TECHKON

TECHGUIDE:

Stepping Stones Toward Developing a Color Quality Control Process

Controlling Color Incrementally …

In our initial TECHGUIDE, we explored *"How to Implement a Color Quality Control Process for Packaging"* and identified some specific steps towards achieving that goal. For many companies, the complexity of plant-wide conformance to a color process control program far exceeds the time and resources available to develop this type of strategy. In this TECHGUIDE, we'll discuss how you can create "Stepping Stones" towards total color process control and:

- Focus Where Color Control has the Greatest Impact
- Approach Color Process Control as a Team
- First Identify How Customers Communicate Their Color Requirements
- Understand the Challenges of the Color of Paper

Consumer brand companies are becoming more and more color conscious as they watch profits grow with their brand's awareness. Coca Cola is leading that parade, creating very stringent color requirements for their package printing suppliers. At the 2011 Color Management Conference, Axel Kling, senior packaging graphics quality manager of The Coca-Cola Company addressed the importance of color consistency for all consumer product companies, how Coca-Cola communicates their brand message company-wide and the crucial role color management plays in ensuring the company's long-term, sustainable growth and market share.

As the color bar is raised by these brand owners, how do packaging printers respond? Is it possible to create a comprehensive color control process across one, let alone multiple print sites overnight? Or are you more likely to succeed by controlling color quality incrementally. Here is our strategy for breaking down the color quality control process in 4 color-manageable "Stepping Stones" …

FOCUS WHERE COLOR CONTROL HAS THE GREATEST IMPACT

Where to start and how to find the biggest paybacks?

Typically the further downstream a color control issue develops, the more expensive it is to fix in terms of press downtime, wasted ink and paper and failed customer expectation.

Typical Scenario: During a press run you are unable to hit your mid-tones (50%). You make multiple density adjustments, change inks, fountain solution, make blanket adjustments (over/underpacking), and slow the press speed. You have burned through hundreds, maybe even thousands of sheets with no solution in sight. Nothing seems to work. What is causing this problem? Excessive non-mechanical dot gain caused by printing plates that are not linear or that were not processed with the right correction curve.

This requires that you stop the press, apply the corrections, process new plates, mount them on the press and start print production from the beginning. This translates to substantial costs in lost production time, wasted paper and ink and negatively impacts customer expectations on the promised delivery. How could this have been avoided upstream? By using a printing plate measurement device to determine if the plates were processed with the correct values BEFORE putting them on press – making sure that the 50% dot area is not really 75%.

This is just one example of catching a problem early and upstream in the process by the simple expediency of utilizing a plate reader (often called a digital microscope) as a reality check before going to press.

APPROACH COLOR PROCESS CONTROL AS A TEAM

Are your inks the right color? Do your substrates meet spec?

When tackling color process control for your entire plant, (let alone a multi-site printing operation), begin thinking in terms of the benefits to be reaped by controlling color "locally," one area at a time. Taking a tiered implementation approach starting with the most problematic areas is not only more practical, but more realistic.

Here are some practical suggestions:

- Assign an individual who is responsible for identifying areas that have the greatest need for a quality color control process, and can work with various departments within the plant to objectively isolate color control issues. If not viable, engage a consultant (budget permitting).

- Ask the question, "Where do most of our troublesome color control issues come from, and how do they manifest themselves?" Effectively trace the path of a "bounced" job to determine where the color problem originated.

- If problems originate in ink formulation, focus your efforts on implementing a process that determines whether the ink you or your vendors are formulating is within customer specification.

- If problems center on substrate, determine acceptable tolerances preferably using an ISO, Gracol or SWOP industry standard and use a Spectrodensitometer to measure incoming materials to qualify and quantify if they fall within acceptable tolerances.

FIRST IDENTIFY HOW CUSTOMERS COMMUNICATE THEIR COLOR REQUIREMENTS

Are the customer colors clearly defined? By what method?

There are various methods a customer will use to communicate the colors they want to see on press, many of which offer unique and sometimes substantial challenges. The customer may provide a digital proof, a press sheet from a previously printed job, business cards, company letterhead, industry standard color guides (swatch books), or may even have L*a*b* color values obtained from either the industry standard color guides or colors from a previous press run. Establish what the customer views as acceptable color tolerances. Learn the challenges of working with what they supply for color match. Here are a few suggestions on how to overcome those challenges:

Color Guides (Swatch Books)

Industry-accepted color guides can (and will) have vast color differences from each other. A color guide printed in 2009 will visually and measurably be different from the color guide printed in 2011. Even color guides printed in the same year or same press run can demonstrate vast color differences.

If the customer is using a color guide to visually define the color they want to use on the press run, then it is important that specific guide becomes the “Bible” to base all color decisions throughout the print job. Use a Spectrodensitometer to take multiple measurements in different areas of the designated color swatch in the color guide, and average the measured results into one value. This becomes the color reference when choosing or formulating ink and checking color throughout the printing process.

Why take multiple measurements in different locations on one color swatch? Color guides not only have color variance between different guides, but can substantially vary within the color swatch itself. By averaging the measurements you are minimizing the impact of color swatches that have inconsistent color. That specific color guide should accompany the job throughout the print production process.

Customer Supplied L*a*b* Color Values and Proof

The customer may provide L*a*b* color values accompanied by a proof. While the L*a*b* color value offers an empirical method for checking color, it does not guarantee that what is coming off the press will visually match the proof or meet the customer's expectation. Remember, customers cannot "see" an L*a*b* value, only a printed representation in the form of a proof. There are many factors that influence the visual match of proof to press. One of the main influencing factors is paper, and is covered in the section that follows.

UNDERSTAND THE CHALLENGES OF THE COLOR OF PAPER

How does the color of paper influence how we perceive color?

It is commonly understood in our printing industry that paper is the fifth color. The "color" of paper heavily influences how our eyes visually perceive color. Often times, inkjet proofs will contain optical brighteners to increase the whiteness of the paper to make the paper look "less yellow." This is done by adding chemicals to the paper causing invisible ultraviolet light to re-emit more towards the blue end of the spectrum, so that the human eye perceives the paper to be whiter, even though in actuality it is bluer.

In addition, optical brighteners show large color shifts when viewed under different lighting conditions, i.e. Tungsten, fluorescent, D5000 (normal day light), light sources. So the press sheet will appear more yellow than the proof, adversely affecting the visual match seen by the human eye. The surface texture and coating differences between the proof and press papers will also contribute to visual color differences.

If the proof is from a previous job, exposed to both open air and light, it will lose a certain amount of color fidelity and no longer accurately represent the customer-defined L*a*b* color values. The "blueing" effect of optical brighteners will fade over time causing the paper to yellow, and not only lose the visual accuracy, but also the empirical measureable accuracy as well.

How do you determine if there are optical brightening agents in the customer proof?

Here are two methods for determining whether the customer-supplied proof contains any optical brighteners:

- **Use a Spectrodensitometer to take an L*a*b* measurement of the non-printed area of the proofing paper.** In general, if the b* value is greater than -3, there are optical brighteners in the paper. The larger the difference in the b* value (-3, -4, -5, -6), the more optical brighteners there are in the paper.

- **Turn off the lights and using a black light illuminate the customer's proof and the press sheet.** The white, non-printed area of the proof will shine bright white while the white area of the press sheet will be muted by several levels of magnitude when compared to the proof.

If optical brighteners are detected, what are the possible remedies?

Here are three remedies for compensating for optical brighteners:

- **Install UV blocking filters**

  If the proof is being viewed in a light booth, you can install UV blocking filters over the D5000 bulbs so when comparing the proof to press color match, these filters will help your eye ignore the optical brighteners in the paper.

- **Accept and Ignore**

  To "accept and ignore" the fact that there are optical brighteners in the paper, use a Spectrodensitometer to measure the color in the proof, and in a D5000 light booth, visually match the proof to press as close as possible. This requires that you educate the customer on optical brighteners and the inherent issues in matching the proof to the press. "Seeing is believing." Bring the customer to the light booth, show them the visual differences and make sure they acknowledge their understanding for the visual differences.

- **Create a Proof**

  Create a proof using ISO, Gracol, SWOP, etc. industry standard compliant materials. This proof will better visually match what will be printed on press. You may question why proofs cannot be printed on the actual material that is going to be used on press? While this is possible, it is not practical. Inkjet inks require a receptive coating be applied to properly bond to the press paper.

What if there is no background color at all?

Printing on translucent materials is very common in package printing and offers some very unique challenges. The color of the backdrop, or the surface behind the proof or press sheet, can substantially influence both the visual and measured colors between the proof and/or press sheet. For example, when you view a printed piece of translucent material placed on a dark colored viewing surface, the color will look vastly different than when it is placed on a light colored viewing surface or when held up to an illuminated backlit surface. This can be substantiated by taking measurements with a Spectrodensitometer on all three different surfaces. The measured L*a*b* values will be different when measured over the three different surfaces.

How do you compensate when printing on Translucent Materials?

Use an industry standard white, black or neutral colored background in a controlled viewing environment to both visually check and measure the colors using a Spectrodensitometer. Print standard ISO 12647-2 specifies the surface color value ranges for measuring materials with a Spectrodensitometer, which in turn offers you consistency and predictability when measuring translucent materials.

Take the customer-supplied proof, place it on the surface that is within the ISO 12647-2 specification and take measurements with a Spectrodensitometer. The resultant measurement becomes the reference color to use when checking color on press. You must remember that when checking color on press , measurements must be taken on the identical surface and lighting environment that the reference color was obtained.

How should you approach unrealistic customer color tolerances?

If a customer had a 1.5ΔE tolerance on a previous press run utilizing a high quality coated stock, but is specifying newsprint quality paper for this press run, maintaining the same 1.5ΔE tolerance consistently on press is unrealistic, and should be classified as an unrealistic tolerance. Adjust your customer's expectations accordingly.

SUMMARY

Whether you build your color control process in one all-encompassing leap or one "Stepping Stone" at a time, consistent color measurement is the core component to any successful strategy. You may use a simple handheld Spectrodensitometer or more sophisticated inline device … the difference is measured only in time and efficiency. Highly accurate color measurement devices, operators skilled in the practice of using them and clear cut guidelines to follow provide a sound foundation to build upon your Color Quality Control Process, even one "Stepping Stone" at a time.

Look for TechGuide #3 *in which we will discuss the challenges of proofing to press inks and offer insight how to best meet those challenges.*

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