Expanded Gamut

for Narrow-Web, Bringing More Colour To Less Web

As with many other innovations and technology advancements, the Expanded Gamut process has been a common flexo practice for years. It is now presenting its strengths and advantages to the narrow-web market. The high level of automation now applied to narrow-web inline presses is the primary advantage. Today's narrow-web press offerings provide automated print head settings, on board colour management tools, and total job recall, to mention a few, but the advantages are many. This makes the Expanded Gamut process and highly innovative narrow-web press offerings an ideal combination to meet the challenge of digital printing. All inline, one pass with all converting features

Although Expanded Gamut printing has become possible for the narrow-web converter to accomplish, it takes a considerable amount of upfront effort and homework to create consistent and reliable results. So, the question is, "How do I get started?"

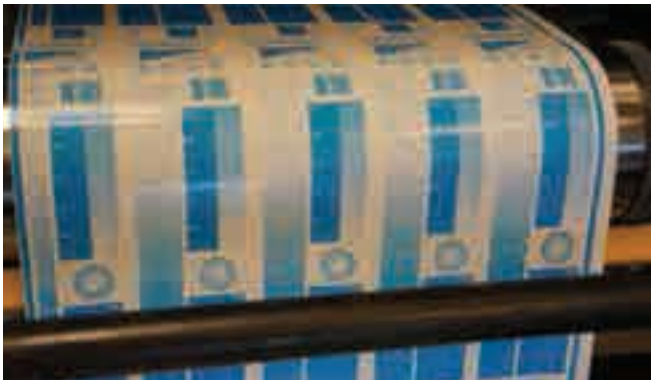
Optimization: The Journey Begins

Before going to press with Expanded Gamut or 7-colour process, a narrow-web printer will need to do thorough evaluations of several things to achieve an acceptable end result. Here are a few of the questions that need to be answered.

- What type of substrates will be used?
- What is the plate DPI desired?
- What type of ink system? UV- or water-based?

Anilox Selection

After determining the DPI that the job(s) will be printed at, the anilox rolls will have to be specified to deliver the smallest dot while achieving optimum solid ink density (SID). The most cost effective method for choosing the correct anilox roll is through the use of a banded anilox roll. A banded anilox has multiple engraving bands across the roll, typically five or more, that have different screen counts with different bcm volume values. Once the screen counts and volumes have been selected, a photopolymer plate that has tints and solid targets that match the engraved bands of the anilox roll will be made. This banded anilox roll trial will help determine the optimized engravings for the CMYK and OGV colours of the Expanded Gamut process. The fixed colour ink set used in the process typically includes: Cyan, Magenta , Yellow, Black , Orange, Green, Violet



The Ink Set

The inks that are chosen for the Expanded Gamut process are not typical process inks. The CMYK colours have to hit a ΔE value of 5 or less to be compliant within the G7-ISO colour standard. The OGV ink should be mono pigmented and needs to fall within the proper hue angles of Flexographic Image Reproduction Specifications & Tolerances (FIRST), while achieving the most chroma.

Plate Durometer and Tape Density

To achieve the highest level of print quality, the durometer of the printing plate, in combination with the foam density of the mounting tape, needs to be tested. The desired result is to be able to print the smallest highlight dot while printing the optimum SID. If this balance is off, you will have too much dot gain or too much pinholing in the solid areas.

During the optimization process, the different types of substrates that are used will need to be tested. The "one size fits all" motto will not work. You will need to print test each substrate to obtain the correct information, density, dot gain, colour hue, etc., that will be used during the next step.

Fingerprinting The Press

After the optimization of the anilox, ink, plates and mounting tape is completed, the press will need to be fingerprinted to determine where the dot gain and solid ink densities are. The purpose of the fingerprint is to:

- Linearize the press to an industry standard such as GRACoL/G7
- Neutralize press for gray imbalance
- Produce neutral print curves

To be able to achieve consistent and repeatable results in your printing process, the fingerprint must be run under normal conditions and at production run speeds, i.e. 250 fpm. Virgin ink, along with clean anilox rolls, must be used. Consistency is key for success. A spectrophotometer is used to measure colour and densities, as well as check for even plate impression, which should be 3 percent or less between operator and gear side. Watch for skips in the print or dirt on the targets. This will cause the test results to be inaccurate. After the fingerprint data is collected and extrapolated, the next step will be to apply a curve to compensate for dot gain.

Profiling For EG

After the fingerprint test, the next step in the Expanded Gamut calibration process is profiling. A new set of plates with the curve applied will be used to print the profile test target. There are several printruns for this test. The initial test is to print the plates in the CMYK stations. Begin by moving the cyan plate to the orange station and running the colour combination of MykO. Then, return the cyan plate to the cyan station. Next, move the magenta plate to the green station and print the colour combination cGyk. After this, move the

magenta plate back to the magenta station. Lastly move the yellow plate to the violet station and run the colour combination cmVk. With these four data set combinations the Expanded Gamut profile is ready to be validated. Once validation of the data is complete, conversion of screen builds into spot colours can be accomplished through prepress software.

Automation Equals Process Control

The Expanded Gamut process requires a high level of registration and web tension control to be successful. Building multiple spot colours out of multiple screens requires registration tolerances of 0.001 or below. CI presses always had an advantage of colour to colour registration, due to the single impression roll and efficient web tension control between decks. Traditional inline presses were constructed with line shaft designs, gear boxes and gear-driven transmissions that would contribute to line shaft whip through speed ranges, gear backlash tolerances as well as tension deviations due to multiple impression cylinders. These variables were the main contributing factors to lineal registration movement. If you could hold under 0.005, you were having a great day.

The current automation technology on narrow-web inline presses offers the ability to maintain the tightest register tolerances that allow the Expanded Gamut process to succeed. There are many other advantages that automation has provided to better control our printing process. Having the ability to save and recall roll positioning is key to allowing the Expanded Gamut process to integrate seamlessly with the flexo workflow, it improves performance by only requiring a simple roll change by the operator. Recalling a saved job will reset the entire process to its last known saved position. One servo motor controls the rotational axis to reset lineal register; another controls lateral register and yet others control print roll impressions. A production run six months ago will be recalled and set up with no waste, all while the press sits idle.

Now that the entire press is automated from the unwind to the rewind, every servo motor position can be captured for total job recall. The tension settings, dryer settings and all critical production information is now captured, saved and stored for future recall with minimal operator intervention. There are no longer manually adjusted knobs all over the front of the press, requiring highly skilled operators to reproduce past jobs. This level of automation produces repeatable and consistent print performance, greatly reducing human factors.

Transferring The Gamut

The inking systems on the latest narrow-web press offerings have also taken the next step in performance, ease of use and increased productivity. In the wide web environment, enclosed chambers are a way of life. Enclosed chambers offer a single inking component that foster quick change abilities with a higher control of ink transfer, colour consistency and chemistry control. We can have this higher level of colour consistency and a more efficient on press process, so our colour management of the Expanded Gamut fixed colour set of inks will be more manageable. Since we are now running a fixed colour ink set, the makeready times and colour changes required for the Expanded Gamut process will be greatly reduced. Think of the savings in ink, consumables, manpower and machine downtime from running this process efficiently. Think of the substrate savings from not needing to colour match spot colours on press.

Ask yourself the question: "Would I rather commit to managing these seven colours or continue to manage the hundreds of gallons of ink on my work off shelf?" I will take seven over 100 any day of the week. Even though it may seem like a lot of work, the benefits greatly outweigh the effort involved. There are several reasons that narrow-web printers should consider the Expanded Gamut process:

- Reduced ink inventory
- Seven ink colours versus hundreds
- Reduced anilox roll inventory
- Reduced wash ups
- Faster job changeovers
- Only change plates because the seven inks stay in press from job to job
- Print by numbers utilizing FIRST methodology
- Less down time and substrate waste because no need to match colour on press

EG allows the printer to be able to print close to 85 percent of PMS spot colours within a ΔE of 2 - all from only seven colours. This gives flexographic printing a greater competitive edge against digital printing. The Expanded Gamut printing process has tremendous advantages for those who are taught to work by the numbers. As a FTA FIRST Implementation Specialist can tell you (such as Nilpeter's Paul Teachout), employing the Expanded Gamut process on an automated machine and utilizing the FIRST methodology will insure its success. Press offerings of today, with job save and recall, automated plate positioning and more efficient inking systems, will allow the Expanded Gamut process to flourish in narrow-web. Combined with the proper methodology of the flexographic process, it will yield enormous advantages for those who embrace and educate themselves on the entire process. The narrow-web converter now has a direct flexographic solution to the digital challenge, where we will more than compete and offer a total printing and converting solution inline.

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-from Nilpeter website-