

## DIGITAL PRINTING 5.0 OPTIMIZING COLOR ACROSS PRINT PLATFORMS



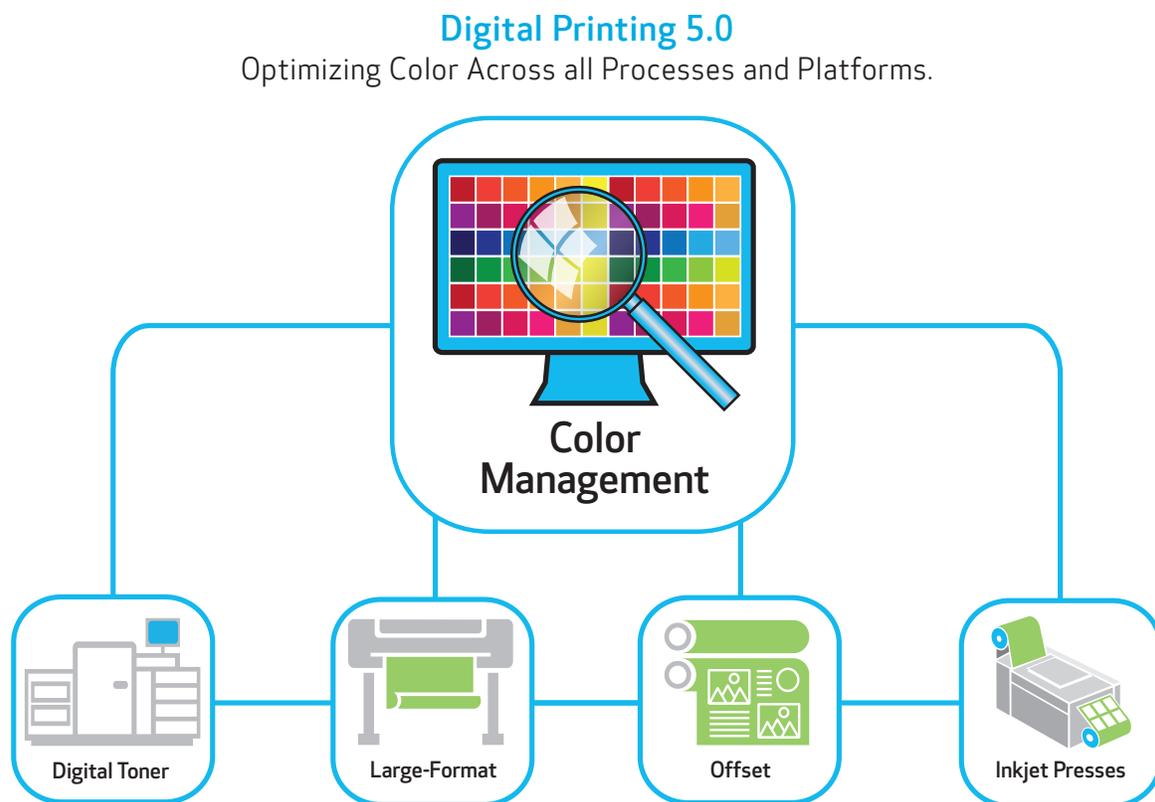
A NAPCO Research Study and White Paper  
Sponsored by Canon U. S. A., Inc.

# Optimizing Color Across Print Platforms

In today's multichannel communications world, color management has never been more important. Marketers, brand owners, and print buyers demand that color be consistent across all digital and physical output forms, from direct mail and signage to mobile devices and monitors.

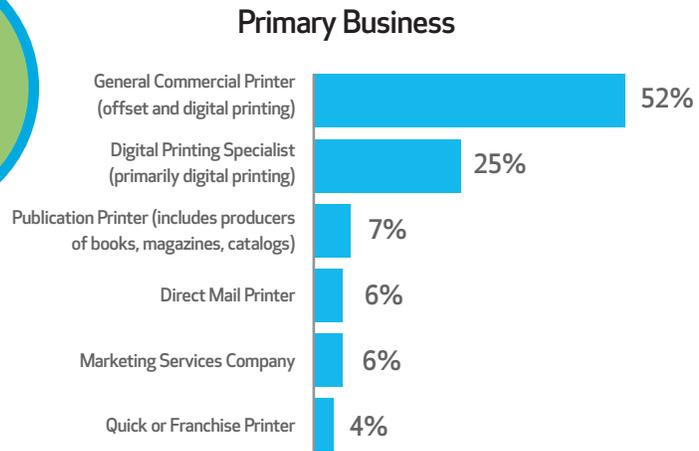
In the early years of toner and production inkjet, digital presses couldn't match the appearance of offset presses. Early adopters of digital expected tradeoffs in color to gain other advantages. Advancements in printing devices, digital front-ends, inks, toners, and color management tools have helped to improve color matching across devices. Because many print providers support multiple print technologies, including digital inkjet, toner, wide-format, and offset, optimizing color across all processes is more important than ever.

As the manufacturing world has moved into "Industry 4.0" and continues to evolve, printing is entering a new phase described as **Digital Printing 5.0**. Critical components here are color management and the ability to produce print work that's consistent, repeatable, and optimizes matching color across various printing systems. In the simplest terms, color management is a set of standards, rules, and procedures that, when followed, control the variables involved in color workflow. A properly implemented color management workflow can help achieve consistent color results across various devices.



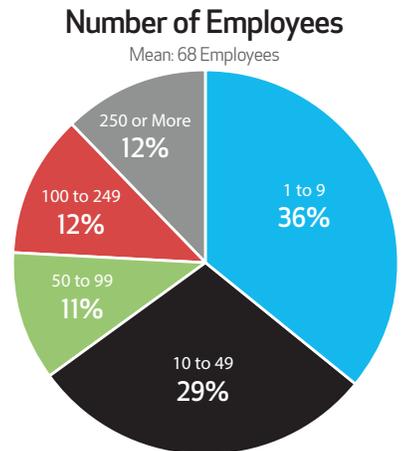
A new NAPCO Research\* study and white paper, sponsored by Canon U. S. A., Inc., offers insights on how print service providers (PSPs) are leveraging digital printing to boost efficiency, better serve customers, and output print products once considered not possible on digital devices. The study, *Digital Printing 5.0*, surveyed 233 commercial printers and 174 in-plants to uncover key and evolving trends that are advancing the use of digital printing, including color management. Figures 1 and 2 describe the types of printers participating in this study.

**Figure 1**  
Commercial Printer Respondent Base



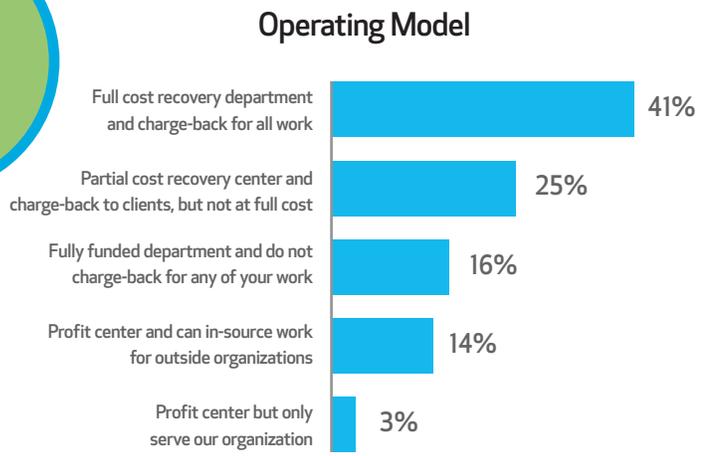
Q. Which category best describes your company's business? Single response.  
N = 233 Commercial Printers

Source: *Digital Printing 5.0* NAPCO Research 2019



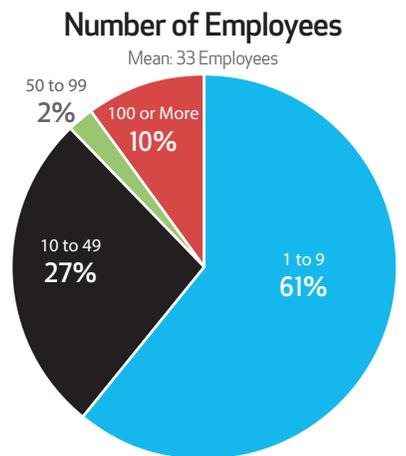
Q. How many employees work at your company or in-plant?  
N = 233 Commercial Printers

**Figure 2**  
In-Plant Respondent Base



Q. Which of the following describes your in-plant operation?  
N = 174 In-Plants

Source: *Digital Printing 5.0* NAPCO Research 2019



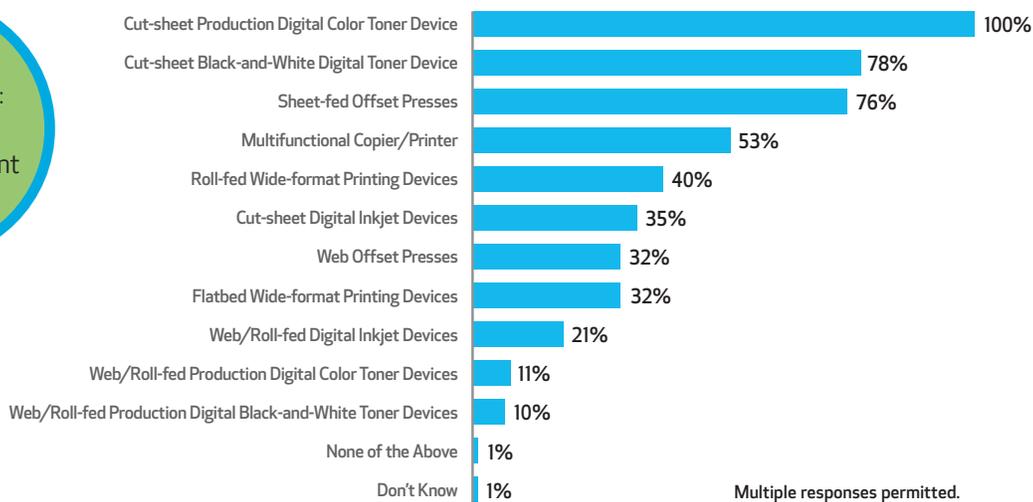
Q. How many employees work at your company or in-plant?  
N = 174 In-Plants

\*A unit of NAPCO Media, the parent company of Printing Impressions and In-Plant Impressions.

## Mixed Production Environments Drive Need for Optimizing Color

Optimizing color across printing devices is essential as increasingly more operations use a variety of printing technologies to produce customers' work. Clients expect the components of their print campaigns (from direct mail to signage) to match. NAPCO Research's survey of commercial and in-plant printers puts the variety of equipment used by operations in perspective. The study reveals that many printing organizations are using both digital and offset printing to deliver a variety of products to their customers. All commercial printer survey respondents report owning at least one cut-sheet color toner production device while others operate the following equipment: 35% cut-sheet color inkjet device; 76% sheet-fed offset presses; and, 32% web offset presses (Figure 3). Roll-fed, wide-format printers are in use at 40% of respondents' shops while 32% operate wide-format flatbed printers. This finding points to the rise in mixed production workflows, where work from various devices needs to match..

**Figure 3**  
Digital Presses:  
A Commercial  
Printer Equipment  
Essential

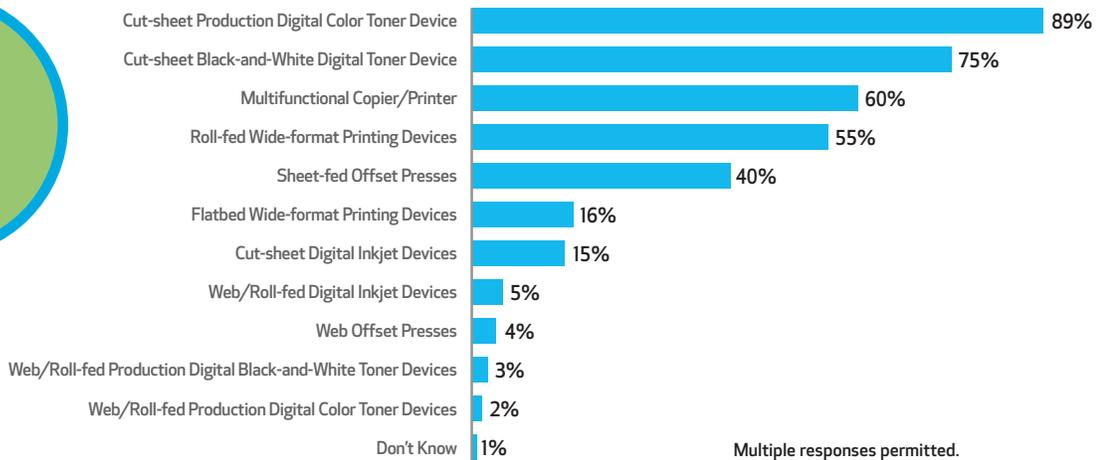


Q. Which of the following printing equipment do you use in your operation?  
N = 233 Commercial Printers

Source: Digital Printing 5.0 NAPCO Research 2019

In-plants also report operating a mix of printing technologies. According to the survey, 89% of respondents report owning at least one digital cut-sheet production color toner device and 75% have a monochrome toner device. Inkjet has not (yet) made much headway into the in-plant market; only 15% of the respondents own a sheet-fed production inkjet device, and 5% own a web/roll-fed production inkjet press. (Figure 4).

**Figure 4**  
In-Plants  
Powered  
by Digital  
Devices



Q. Which of the following printing equipment do you use in your operation?  
N = 157 In-Plants

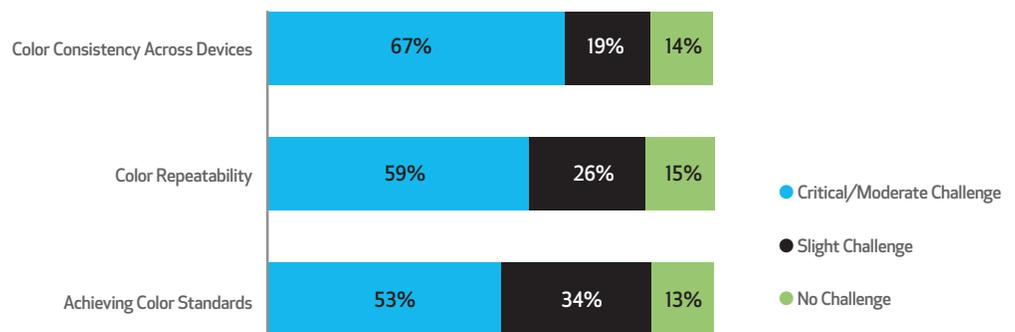
Source: Digital Printing 5.0 NAPCO Research 2019

## Color Management Challenge Still a Challenge

As many PSPs produce multipart jobs in hybrid workflows that distribute work across digital and conventional presses, maintaining proper color management is essential. Customers expect colors to be the same on their printed materials, from business cards and corporate brochures to trade show signage. Color consistency across substrates and devices is a key customer expectation, yet survey respondents report challenges in managing color.

More than two-thirds of commercial printer respondents report that achieving consistent color across devices is a critical/moderate challenge, only 14% indicate it presents no challenge (Figure 5). Producing repeatable color is a challenge for 59% of commercial respondents while more than half report obstacles in achieving color standards.

**Figure 5**  
Managing Color is Still a Challenge for Commercial Printers



Q. Please rank the level of challenge each of the following color management tasks present to your digital printing operation?  
N = 176 Commercial Printers

Source: Digital Printing 5.0 NAPCO Research 2019

In-plant respondents report similar challenges in color management tasks. More than half cite achieving color consistency across devices and color repeatability as major challenges (Figure 6). Achieving color standards is a challenge for 39% of in-plant respondents.

**Figure 6**  
Managing Color is Still a Challenge for In-Plants



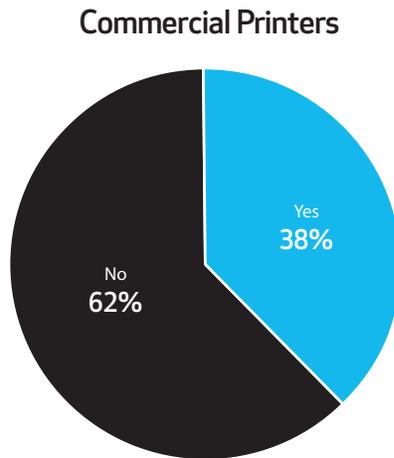
Q. Please rank the level of challenge each of the following color management tasks present to your digital printing operation?  
N = 118 In-Plants

Source: Digital Printing 5.0 NAPCO Research 2019

## Print Service Providers Not Implementing Standards

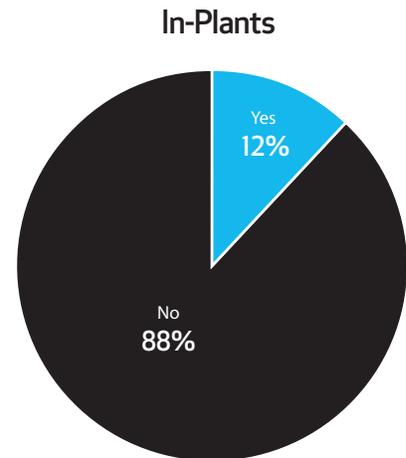
Efficient color management is critical for consistently reproducing color across all platforms. A key reason color management remains a challenge is because most PSPs view it as complex and intimidating — even though there are many tools and resources available to demystify the process. Close to two-thirds of commercial printer respondents and 88% of in-plant respondents are not following color specifications to optimize color across printing devices (Figure 7).

**Figure 7**  
Printer Providers  
Not Leveraging  
Color “Control”  
Across Devices



Q. Has your organization implemented G7, GRACoL, or other color specifications to optimize color across devices?  
N = 182 Commercial Printers

Source: Digital Printing 5.0 NAPCO Research 2019



Q. Has your organization implemented G7, GRACoL, or other color specifications to optimize color across devices?  
N = 121 In-Plants

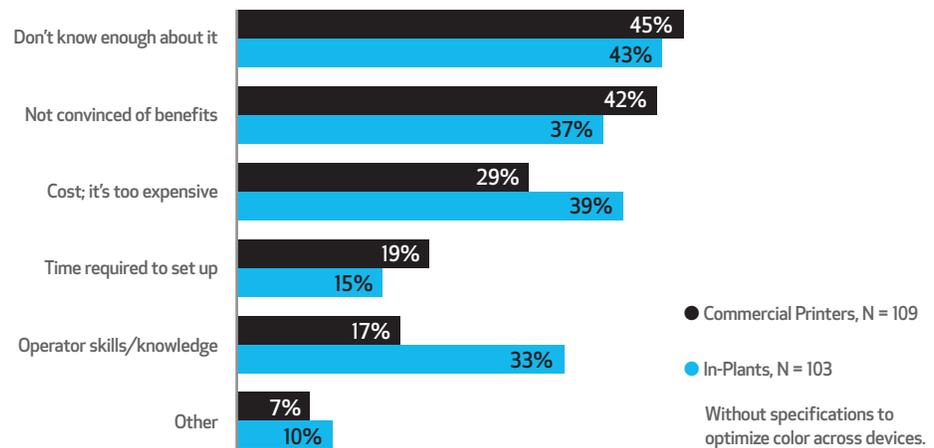
A key method for achieving consistency in printed results across printing systems is the use of a near-neutral tone scale calibration process such as G7<sup>®</sup>. Because the G7 specification is device-independent, PSPs can leverage the benefits of the specification across a range of digital and conventional printing technologies. The application of this method enables printers to reproduce a similar visual appearance across different presses.

Implementing and achieving color certifications offers PSPs many benefits. A key advantage is that it helps establish a process on how to manage color and can deliver a repeatable process. In addition, obtaining a G7 Master Qualification demonstrates to customers that a PSP has validated their print color output to the specifications.

## Obstacles to Optimizing Color

The top obstacles preventing commercial printer and in-plant respondents from implementing color specifications to optimize color across devices are not knowing enough about specifications and how to implement, an uncertainty about the benefits, and cost (Figure 8). In addition, one-third of in-plant respondents report operator skill levels as a barrier to implementing color specifications.

**Figure 8**  
Reasons Preventing Implementation of Color Specifications

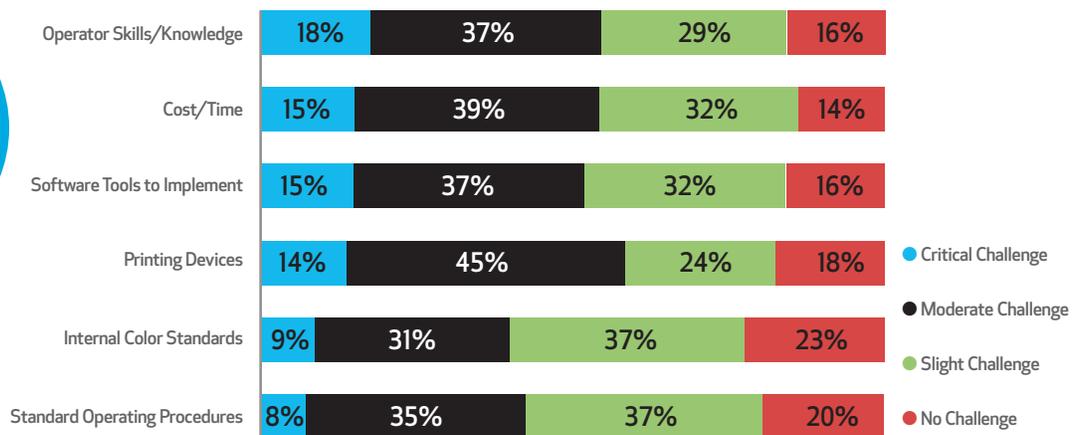


Q. What is preventing your organization from implementing color specifications to optimize color across devices?

Source: Digital Printing 5.0 NAPCO Research 2019

When asked to rank potential obstacles to achieving more consistent and repeatable color, survey respondents overall cited operator skills, costs, software, and printing devices as key obstacles (Figures 9 and 10). Of note is that respondents report lack of internal color standards as a challenge to color consistency and repeatability, but the majority of respondents have not implemented color standards. Interestingly, survey respondents also blame printing devices as an obstacle in producing consistent color, even though they may take no action to manage color across devices.

**Figure 9**  
Commercial Printer Obstacles for Consistent and Repeatable Color



Q. Please rate the following potential obstacles to achieving more consistent and repeatable color.  
N = 182 Commercial Printers

Source: Digital Printing 5.0 NAPCO Research 2019

Respondents also report that establishing standard operating procedures to ensure consistent and repeatable color is difficult. Quality control in printing usually begins with a printer's standard operating procedures (SOPs). These measures often ensure consistent practices are used to control color reproduction and quality throughout an operation. A possible reason SOPs are a challenge is that a majority of respondents report not having color specifications in place to guide and support procedures.

**Figure 10**  
In-Plant  
Obstacles for  
Consistent and  
Repeatable  
Color



Q. Please rate the following potential obstacles to achieving more consistent and repeatable color.  
N = 121 In-Plants

Source: Digital Printing 5.0 NAPCO Research 2019

## Color Matching on Multiple Devices

Matching printed output produced on multiple presses can present challenges, as there are many variables including multiple substrates, ink/toner types, printing processes, and digital front-ends. A key factor is ensuring color consistency on the printing device. In general, this is done by measuring print output and making changes to keep color from varying or shifting too far from an established target.

In analog printing, press operators manage consistency by measuring sheets during the press run with scanning densitometers to validate the sheet is consistent with target densities. If the sheet is not matching the targets, press operators make changes to press ink key settings to keep the printing consistent with the target densities.

On a digital press, color is controlled by the digital front-end using linearization curves and color profiles created using a spectrophotometer. Typically, color on digital presses doesn't drift as quickly as it does on offset presses, but color can drift over time.

## Methods for Optimizing Color

Printing operations with multiple digital and analog printing devices need to implement process control procedures along with the tools to measure, monitor, and manage color consistency over time. The combination of measuring, monitoring, and managing is the only way to maintain color consistency of any printing device. Vendors of offset and digital equipment are continuing to integrate spectrophotometers to perform routine color procedures and monitor the color quality throughout the job as it's printed. Calibrations, profile creation, and quality control scans can happen automatically using digital presses equipped with in-line spectrophotometers.

**Successfully managing color across all printing devices requires executive-level commitment, actions to solidify color management tasks in the process, and developing and following the right SOPs.**

Many experts recommend establishing color reports to document the consistency of printing device performance. Many printing operations generate a variety of financial, accounting, and spoilage reports to track and manage the health of their organizations. For printing operations that want to ensure color consistency, establishing and requiring color reports is a good place to start.

A printing operation with the tools and trained staff to perform calibrations on digital devices and/or perform G7 plate curve adjustments for analog devices has the basic tools to start a process control program. The SOP should include establishing baselines for the printing devices, and then measuring and monitoring device consistency over time. Doing so will help production staff to "see" when a device goes outside its limits of color consistency and needs to be recalibrated to bring it back into compliance. Printing operations not monitoring how printing equipment prints may not know when the device is starting to vary from the baselines.

Another important consideration is to involve all staff responsible for implementation when documenting SOPs to manage color. The SOP should define each process, tolerances, and the steps required to keep each process in control. Measuring, monitoring, and managing color of printing devices according to SOP specifications are essential to optimizing color across platforms.

Also, it's important to review and update SOPs and related documentation on a regular basis, as new processes emerge and new equipment is added.

## Conclusion

Optimizing color across all print processes is more important than ever. Many marketers, brand owners, and print buyers demand consistent and repeatable color across all communications. Print service providers are producing work on multiple printing technologies to best meet customer requirements. Despite the importance and benefits offered by taking steps to ensure consistent, repeatable, color across printing platforms, printing providers' embrace of color management practices is lagging. Leveraging the advantages of Digital Printing 5.0 requires print providers implement available tools and resources to optimize color across platforms.

## About Digital Printing 5.0

Digital Printing 5.0 is a series of thought-leadership content pieces based on a NAPCO Research survey of commercial and in-house printing that was sponsored by Canon.

1. Digital Printing: Where Are We Now?
2. Beyond the Press: Defining the Infrastructure for Operational Success
3. Optimizing Color Across Print Platforms
4. The Rise of the Digital Enhancement Opportunity
5. Best Practices For Digital Finishing

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