

So now you have set the goals and established your measuring and recording methods. What will you be

measuring? Some of the more obvious aspects include the digital color profile in multi-color process print, indicating the color gamut that can be reproduced, and registration capability. Equally familiar to most printers will be density, dot gain, trap (printing one color on top of another), slur, and perhaps tonal range.

It's important that you don't forget some of the daily aspects that you may take for granted like positive and reverse type and barcode reduction. If inline processes (such as a rotary diecutter or case maker) are likely to be part of your operation, you may want to consider a measurement of drying speed, scuff and rub-resistance.

The indicators that you design into your test form will provide the results for your analysis. So let's look at some of the indicators that will be necessary for a successful press characterization.

You will need to have color targets, (ICC 8 or similar) which can be read by a digital tool. These targets must be tested in all screen rulings and art screens that are to be standard production tools. They should also be tested in one or two finer screen rulings, which may define the boundary of the process capability.

For example, if 65 lpi conventional screen and 85 lpi combination screen are to be standard production tools, include a 30 micron stochastic and a 100 lpi combination target. Certainly tonal range will be compromised in these two finer ranges, but you will obtain valuable information on the entire process. This may also provide an indication of the outer range limits of the process.

Even though digital devices will be used to read most of the results, tonal scales are still included in the design of the test target. These scales will facilitate quick reading of dot gain with a densitometer and by visual inspection. Design your test form with these scales running in multiple directions on the sheet, preferably in all four directions. Didn't realize that there were four directions? They are through machine ascending and descending and across the machine Operator Side to Drive Side and Drive Side to Operator Side.

Less common, but quite helpful, are small squares of light tones, perhaps 2-inch x 2-inch at 15%, in various screen angles; these can indicate varying degrees of washboarding effect at different angles.

Next is the big beautiful picture that represents your favorite hobby, sport, super model or vacation spot. Forget about that one because it can just be a needless distraction. The exercise is not about making the picture look good, but about finding out how to make the picture look good by defining the capabilities of the press. You don't want to get caught up in "tweaking" the setup to produce a pleasing image and sacrifice the validity of the data you collect. So select a photo with a wide tonal range.

A small multi-color picture with solid overprint of varnish can be a good indicator of drying speed, smudging, doubling, halos, etc. Remember, you want to focus on the test, not on producing a flawless image.

Test images should be designed to one particular press, and the number of colors in the image should reflect the number of print stations in the press — a two-color image for a two-color press, or a four-color image for a four-color press and so on. A press characterization is a huge effort and should yield as much information about the process as possible. Don't limit it to just a digital color profile.

If you have nine units, find out the registration ability of all nine and not just four units, find solid traps over and under four-color process, haloing of varnish, etc. While you're investing the time and money don't cut corners, do it right and get everything out of it that you can.

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When developing the form, it is most important that the mechanical make-up of the printing plates used in the test should reflect what you plan to run in production. This is the only way the data you collect will be accurate and useful. A change in film output device (or for that matter, plate imaging device), plate polymer, mounting tape, mounting material, lock-up mechanism and most certainly plate or backing thickness will render the data useless.

It's very important to know your production plans before you design your test form. Also, make everyone aware of the impact even a small change can make. For example, if your purchasing agent decides that he can save $10 a plate by changing to supplier "Z," the information collected in your characterization will be invalid and a new characterization will probably be necessary in order to produce your best quality. Maybe he can convince the new supplier to pay for the characterization as part of getting the new business. Maybe... maybe not. Just be careful you aren't spending dollars to save dimes.

If the goal of the exercise is to determine the correct plate package for the machine, then a smaller, compromised test target may be used. However, make sure the test target still represents the full gamut of graphics you wish to reproduce later.

A Mountain of Data

There is a mountain of data that should be collected during a press characterization. The importance and quantity of this information is often underestimated. It does, however, have a dramatic impact on interpreting the results and recreating, as near as possible, the exact environment for future characterizations.

This information typically can't be obtained from the image on the test sheet such as specifics about the board. This should be recorded in the printer's notebook or on a form designed specifically for this purpose.

Remember, you are testing the entire process and not just the press. The number of variables outside of the mechanics of the press which influence the results are tremendous. You want to capture as much information as possible so when future tests are performed you will be comparing apples to apples.

Begin with meticulous

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records on the substrate. 32ECT B-flute #3 from two different corrugators, or paper from different mills, may have very different characteristics. So simply recording the board grade isn't sufficient. At a minimum, detailed mill and grade information should be recorded on the top- iner (e.g.: 180 gsm LEIPA Lux), and preferably also on the medium which has a major effect on print results (e.g.: 23# SC PCA).

When running doublewall board, collect exacting data on the center liner, as it can dramatically influence the print results. In the case of a sheet plant, make sure you fully understand the parameters of the board combination process (e.g.: ABC sheet feeder, BHS bandleader, Kohler glue machine, Friese B-flute rolls, etc). Here again, changing suppliers can make a big difference in the results. Make sure the purchasing agent is aware of this.

The physical specifications of the sheet must also be carefully recorded. Take caliper measurements at a minimum three, and ideally nine, points diagonally across the sheet. Record the location as well as the caliper reading. If you know the corrugating roll diameter, you can correlate this to your measurements. Make note of the visual appearance, edge evaluation and glue (or pressure) line picture. If at all possible, try running at least two different sheet sizes to measure the impact of sheet size on the mechanics of the printing press.

Other Important Variables

Think you've gone too far? Bear in mind the process will only be as good as the weakest variable. This reminds me of Peter Basler's favorite saying: "Garbage in, garbage out." (Peter is recently retired from his 44-year position with Bobst Group, USA. He served as Bobst's resident color expert and director of technical services.) It's important to remember that thresholds exist in every process and each variable has the capability to limit the threshold.

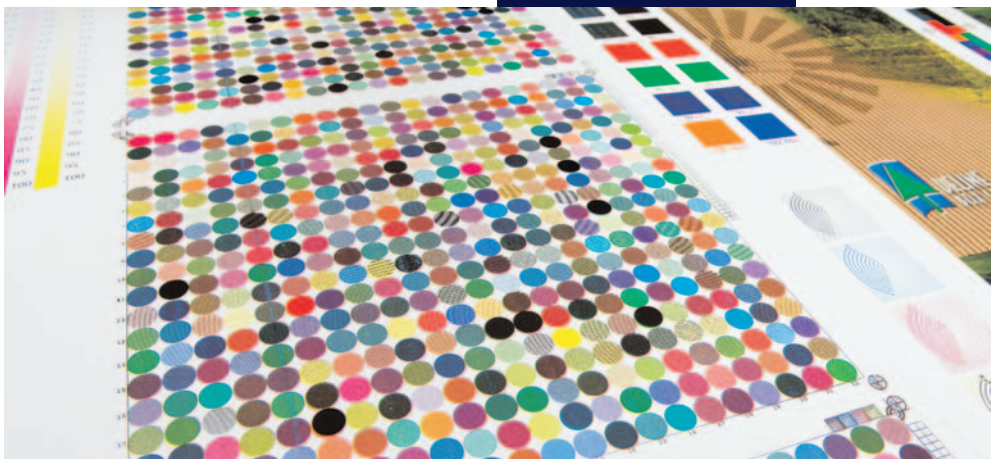
It's important to know why you're doing the test. Is it to determine the limits of the process, find the optimum operating envelope, or simply to set a benchmark?

It is equally important to collect and record exact and specific data on the inks as well. Surely everyone thinks of viscosity, pH and temperature as important details to record. However, details of additions or adjustments made over the run should be recorded in exact detail. Did you add an extender or anti-foaming agent? When? How much? Why? Additional information about ink conditions or reaction can also be useful when evaluating the results of the test. Comments on such observations as foaming, micro-foaming, viscosity or temperature changes can be helpful later.

Details of press performance will also be vital to understanding the results and the ability to recreate the conditions for future characterizations. Begin by recording the temperature and humidity of the day. If possible this should be done at the machine side and should be monitored for change throughout the test.

Other important information you will want to record about the press is the specifics on the anilox roll used. Record the manufacturer, line count and type of roll at a minimum. If possible, capture the roll condition with a picture (QX5 microscope) or at least a rub-off (Capatch).

Details on the doctor blade will also be important. Record the manufacture product number or trade name, type of material, thickness and age.



When you have a CNC machine you don't save one set of parameters for every job you run, do you? Of course not, and your setup for fingerprinting should not be any different. Create a new job number for each board combination, as machine adjustments do change from board type to board type.

On manual set presses keep copious notes. Record every bit of information it is possible to save. Nip settings, pull roll positions, feed gate positions, vacuum settings, etc. should be recorded for future use.

Oh yes, you mustn't forget to include inline operations. Rotary diecutting may well be part of the operation. So, a cutting die may therefore be part of the exercise, if a good portion of your high-end print work is to be diecut inline. Appropriately place hole-punch and rubber for smear test. You may also want to strategically place some hard rubber on the die as a test of scuff resistance.

Make The Most of The Experience

The more data you log… the more you will learn. If you're new to this (and just about everybody is!) commit to one press characterization effort every month. After six months relax to quarterly, and then after about a decade relax to running press characterization tests on a bi-annual basis. Imagine what you will learn!

I had a friend make this statement the other day: "We know within 5gsm which center liner to use to avoid repeating of the B-flute pattern in large screen print on E-/B-doublewall board." Wow! Or try this: "Every time the containment blade is older than 87 hours we experience doubling in the large image areas." – double wow!

How did they obtain this knowledge? They established a program for performing characterizations, religiously adhered to the program, collected every bit of data possible and took the time to analyze the results.

Now one last point. Run the test at production type speeds. Remember you are trying to duplicate the conditions under which the machine will most often operate. Make 100% machine speed part of the test. Crank it up and see what the press will do at 10,000 sheets per hour. You will be amazed how what you've learned from the press characterization will not only improve your printing now, but also enable you to achieve superior results over and over.

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