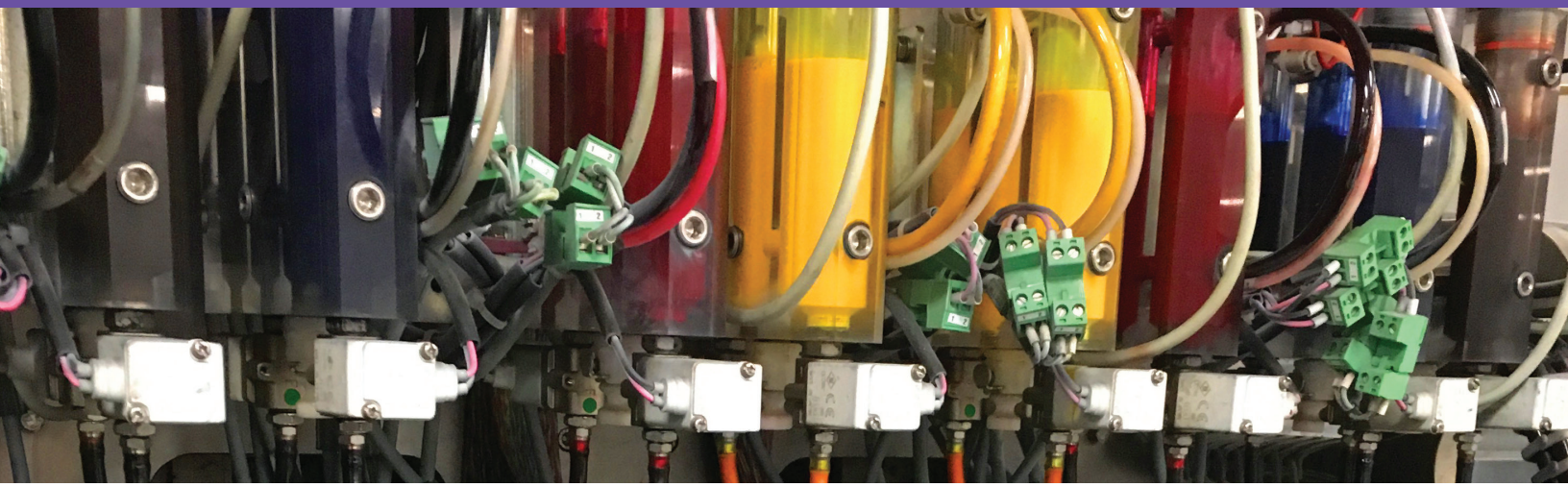

6 Keys to Color Success in Wide Format

By: Sal Passanisi

Introduction

In its April 2017 report, I.T. Strategies reported a 6.22% increase in square meters printed using wide format graphics printers in 2016 as compared to 2015. This does not include soft signage (textile) printing, which the firm estimates as more than 20% of all other wide format inkjet markets combined. In a market where commercial and transactional print volumes are flat, it is no wonder there is significant interest in the digital signs & display graphics market by vendors and printers alike.

Many existing sign & display graphics businesses are reporting growth, and there are new entrants to the market as well, including commercial printers looking to enhance revenues and deliver a more complete offering to existing customers. At the 2017 SGIA Expo, an event focused on wide format printing, commercial printers were out in force to see the latest and greatest digital printers before making a buying decision to ensure they take advantage of the best technology options. It was not unusual to hear commercial printers who had added wide format printing to report 50% year-over-year growth in that part of their businesses. But these businesses are investing in future of growth when they enter the wide format market.

For commercial printers, the opportunity is clear: offer these services to existing customers and use them to attract new customers. This places traditional sign & display graphics providers in the potential position of adding their own digital printing capabilities to retain the wide format business by also offering a more complete service, including production of brochures, sell sheets and other materials typically produced by commercial printers.

Marketers are busy and always looking for ways to save time, reduce cost, and speed time to market. Buying all components of a campaign from a single source is one way to achieve those goals. So it is logical that both commercial printers and sign & display graphics providers are battling to be that single source.

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But along with opportunity, there are also challenges. When a project includes multiple components printed on different materials, color can vary widely if not carefully managed. A trade show project, for example, might include digitally or conventionally printed brochures and sell sheets; polyvinyl chloride (PVC) and other plastics for rigid components; and paper, vinyl and textiles for flexible signage. The different white points of each base substrate can significantly affect the appearance of the final printed output, so it is extremely important to take each material into account when developing, communicating and producing color for a given project.

In this white paper, we share tips from our color experts that will help providers of wide format signs & display graphics ensure they meet customer color expectations regardless of the substrate, printing technology or ink systems being used. In big color, small variations from one printer or site or department to another can quickly snowball into printed output that does not fall within specified tolerances. This means rejects and rework; it means unhappy customers; and it increases both costs and cycle time. None of this is acceptable to increasingly demanding customers. The good news is there are tools, techniques and technologies that help today's printing operations address these challenges, satisfying both customers and their own bottom line requirements.

6 Keys to Color Success in Wide Format

As printing operations increasingly adopt wide format printing – or continue to expand existing sign & display graphics businesses – there are six important areas of focus to ensure color consistency, in the wide format operation, across a hybrid operation, and for the consumer at point of sale.

1. Make sure all image capture and viewing devices are profiled and calibrated. Do not depend on offset-centric techniques when working with digital toner or inkjet or dye-sublimation printing.
2. Always consider target substrates early in the design process, and establish both master and dependent digital standards against which to measure colors at each step of the workflow.
3. Use customized ICC profiles for output devices, fine-tuning them to take best advantage of each particular device; e.g., the expanded color gamut of a digital wide-format inkjet printer.
4. Use spectrophotometers as the primary physical means of evaluating colors, supplemented by visual evaluation. Make sure these instruments are aligned with each other for consistency.
5. When visually evaluating colors, always do so under controlled lighting, replicating the various conditions under which the graphics will be displayed out in the world.
6. Above all, establish standard processes to ensure effective color specification, communication, measurement and management across the entire supply chain.

Each of these keys are examined in more detail below. Taken together, these six keys will help operations build a predictable RIP-to-roll workflow that will ensure color consistency in wide format products, the first time and every time.

1 Image Capture and Viewing

As with any color-managed workflow, if color is right from the get-go, there is less likelihood of accumulating error as the job moves through prepress and production. This means ensuring all image capture and display devices, including cameras and monitors, are correctly color profiled and calibrated to ensure the printed cyan, magenta, yellow and key/black (CMYK) graphics match the originally captured and displayed colors as closely as possible. Not only will this result in better printed output results; but more accurate images will be captured, and colors will display on the screen just as they will appear in print.

Commercial print and wide format professionals are likely already working with profiled and calibrated image capture and display devices. But what about brands and designers? For the most effective color workflow, it is important to educate brands and designers about the importance of profiling and calibrating cameras and monitors used in the capture and design process, as well as any printing or proofing devices they are using. In this way, designers will have the right expectations about what they will see in the final product.

Luckily, there are numerous affordable tools available today for profiling and calibrating devices that comply with International Color Consortium guidelines. For example, X-Rite offers the i1 Pro 2 and the i1 Display Pro along with top-of-the-line i1Profiler color management software for the ultimate in flexibility and control over these important processes. For printing operations that receive a high volume of work from a small group of brands and designers, investing in these devices and making them available to their clients, along with education, will pay off in the long run. It will also help build better communication and stronger relationships that evolve into enduring business. Investing in clients in this way makes the entire process more streamlined and demonstrates how important the it is to the print business owner to deliver the ultimate in quality.

At a minimum, conducting client educational sessions in the form of seminars or lunch-and-learns will make the process easier for everyone. Bringing in outside experts to help with the training can also add credibility to the entire program.

Another aspect that will help streamline the entire design and production process is the use of both physical and digital references in the design process. Graphic designers love to not only see their work, but also touch and feel it, and there is still a need for physical references such as Pantone fan decks and

other inspiration items. But beyond this phase, a digital workflow is becoming the preferred strategy in today's industry. To that end, digital tools have become increasingly capable of allowing users to select colors digitally and visualize them as they will appear on target substrates.

A designer can now measure a color with a visualization tool before using a software plug-in like Adobe Illustrator's to pull that color into a graphic to find the closest match for the intended substrate, all without having to wait for physical samples to be produced to see how far off-target the printed colors could be. Some visualization tools, for example, create a 'soft proof' that allows designers to check colors accurately on screen. They even simulate the dot gain of the final printing process.

2 The Impact of Substrates

Designers appreciate the opportunity to choose and add spot colors to their designs, but they should be able to do so in a context that allows them to easily see (a) whether or not and, if so, (b) how those spot colors can be reproduced with the inks in the digital printer, on the target substrate. The inks used in digital wide-format printers and digital toner-based or inkjet printers have a much higher pigment load than those used in offset or flexographic printing and, therefore, can achieve a higher percentage of color matches with process printing. Regardless of which model of printer will be used, everyone involved in the workflow should be able to know the optimal reproduction of a spot color for a specific substrate.

Taking into consideration how color will appear on target substrates for each project or component is most effective at the design stage; but if that is not possible, the printing operation must work to adjust color values to take substrate color differences into account. In flexo or offset using spot colors, this can be handled in the ink formulation process, and by adjusting ink densities or strengths. For process printing, it is a more complex – but achievable – process to adjust each separation to achieve the expected color.

Digital printing, by definition, is process printing, although a growing number of digital presses feature standard spot colors, custom spot colors as well as expanded process gamuts using more than four colors. This is where profiling and calibration of digital presses is critical. Once a baseline has been established, color can be adjusted to accommodate differing substrate needs.

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In the introduction to this white paper, we used a trade show exhibit as an example. This is a great example of a single project that uses a variety of printing technologies and substrates, ranging from paper to fabrics, vinyl, PVC and more. As we stated earlier, the white point of each base substrate can significantly affect the appearance of the printed output, so it is extremely important to take each material into account when developing, communicating and implementing color specifications for a given project.

The most obvious examples are substrates that carry their own non-white base color, such as brown Kraft paper. Even backlit graphic substrates, however, may have varying white points. And different batches of the same substrates from the manufacturer can also vary enough to affect the color outcome.

Experts recommend establishing a digital master standard, assigning a spectral value for each color. From there, dependent standards can be created that reflect the spectral value differences for each given substrate. This way, printing operations can come as close to achieving the master standard as possible when targeting colors for various materials.

By taking each substrate into consideration during the graphic design, specification, prepress and production processes, all colors can be aligned for individual components of an entire trade show exhibit, whether they are individually intended for digitally printed vinyl graphics, rigid plastic materials, backlit signage, soft signage, or even accompanying brochures and other point-of-sale materials.

3 Fine Tuning Output Devices

If all the image capture and viewing devices have been color-profiled and calibrated accurately beforehand, then the design, prepress and premedia steps will all go more smoothly. This is important because today's compressed production cycles do not allow for production of numerous proofs, for samples to go

back and forth with the client, for long setup times at the printer, and then for the testing of materials to get tricky brand colors right.

Instead, today's inkjet printers offer digital front ends (DFEs) with ICC color profiles. In most cases, these profiles can be fine-tuned within the RIP software for the production environment with the specific ink set and substrate in mind.

Establishing a standard set of master parameters will minimize the need for corrections and reduce errors, as well as save time and money. By using the appropriate tools and techniques at the beginning to ensure files are optimized for printing, a printing operation can implement an entire 'RIP-to-roll' production workflow, increasing its throughput and improving its profitability.

It should also be noted that using color profiles from offset printing that follow offset plate curve principles is not the most effective approach in digital printing. Today's digital printers—from small-format inkjet proofers to grand-format presses—can achieve a much wider color gamut than offset and flexographic presses, and thus can achieve results that were previously constricted by technology. Developing specific profiles for each printing device is the recommended approach for the best possible results. This allows you to use all the gamut of the device, but with a good neutral you can still maintain a shared appearance with conventionally printed materials if they are part of an overall campaign.

4 Using Spectrophotometers

As business management consultant Peter F. Drucker famously put it, "you can't manage what you don't measure." Instruments for color measurement are critically important elements in a color-managed workflow.

Using a properly calibrated spectrophotometer at various stages, from design through prepress and production, will help ensure color standards are being communicated in a way that everyone understands, and that the desired results are achieved. And if multiple spectrophotometers are being used across the production environment or throughout the supply chain, then additional tools should be used to ensure these instruments are aligned with each other.

That said, even when one user measures a color with a spectrophotometer and finds it within tolerance, while another does the same elsewhere, when you compare their respective results, they may still fall far apart within the color spaces; this difference is known as Delta E. When considering a project with multiple components that must match, this variance can be an issue. And visual evaluation alone can be even more subjective.

This is why the common practice is not necessarily the best practice when it comes to color accuracy. Instead of producing a new physical sample to work with at each step of the workflow, it is preferable to provide access to the original color data—whether a master or dependent standard—and measure against that.

A digital workflow makes this possible, whereby the exact spectral color value specified by the designer can be accessed and used at each stage of production, from proofing to printing. This is true whether using digital or conventional printing technologies. This is the best possible approach for improving color consistency all the way down the line, for everything from trade show exhibits to packaging on retail shelves.

This technique also offers simplicity and efficiency when tackling a complicated color management project. By way of example, it was used in 2016 with wide-format graphics for the U.S. College Football Playoffs. Materials for this project were produced using a broad variety of printing technologies and substrates. Since everyone involved was able to work from the same set of digital master standards, they could quickly determine which color effects could or could not be achieved on particular substrates. This was important because there was very little time to specify colors by trial and error based on the outcomes of the games along the way.

5 Visually Evaluate Color Under Controlled Lighting

It is also worth noting the perception of colors changes depending on the lighting under which they are viewed. As such, controlled lighting should always be used wherever colors are visually evaluated throughout the process.

A light booth that features several different modes allows for evaluation under all viewing conditions the graphics will be subjected to in the field. This includes fluorescent lighting in retail or trade show environments, incandescent lighting in homes, and natural daylight for outdoor applications. There is increasing use of LED lighting in many of these environments as well. The International Standards Organization (ISO) is in the final stages of developing LED lighting standards which will set the stage for inclusion of Standardized LED lighting in light booths later in 2018 or into 2019.

Here are some tips to ensure you're getting the most out of your visual evaluation process.

Know your limitations. If your eyes aren't capable of seeing accurate color, there's not much a light booth can do to help. Everyone involved in your visual evaluation program should be tested for color discrimination. The Farnsworth Munsell 100 Hue Test has been around for over 40 years, and is an easy and effective method for identifying superior (or sub-par!) color vision.

Choose the correct lighting condition. Select every light source under which the final product will be viewed. For instance, if you're producing plastic garden ornaments, you'll want to make sure they look good under each daylight source, plus fluorescent store lighting.
Minimize surrounding light. The only light in the room should be coming from within the light booth. Light is color, and even a little bit streaming through the window or from a table lamp can change the color perception of your sample.

Keep your light booth clutter free. Don't place or store anything inside your light booth… no plants, no pens, no cute little stuffed pets. All these things will influence your color vision and can cause you to make poor decisions.

Be aware of surrounding colors. Our eyes are constantly processing the light that strikes the retina. Even our clothing can change our perception of color! Although it may feel drab, stick to neutral colors like white and gray if your day includes visual color evaluation.
Properly arrange your samples. Although it depends on the product and material, the general rule of thumb is to view samples at a 0°:45° geometry. Light booths make this easy – just place the sample on the bottom of the booth, parallel to the light source. If you're comparing samples, lay them side-by-side so they're parallel and touching. Even a slight space between colors can trick your eyes. You also need to move them around – left to right, top to bottom – and observe any changes in color.

Look fast. You may think that staring will help you focus, but our eyes actually become less sensitive after 5-10 seconds of looking at the same object. When judging color, look fast, then rest your eyes and before you judge again.

Define standards. Once you determine what works for you, your products, and your customers, write it down. Standard operating procedures will ensure everyone responsible for evaluating color is doing it the same way.

6 Establishing Standard Processes

Establishing standard processes is important not only in lighting, but across the entire production workflow. The best way to think about it is not so much as 'color management' in the abstract, but instead as optimizing colors for substrates, based on the applicable printing system. This may seem like a minor shift in thinking, but it is an important one, because it specifically accommodates today's production technologies and demanding conditions when optimizing a shop's workflow.

Color as You Expected It

Optimizing the color workflow using the tools and tips discussed here, from design through production, will help printing operations deliver better color faster. Inconsistent or inaccurate color remains one of the most common reasons for work being rejected by customers. This can be fatal to the relationship, especially with the short cycle times producers face these days. If the trade show exhibit or point-of-sale materials do not meet color expectations, clients will not be happy. And the producer is usually at the back end of the project from a timeline perspective. Being late with trade show exhibit materials is simply not an option. And increasingly, point-of-sale, outdoor advertising and other materials are tied to specific campaign dates and must also be delivered on time.

By ensuring a streamlined and accurate color-managed workflow, printing operations can largely avoid these pitfalls, delivering work they – and their clients – are proud of and that help clients meet their business objectives.

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