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Finish with a Flourish: Fundamentals of Digital Postpress

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I. INTRODUCTION

The phrase “digital finishing” has several shades of meaning. One is simply that the job being finished has been printed on a digital press. Another refers to the digital controls that make modern finishing equipment fast and efficient.

The bigger meaning is that digitally enabled postpress (an alternative term for finishing) is taking its rightful place with prepress and press as a part of the 21st-century manufacturing concept known as Industry 4.0. Imagine machines that can share data to set themselves up for operation and instruct other machines how to join in the workflow. That’s the essence of Industry 4.0. Its goal is to enable “smart factories”: manufacturing environments where zero-touch, lights-out production becomes routine.

In reality, few postpress environments are this autonomous (yet). But, as the printing industry’s analog-to-digital transformation accelerates, every plant that finishes what it prints will likely find itself

moving in a straight line toward the capabilities of Industry 4.0. This white paper is a guide to understanding how digital finishing can be as “smart” as all the other steps in the print manufacturing sequence.

Today, finishing can be fully integrated with prepress and printing in a workflow based on relaying digital job specifications from process to process. When this happens, the whole print manufacturing paradigm changes.

Instead of prepping a job in one location, printing it in another, and binding it somewhere else, everything takes place in a unitary production line consisting of a networked press with finishing modules connected directly to it. In this in-line digital finishing scenario, the sequence is “white paper in, sellable product out”: printed, trimmed, folded, bound, and ready to ship to the customer in one pass, all from what is essentially one device.

There are other ways to perform digital finishing, but every method of doing it has the same objectives:

- Eliminate manual steps and touch points
- Minimize errors, waste, and excess cost
- Achieve increased throughput, more machine uptime, faster turnaround
- Optimize labor utilization

These are imperatives for every commercial and captive printing operation. As plant managers watch the share of work they print digitally go up, they realize that their conventional finishing equipment isn't ideally suited to digital formats and quantities. They face increasing pressure to turn around short runs on tight delivery schedules. They're called upon to produce hybrid jobs that contain a mix of paper stocks, sometimes including offset preprints.

Only with the help of automated digital finishing systems can postpress keep up with requirements like these. On-demand production of both static and variably printed jobs is becoming the norm in many plants. As a result, there is little tolerance for spoilage and rework. In a run of one, after all, there is only one chance to get the job right.

"Plan backwards from postpress" is a classic piece of wisdom in conventional production. It is a gem for digital finishing as well. As the step that turns printed sheets or webs into things that customers are willing to pay for, finishing deserves the same status in the creative brief as any other aspect of the item being produced. Digitized instructions for executing it should be available at all stages of the workflow. This helps ensure a problem-free run and a result that satisfies everyone's expectations.

II. INTEGRATING DIGITAL FINISHING INTO THE PRODUCTION WORKFLOW

Postpress traditionally has been the most labor-intensive stage of print production—the set of chores with the most paper to handle and the largest number of task-specific machines to process it on. Slowdowns and backups are hard to avoid, and the "bindery bottleneck," while not as prevalent as it used to be, still challenges conventional printing operations.

Digital finishing—especially when it takes place in-line with the press—breaks the bottleneck by eliminating the gaps of time and space that tend to isolate process steps in a conventional bindery. The gaps disappear partly because in an in-line configuration, the press and its finishing stations are physically linked. Substrates can pass straight through from the printing engine to the postpress modules without detours or delays: white paper in, sellable product out.

The other enabler of one-pass production is automated workflow. "Workflow" is a term for software architecture that controls how production equipment operates and, just as important, how it gathers, stores and shares data about everything it does. Workflow also conveys job parameters: color, pagination, imposition, trim size, and so on. Instructions for carrying out these key requirements are encoded in the electronic job ticket that the workflow sends from station to station once the job is under way.

Included are instructions for finishing, which ride along with all of the other job-processing cues and execute automatically as they do. Machine setup becomes simple, because there is no need to program individual devices or stations.

Everything that the production line needs to know is right there in the job ticket, which can be stored and recalled for repeat runs. During printing and finishing, the workflow can feed production data back to the plant's MIS (management information system) and ERP (enterprise resource planning) hubs for real-time monitoring of job costs, machine uptime and productivity, and other manufacturing variables.

Because it is software, workflow can be adapted to the production environment in which it is used. There are finishing workflows for black-and-white print engines, and there are finishing workflows for color engines. Finishing workflows can be controlled from the digital front end (DFE) of the press, or management can take place upstream. The job dictates the specifics.

Workflow automation is what brings finishing fully into the realm of digital production. It is especially critical in jobs containing variably printed elements or multiple components—for example, book blocks with tabbed inserts and covers—that have to be brought rapidly and precisely together.

Canon's PRISMA production management software is an adaptive workflow solution that lets Canon and Océ presses work seamlessly with equipment from the leading providers of digital finishing systems. Together, the software and the devices represent digitally integrated manufacturing at its most efficient—with finishing as the most efficient step of all.

III. IN-LINE FINISHING VS. NEAR-LINE AND OFF-LINE FINISHING

There are best practices for finishing, but no absolute rules. The finishing a plant does depends on the types of presses it runs, the volumes it typically prints, and above all, the customer requirements it has to satisfy. No matter what approach it takes, every plant wants postpress to be a profit center—or at least an activity in which costs are always kept firmly under control.

Finishing can be performed in-line, near-line, or off-line; as a combination of any two; or as a menu of all three. The terms mean different things in conventional and digital printing environments.

In offset plants, they refer mostly to the physical proximity of the postpress equipment to the printing machines, so that in-line might denote (for example) a sheeter or a folder at the delivery of a web press; near-line, a bindery department in an adjacent area of the building; and off-line, an outside location such as a trade bindery.

Data connectivity, on the other hand, is the touchstone for digital finishing. Here the definitions are:

- In-line – the finishing modules are attached to the press and controlled by the same stream of JDF (job definition format) compliant data
- Near-line – the finishing modules are separate from the press but driven by a common JDF job ticket that sets them up for operation
- Off-line – there is no mechanical or data connectivity, and each device must be programmed separately



Each method has advantages and limitations. A method that works well in one set of production circumstances may not be as efficient in a different scenario—the job determines the finishing workflow, not the other way around.

In-line digital finishing is the most sophisticated of the three. In an integrated production line, one-pass printing and finishing eliminates almost all need for manual sheet handling and transport. A single operator directs all of the work. If the press and the finishing modules are optimally matched, there is no “speed penalty” against the printing engine—the paper can be finished as fast as the press can print it.

A digital press dedicated to a particular type of job is an ideal candidate for in-line finishing. In this case, set-up is minimal, and production can be continuous—all the operator has to do is monitor quality and keep the press supplied with paper.

If, on the other hand, there are frequent changeovers among short-run jobs with different finishing requirements, near-line post-processing may be the more efficient option. That way, the press can proceed from one job to the next without adjustment for finishing. Another advantage is that because near-line equipment isn’t tied to a single press, it can support multiple print engines. JDF job tickets ensure the hand-off of processing instructions from the press to the finishing device.

Although, of the three methods, off-line finishing would appear to have the least to recommend it, there could be a legitimate role for it in high-volume repeat jobs. Again, no hard and fast rules exist. In-line or otherwise, a digital finishing system must be able to handle jobs at hand with the least amount of manual intervention that the nature of the work will permit. It should be part of a digital workflow that automates its setup. Flexibility and scalability for jobs that the plant does not handle now but may have to produce in the future are additional hallmarks of smart digital finishing systems.

IV. EQUIPPING FOR DIGITAL FINISHING: WHY

An offset plant installing its first digital press probably already has finishing equipment that it expects to use for the output from the new machine. This is a reasonable idea, but it is also an impractical one. Digital presses produce the best results when they are supported by digital finishing equipment. Although conventional postpress will work up to a point, it is essentially incompatible with the characteristics of digital printing.

Consider size. Only the smallest sheetfed offset presses have format sizes comparable to those of standard sheetfed digital presses. This is where any similarity between the two platforms ends. The most commonly used offset sizes are considerably larger than digital sheets, and they usually are imposed in signatures of eight or more pages. In contrast, most digital presses are designed to print A4 (8 1/2" x 11") layouts one- or two-up.

The same disparity exists between offset web and digital web presses. Many of the latter are narrow-web devices, and few digital web presses print rolls wider than 20"—a fraction of what commercial web presses are built to handle. Finishing machines built for offset sizes and impositions are inherently mismatched to digital formats, even though they may be mechanically capable of processing them.

Volumes create another mismatch. Like the offset presses they serve, conventional folders, saddle stitchers, and perfect binders operate most cost efficiently when they have long runs to work with. Like offset presses, they have to recover makeready costs by spreading them over large numbers of pieces. The small quantities typical of on-demand digital printing may make it difficult to avoid running them at a loss in jobs of this kind.

And, as if these drawbacks weren't enough, there is also the fact that conventional postpress devices can't be operated in-line with digital presses. If the machines are vintage, they probably will not support JDF-enabled workflows for near-line operation. This means that the most streamlined forms of finishing for digital printing won't be possible—off-line post-processing may be the sole option.

The takeaway: digital presses need digital finishing systems. But, pairing a press with a finishing module that probably came from a different manufacturer isn't a simple plug-in.

Does the press "know," for example, that a punch for ring binding is attached to it? What will alert the press to a jam that happens after printing, and what reaction will that trigger? Can every printing and finishing function be directed from the DFE? Flawless systems integration—the firm handshake that Canon and Océ presses make with equipment from Canon's qualified finishing partners—is crucial to taking full advantage of digital production.

V. EQUIPPING FOR DIGITAL FINISHING: WHAT

When digital presses first began appearing, there wasn't much in the way of compatible finishing equipment to complement them. Today, a shop can have whatever digital-friendly postpress capabilities its workload requires—not just machinery, but workflow software and DFEs as well.

The right capabilities to have are the ones that best suit the kinds of work a shop most commonly does. The finishing assets of a shop specializing in direct mail, for example, would be different from those of a shop where the volume consists mostly of booklets and brochures. A big advantage of in-line finishing in this regard is that postpress modules can be added when new kinds of work come in. As the applications become more specialized, the production platform can evolve to keep up with them.

Systems for the following postpress functions are available as in-line, near-line, and off-line adjuncts to digital presses:

- Collating and stacking
- Stapling and saddle stitching
- Cutting and sheeting
- Booklet making with three-side trimming
- Punching and ring binding
- Die cutting
- Inserting
- Creasing
- Folding: z-fold, accordion, etc.
- Perfect binding
- Square folding
- Coating (including UV)

All of these systems add versatility and value to printed matter from the presses they support. Equipped with a punching and ring binding unit, for example, a Canon varioPRINT135 sheetfed press can produce bound and ready-to-deliver booklets at full machine speed.

A Canon imagePRESS C10000VP fitted with a square folding module can bend cover stock in a way that creates a printable edge. A creasing die prevents toner cracking at the fold. Joining the creased, square-edged covers to interior pages in another in-line step yields a saddle-stitched product with the high-end look of perfect binding.

A press augmented in this way becomes an end-to-end document factory: a fully integrated print manufacturing line in one room with one operator and one all-encompassing workflow. An imagePRESS C10000VP configured for magazine production can turn out full-bleed copies—printed, face- and side-trimmed, and bound—for hours at a stretch in unattended operation. It is nothing less than the dream of printing as a form of computer integrated manufacturing come true.

Contrast this with the siloed workflows of offset environments, where making a finished product means shunting printed sheets and rolls among multiple machines in separate areas of the plant—with human touches and the potential for error and delay present at every stage. Digital finishing empties the silos and replaces them with assets for getting all parts of the job done in the right place, at the right time, and in the right way.



VI. EQUIPPING FOR DIGITAL FINISHING: WHERE

Vendors of digital finishing systems, once a small subcategory of the print equipment market, are now numerous. More than 60 of them displayed their wares at drupa 2016, and the majority have sales channels in the U.S. But, just because their products are easy to find doesn't mean that they are easy to select.

A key selling point of any digital finishing system is its ability to integrate with digital presses for in-line and near-line operation. As already mentioned, achieving a white paper in, sellable product out workflow isn't just a matter of hooking up one box to another and hoping for the best. The connection has to be seamless, both mechanically and in terms of data communication. This can come about only from close technical collaboration between the supplier of the finishing equipment and the maker of the press.

The power of collaboration for digital finishing is on full display in this video of an Océ ColorStream 3900 color inkjet press in-line with a Standard Horizon SL6000 Booklet Maker. Together, the systems form an end-to-end production line that turns white paper into a continuous stream of finished booklets at the rate of 6,000 pieces per hour. The combination demonstrates that the best solutions come from partnerships between digital press manufacturers and qualified suppliers of digital finishing equipment.

Canon takes pride in working in tandem with the finest such suppliers. Finishing systems from these manufacturers are tested for compatibility with Canon and Océ presses and the software that drives them. A recommended pairing of one of these presses and an approved finishing component is a reliable formula for reaping maximum benefit from the marriage of digital printing and postpress.



Additional Resources

This white paper was written as an introduction to the basics of digital postpress, a steadily evolving segment of print production technology. Canon Solutions America is committed to advancing digital postpress and to helping its customers identify finishing solutions that meet their needs. Please feel free to contact a Canon Solutions America representative for further guidance.

ABOUT *PRINTING IMPRESSIONS*

Printing Impressions publishes authoritative coverage of industry trends, emerging technologies and the news in the graphic arts industry with a specific focus on the commercial print segment. Its core audiences include commercial printers, package printers and in-plant printers. Printing Impressions provides C-level managers, production managers, and operations and sales/marketing managers with critical information and news, cutting-edge technology features, case studies and company profiles.

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Patrick Henry is a journalist, an editor, and an educator who has covered the graphic communications industry for more than 30 years. He has written for most of the industry's principal trade media and has been chief editor of several of its leading publications. Henry holds numerous awards for editorial excellence and has been recognized for exceptional service to the industry, particularly in education.

This analysis was commissioned by Canon Solutions America and NAPCO Media to help printers better understand how today's technology can optimize their production and how they can benefit by adopting these solutions.

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