So you’ve invested in digital printing and your sales representatives are out touting your newfound flexibility, cool front-end applications and improved customer responsiveness. A job comes through your web-portal, matched to a pre-tested job ticket it’s automatically checked, driven through prepress operations, imposed and queued to the press. The operator checks that the right paper is loaded, selects the job and go! Now what do you do … Outsource the finishing? Set up the finishing equipment manually?

Welcome to the digital postpress quandary. If you are going to compete in digital printing, your postpress operations need to keep pace with a greater number of jobs run each day, most with shorter run lengths. The cost of manual setup or the time lost on outsourcing can sink your ship. So what are your options? The three basic options are inline, offline and near-line finishing.

**Inline**

There are many digital press vendors that offer inline finishing options directly or through partners. Inline finishing has a lot of advantages; inline finishing systems are tightly integrated with the press so that one job ticket or one set of operator options sets up the entire line. Fully integrated digital printing systems may integrate pre-print operations, such as color separating, screening and RIPing, digital printing, and finishing operations, such as perfect binding. Integrated digital printing systems can communicate bi-directionally with print MIS systems and prepress systems through JDF. Internally, many such systems ascribe to UP3I specifications, which allow components to coordinate status signals such as a jam in the paper path.

For the printer, what this all means is that fully integrated inline digital printing systems offer a high level of automation and productivity, and until recently, the only option for producing variable jobs, where each piece is unique. However, the downside is that inline integrated digital printing systems are inherently inflexible. Sheet size, stock, finishing options are all fixed in the system. For niche work, it’s great, but for most general commercial printers, inline is too limiting for the array of work coming in through the front door.

**Offline Automation — Really?**

Offline automation is possible, albeit with limitations. fixyourownbindery is one of a handful of companies that does custom automation for bindery systems, with or without JDF, according to what the printer already has installed. According to Brad Emerson of fixyourownbindery, “The next generation of variable binding will use inline measurements and barcodes to adjust cover, cut, and gluing for each booklet that comes down the line.” fixyourownbindery works with printers of every size, from printers with $2 million of revenues and up. They fit bindery equipment with servos, measuring devices, barcode readers and other devices, often connected to a console that allows operator input, or input read from 2D barcodes, to be used to automatically setup offline postpress devices. Sometimes a console isn’t even necessary. An Intelligent Relay, which is just a couple hundred dollars, can be installed to watch multiple input sensors and run a small servo for a programmed amount of time … allowing fixyourownbindery to automate some functions so that no operator input is required.
Although fixyourownbindery’s bread-and-butter is offset printing postpress, they are working with digital printers and see digital printing as the future of postpress. “We don’t see any reason why legacy equipment cannot be fitted to digital printing operations. There are limits, and at some point it doesn’t make sense to make a Frankenstein device covered in servos, but operators know how to use the equipment on the shop floor and often it makes good sense to retrofit, rather than replace.”

Of course the down-side is that of offline automation is that it is limited. Data isn’t used from its point of origin, the postpress equipment is not connected to a print MIS system, and management does not have online status and control over all systems in the postpress department.

Near-Line Finishing
Near-line finishing allows for the same flexibility commercial printers have demanded of postpress operations in the past, but adds the automation necessary to keep pace with modern printing. Where offline finishing is where everything is decoupled, including both paper trail and commands and set-up, near-line finishing has a disconnected paper path, but job and device control is networked through a central system. An imposition layout includes information specific to a product and that information is relayed to the finishing system for set-up. The intelligence of the layout is preserved and used by finishing systems, as much of the same information that is need by the imposition engine and press, is also used by the finishing device. Near-line systems have three common characteristics:

1. They are fitted with servos the make automatic adjustment, selections and fittings based upon the electronic job ticket.
2. They are networked, allowing them to take in job tickets from print MIS or job planning systems, and reporting back job status and completion data.
3. They are capable of reading JDF job tickets.

Near-line finishing isn’t unique to digital printing and can be used in automated offset production as well. In fact, near-line finishing systems have been on the market for several years and are available from Bobst, Colter & Peterson, Duplo, Horizon/Standard Finishing Systems, Itotec, Kolbus, MBO. Muller Martini, Perfecta, Polar, RECMl, SHOEI, Stahl, and Wholenberg. Today, you can find automated near-line solutions for every postpress function:

- Die-cutters
- Hot-foil Stampers
- Folders
- Gluers
- Collators
- Stitchers
- Binders
- Threaders
- Cutters
- Case-makers/Case Binding
- Stackers
- Trimmers
- Palletizers

These JDF-driven postpress devices save time both in setup and down-times. Depending on the device, printers have reported reducing setup times from 20, 30, 40 minutes or more to just a few minutes. In digital printing, where you may be dealing with tens or hundreds of jobs per day instead of a just a few jobs, operating postpress manually is not profitable, if even possible. In automated near-line finishing the JDF file, derived from imposition and layout and sent to a postpress controller either directly or through a print MIS, can be used to set-up each postpress device needed for a job, and the postpress systems can send back status and job processing data to be collected in the MIS. This means that …
• Operators don’t have to repeatedly input the same data at the console for each device. Some applications allow a job barcode to be read to pull up the job specifications automatically. This also saves time in job planning and doing job parameter calculations.

• In the case of repeating jobs, such as periodicals, or where a job is interrupted, job data can be reloaded, saving wasted time.

• The hold time between postpress processes is reduced, as job status information is passed back to MIS, allowing job planners and managers to optimize machine use and minimize the latent wait times between postpress operations.

• Because set-up information is derived from a single source and there is no re-keying of data at individual consoles, the risk of input errors is minimized, as is expensive rework.

• With job processing data recorded from postpress devices directly, management can more accurately calculate costs and operation time for both new estimates and billing.

• Automation provides shorter processing times and improves management’s ability to calculate and guarantee on-time delivery.

• Through real-time data collection from postpress systems, breakdowns and failures can more quickly be immediately detected and schedules can be adjusted and communicated to everyone without labor-intensive coordination meetings.

Most of the near-line automated finishing systems on the market are not specifically targeted to digital printing. Some devices, such as Duplo’s DC-645 cutter/slitter/creaser combines processes and is optimized for the kind of short-run work that digital printing produces. The DC-645 is able to slit, cut, crease and perforate digitally printed work in a single pass to produce greetings cards, post cards, CD & DVD covers, business cards and so on. The DC-645 can store up to 80 job profiles, and can process up to 6 slits, 15 cuts and 10 creases in one pass.

**Versioned Digital vs. Variable Digital: The new horizon for digital postpress**

One of digital printing’s primary advantages over conventional printing is that every impression can be unique and each print product of a run may have physical variation as well. “Ideally we wouldn’t distinguish between digital and offset finishing systems that would, for instance, bind a book,” said Tim Donahue, Managing Consultant from Kodak MarketMover Business Advantage Solutions and CIP4 Digital Printing Workflow Working Group Chair. “However, digital presses have very different capability compared to offset presses as they do not use a reproduction master and can print collated output directly. Given this basic distinction, how a finishing workflow for digital printing is optimized for greater efficiency is typically different from that of an offset workflow.” This poses a unique requirement for digital printing finishing systems. Almost all near-line systems on the market are designed for short, medium and long run jobs … not truly variable jobs.

Many digital printing jobs are best described as “versioned,” meaning that there may be variations of a job for different target audiences rather than every single piece being unique. From a production point of view, one job with a few variations is actually broken down into a series of smaller production runs. So 500 copies of version “A” is printed, 300 copies of version “B” is printed, and so on. However, in variable digital printing applications every print may be different, and there may be multiple components, such as a personalized envelope that is inserted with a personalized and variable letter.

Both versioned and variable jobs can be ganged on a sheet for economy and postpress optimization. For instance, a printer can gang business cards to print on the same stock, print a couple hundred copies, cut the cards and then box the individual orders (an example of versioning).
Devices such as the Duplo DC-645 (described above) can be used to finish relatively simple pieces that include variable content; brochures folded from a single sheet, greeting cards, photos, business cards and so forth. Where variable digital printing gets complex is where more than one variable component needs to be match in postpress.

Pioneers of personalized and variable printing have had to use conventional postpress equipment and maintain strict control over the order of printed components to match them in a logical order; however, one jam or missing sheet can lead to embarrassing and costly mistakes. In situations where multiple unique or personalized components are to come together in postpress it is necessary for the finishing and inserting equipment to have a way of verifying that only related print components of the same recipient are being combined.

“Integrity verification often involves the use of barcodes that uniquely identify each printed component and are printed either in the trim area of the component or somewhere within the page image. Ideally the presence of the barcode has minimal impact on the page design” says Donahue. “As the lead component moves through the inserting system to be joined with related customized components, it reads and verifies that the barcodes of each printed component as a match. If a mismatch is detected then the finishing line is stopped and the exception is logged in an audit trail. Where to place the barcodes on the printed components must of course align with where the inserter later reads it and is generally device configuration and application specific. Of course, the design of the imposition layout utilized upstream of the printer must have considered all aspects of the finish verification strategy including inserter control marks, barcode placement and image quality requirements.”

If there is variability in the finished print products of a variable job, such as the personalized booklets of a production run having varied quantities of pages, the finishing system must be informed of how many sheets are to be collected per each bound booklet. “Structure and meta information in the variable page data is key. This information describes record or component breaks allowing the imposition system to calculate the quantity of pages for each booklet or finished component as it reads the page data stream.” says Donahue. “A JDF job ticket can specify a dynamic imposition layout based on such information present in the PDL file. In fact, the latest version of JDF supports logic rules for generating and placing dynamic mark content on select signatures as they are imposed; including control and verification barcodes. The new ISO 16612-2 (PDF/VT) standard is an example of a device independent fully capable structured document format for variable document printing designed to work with JDF in this manner.”

OEM implantations of the Adobe PDF Print Engine may support an imposition capability that can logically place dynamic barcode marks used for downstream matching of components. However, there is no standard use of barcodes for postpress operations, let alone guidance for
placement of barcodes given the nature of customized printing. As more near-line finishing devices with the capability to process personalized jobs enter the market, this will become a clear issue for printers. If one job is to be processed through multiple finishing systems, for example, it makes sense for each system to make use of a common set of barcodes for tracking and matching, rather than printing multiple barcodes on product sheets or separator sheets.

According to Mark Lewiecki, Senior Product Manager at Adobe, the Adobe PDF Print Engine is the first PDF-native RIP optimized for digital printing. It supports PDF/VT for variable print applications such as direct mail and high volume statement printing. “The PDF Print Engine is driven by JDF and can be plugged into any JDF workflow,” said Lewiecki. “It also supports fully functional bi-directional JMF communications, so for instance, the Print Engine can report on the successful rendering of each record in a variable job … a security feature that is commonly required in the production of statements and security printing.” The Adobe PDF Print Engine is used in digital press front ends from companies such as Xerox, Kodak, Océ, EFI, Screen, Xeikon, Fujifilm and others.

**Variable Digital Postpress Systems**

New near-line finishing systems are coming to market are capable of supporting personalized digital printing and they make use of barcodes to track and match variable printed pieces. The new Duplo DPB-5000 perfect binder is an example of a finishing device that has capabilities to support variable print jobs. The device uses barcodes to match book blocks of varying thicknesses to covers. A clamp measures the thickness of the book block as it moves through the machine and automatically sets the scoring and creasing of the cover to fit.

The MBO DIGI-Finisher is another device that is capable of handling variable jobs. The DIGI-Finisher is a combination device that does collection, folding, stitching and trimming and completes jobs in the order they arrive from the press, inline or near-line. It incorporates intelligent barcode monitoring to detect sheets at the infeed and determine how they will be processed, allowing for the creation of fully personalized, individual printed pieces. O’Neil Data Systems of Los Angeles operate two DIGI-

Finisher units in near-line operation from roll stock, and are matching personalized covers with content with barcodes read by the DIGI-Finisher units.

Standard Horizon also offers a couple of devices with variable postpress capabilities, including the Standard Horizon StitchLiner 6000 Digital Saddlестitcher and the Standard Horizon AFC-566F Digital Folder. Both systems are designed to convert from roll to
finished product and are typically installed offline from the digital printer, but can be operated inline if desired, and the design allows the systems to also support a cut-sheet workflow as needed. The saddlestitcher can be equipped with a high-speed sheet feeder (optional) that sits between the cutter and the stitcher, for feeding digitally-collated cut-sheets; a by-pass bridge is provided for when you resume finishing from a roll. The folder has similar capability: if you want to fold cut sheets, you slide back a bypass bridge, swing down a conventional feed head, and the system operates just like an ordinary folder. Both systems sport Horizon’s usual touchscreen-controlled intelligent automation.

Standard Finishing (Horizon’s partner in North America) recently rolled-out a suite of camera-based inspection systems called VIVA (Vision, Integrity, Verification, Automation) that can be fit to its perfect binders, saddlestitchers, folders (and other finishers) and customized to the application requirements. “We find printers have different levels of needs when it comes to tracking, matching, security and verification for variable digital production,” said Mark Hunt, Director of Marketing at Standard Finishing Systems. “Not everyone needs, or can afford a Cadillac system. We have a decision tree process we take each customer through to determine what combination of codes, marks and cameras are necessary to meet their job processing needs.”

Ultimate Technographics is one of the companies taking the lead in the area of digital postpress. The Ultimate Bindery system consumes the JDF imposition data and populates the JDF for finishing operations, such as adding information for gluing, milling, stapling, creasing, and all other finishing characteristics. Ultimate Bindery has an intrinsic knowledge of each machine and will send a message or stop a job that does not comply with the finisher’s requirements, adding an extra layer of quality control in the process. Although Ultimate Bindery is well integrated with Ultimate’s Impostrip imposition tool, it can take JDF imposition data from any system that produces JDF imposition data. Ultimate Bindery has already developed working integrations with near-line and inline finishing systems from CP Borg, Muller Martini, Horizon, and Duplo.

“Not everybody has a JDF enabled MIS, and there are also many home-grown MIS systems, but MIS systems aren’t meant to replace all production workflow systems,” says Joanne David, President and CEO of Ultimate Technographics. “What we’ve done is designed a product that allows printers to bridge prepress to postpress, even where the printer doesn’t yet have a JDF-enabled MIS or their operations are not fully JDF-enabled.”

Barcodes must be produced in the imposition stage of production, as they have to be placed on the sheet, but the JDF has to carry the barcode’s ID information forward to the postpress device, so that when a barcode is ready, the device can know how to process the piece. “When you impose a personalized digital product, you know how many pages are in each booklet or product, and so the imposition instructions relay that information forward.” Joanne even believes that in the future there will be cases where near-line and inline postpress operations may be used in a single production run.

As more near-line finishing devices with variable finishing capability enters the market, the latest features of JDF in support of the dynamic capabilities of digital presses offers a clear advantage for printers in terms of the ability to more readily construct efficient production workflows. “The inherent versatility of digital presses further enhanced by JDF job ticketing
provides maximum flexibility in terms of adaptation to most finishing workflow situations with minimal or no impact on the upstream page preparation workflow” says Donahue. “Enhancing JDF to improve digital print workflow efficiency and solve real world workflow integration problems remains the ongoing mission of the CIP4 Digital Printing Workflow working group.”

To Learn More …
To learn more about automated postpress, a free download of the book “Optimizing Post Press Performance: Getting the most out of JDF/JMF automated machines” by Peter Doyle, formerly of Muller Martini, is available from CIP4 at http://www.cip4.org/document_archive/download_request.php?did=1897.

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