

ANALYSIS

JUST-IN-TIME MANUFACTURING

PRODUCTION COLOR INKJET SYSTEMS LEAD THE WAY

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Introduction

Today's color inkjet document printing systems are capable of producing high speeds and excellent quality levels on a range of substrates, including glossy papers for transactional/promotional communications, publications, and other applications. Fully taking advantage of these speeds and quality levels requires an automated workflow and highly integrated finishing. Now, print service providers (PSPs) can leverage the power of variable data digital printing to manufacture a wide range of just-in-time applications. This document will explore strategies that PSPs can use to take advantage of the power of their production color inkjet printing systems and execute a just-in-time manufacturing strategy. We will define just-in-time manufacturing for production printing, highlight the importance of finishing, and offer strategies for avoiding common pitfalls.

Defining Just-in-Time Manufacturing for Document Printing

Just-in-time manufacturing is defined as a process by which products are produced within a tightly controlled workflow. The components of the products are delivered and consumed in a highly efficient manner to manufacture the finished product. Just-in-time manufacturing is often referred to as "lean production." In document production, just-in-time manufacturing requires an efficient electronic workflow, timely delivery of components like paper, easy access to printing system parts and consumables, service levels that eliminate significant downtime, highly integrated finishing, and on-time delivery. Not to be confused with its sister process of on-demand production (in which documents are produced as needed from a digital document library), just-in-time manufacturing generally involves the production of large quantities of documents (e.g., transactional applications like bills and statements; publishing documents like books, magazines, and newspapers; and promotional documents like direct mail and catalogs). Other types of documents, such as election ballots, are also frequently manufactured in a just-in-time fashion under tight timelines.

What Makes Inkjet So Important in this Transition?

Today's production color inkjet systems produce excellent quality on a broad range of substrates, which makes them ideal for the high-volume print applications that were once predominately handled by conventional processes like offset lithography. At the same time, however, high print speed alone is not enough to take on applications like advertising circulars, books, catalogs, direct mail, election ballots, forms, magazines, newspapers, promotional print, and transactional documents.

High-speed color inkjet printing systems for document printing are fundamentally changing how PSPs leverage production digital printing systems. There are several reasons for this:

- ◆ Print speeds that are comparable to those of offset



- ♦ High levels of reliability
- ♦ High levels of productivity
- ♦ An expanding substrate range that now includes coated stocks
- ♦ Excellent levels of color print quality
- ♦ Integration with in-line finishing
- ♦ The ability to leverage the key values of production digital print, including on-demand printing, just-in-time manufacturing, targeted marketing, and one-to-one personalization

Standards and Just-in-Time Print Manufacturing

Automated workflows commonly used in just-in-time print manufacturing are heavily dependent on the use of industry standards to facilitate production. This includes industry-standard file creation with PDF-based tools, but it also involves tools for proofing, color management, press control, data security, and supply chain certification. These standards include:

- ♦ **G7:** A printing procedure for visually accurate color reproduction that puts an emphasis on matching grayscale colorimetric measurements. G7 stands for grayscale plus seven colors (the four subtractive colors of cyan, magenta, yellow, and black, and the three additive colors like red, green, and blue).
- ♦ **ISO 9001:** Part of the ISO 9000 family of quality management systems, ISO 9001 is a set of standards that helps organizations meet customer and other stakeholder needs within statutory and regulatory requirements related to a given product or service. Companies must pass third-party certification to prove that they meet the requirements of ISO 9001.
- ♦ **SOC-2:** SOC-2 relates to information security. SOC stands for System and Organization Controls and is the name of a suite of reports produced during an audit. It is used by service organizations to provide validation of their internal controls regarding information systems. This is a key standard for PSPs in transactional and promotional work involving personalized data. Other security features separate from SOC-2 include watermarked paper, sequential numbering, IR tags, blacklight-visible information, and careful destruction of all non-final products.
- ♦ **Forestry management:** Responsible management of the world's forests is facilitated by paper supply standards and chain-of-custody processes from groups like the Forest Stewardship Council (FSC), the Sustainable Forestry Initiative (SFI), and the Pan-European Forest Certification (PEFC). Companies that achieve certification of all three are considered "tri-certified." Environmentally-conscious customers will frequently require their PSPs to support these initiatives.



Finishing's Role in Just-in-Time Print Manufacturing

One important aspect of high-volume digital print production is its ability to reduce operator touches and thereby lessen the possibility of errors, particularly in complex personalized documents in which the recipient's data is involved.

A Finishing Terminology Primer

A quick primer on some finishing terminology will help define automation within the finishing market. Finishing terms of particular importance are in-line, near-line, and off-line.

- ♦ **In-line finishers** are actually connected to the printing system. A common example is a booklet-maker that is attached to a cut-sheet production color printer. Functions like binding, coating, collation, cutting, folding, perforating, slitting/merging, stacking, and stitching trimming are often handled in-line.
- ♦ **Near-line finishers** are not physically connected to the device, but set-up instructions from the job ticket can be transferred to the finisher via a network or another system (such as a barcode reader).
- ♦ **Off-line finishers** are not physically connected to the device and are also not network-connected. Set-up is handled manually by the operator, though the finishing system may have a way to save commonly used set-up configurations. Standalone off-line finishers are likely among some of your oldest finishing assets. Most of the finishers sold today have ways of automating the set-up process, which of course saves time and reduces errors.

If your shop has a dedicated application that it focuses on, in-line finishing may be the right choice for you. In- or near-line finishing systems are the key to making high-volume inkjet document production a successful reality. If you produce a range of applications and no single one dominates, near- or off-line finishing may be the best choice.

A Few Words about Roll-Fed Inkjet and In-Line Finishing

Roll-fed inkjet systems can be very long, and they become even longer when combined with in-line finishing devices. Fitting them into your facility requires careful planning as well as the expectation that additional features may need to be added. Although more space is required, straight-line configurations may be preferred over L- or U-shaped set-ups. This is due to stress on the paper and the impact that this can have on subsequent finishing operations. The more the paper turns and the longer the distance, the less control you have over the web. This is particularly true with heavier paper weights.

Space related to these long lines is another important consideration. Allocating space for these devices should be a central part of your planning, and it is important to remember that you might wish to extend the system with additional feeding or finishing capabilities at some point in the future. You might also need to add an entirely new system to meet changing demands.



You should also acknowledge that the productivity of a printing system with in-line finishing will be impacted by potential downtime in the finishing line. If your finishing is down, your press is down. When time is of the essence, in-line finishing can be the difference between missing a deadline and making it. When higher productivity is the requirement, separating the printing and finishing processes may be preferred. Your print application, volume levels, and use of variable data will all be part of the decision too.

Infrastructure Requirements

As PSPs examine their infrastructure requirements, they must balance existing assets with newly-added ones. Among these will be analog printing presses and their associated finishing as well as cut-sheet and roll-fed digital printing along with their in-line, near-line, or off-line finishing assets. Many PSPs have separate finishing operations for offset and digital. In considering these, it can be helpful to consider them one-by-one:

- **Offset:** Although offset finishing may be a separate operation from digital, there will still likely be opportunity for overlap. This is particularly true of mailing operations in which folding and envelope insertion tools can be used for static and personalized documents.
- **Roll-fed digital:** Roll-handling equipment for loading (and unloading when a roll-to-roll workflow is involved) will be one of the first considerations. Trim and trim waste accumulation will be required for many applications. Many PSPs using roll-fed digital will consider in-line finishing to sheet and either slip-sheet or offset stack output, which can then be sent to an off-line bindery for additional steps.
- **Cut-sheet digital:** High speed and expanding color quality is not limited to roll-fed inkjet systems. Adding in-line finishing when a dedicated application set requires it can improve automation and reduce errors.

In addition, for any application that requires a digitally-printed personalized component, PSPs need to consider whether piece-level tracking will be required (this is typical in print & mail operations). Features such as intelligent insertion and variable perforation open up new horizons related to innovative document production in which each document may have personalized covers and a varying number of pages depending on the recipient. Finishing techniques to handle these variables typically use 2D barcodes or other indicators to let the finishing system know how to handle each document. In this case, the variable data capability of the printing and finishing systems work hand-in-hand. Although such techniques have been common in black & white digital print workflows for many years, today's color inkjet systems expand the application set due to their high speed and expanded substrate choices.



Opinion

Now is a good time to fully leverage the ability of high-speed inkjet digital print to just-in-time manufacture a broad range of print applications. In doing so, though, it may be helpful to keep the following recommendations in mind:

- **Be flexible in identifying the ideal configuration:** As soon as a roll-fed or cut-sheet inkjet system is in place, your sales force will likely find new ways to use it that you had not previously imagined. This is frequently true of roll-fed inkjet printing systems. The initial configuration may need to be modified (sometimes with additional in-line finishing) to meet new and evolving customer needs.
- **Plan ahead for expansion:** Roll-fed inkjet printing systems tend to be very long, and they will be even longer when in-line finishing is part of the configuration. Adding a second system or extending the configuration with in-line finishing may test your facility's ability to fit the required equipment.
- **Look to your suppliers for insight:** This relates to the provider of the finishing system, the inkjet printing system, and the software suppliers. They have seen other PSPs implement high-speed inkjet systems with in-line finishing, so their perspective can be invaluable.
- **Value the interplay of cut-sheet and roll-fed systems:** Some PSPs have equipped their cut-sheet and roll-fed systems similarly so that each can handle the dominant application in the shop. That way, when shorter run reprints from roll-fed system output are required, they can be handled more appropriately by the cut-sheet system.
- **Consider the role of paper:** Our industry is facing a critical time in terms of access to paper. Some mills have shut down, and access to papers from other regions might also be impacted by ongoing effects of the pandemic. Carefully examine your printing needs, particularly when pre-treated inkjet papers are required. Although these substrates provide excellent quality levels, even on early color inkjet systems, their availability may be limited at times. This might also be true of other paper types, so it is always important to pay careful attention to your paper supply chain.

The evolution of high-speed inkjet printing systems continues. As it does, new opportunities arise. Just-in-time manufacturing of high-volume color print is bringing new life to the value of digital print. Take advantage of the opportunity by exploring how just-in-time printing can transform the way you meet your customers' needs.



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