Beyond ROI: Increasing Production Efficiencies with Color Inkjet Printers

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EXECUTIVE SUMMARY

Before making the investment in color inkjet technology, a company will typically focus its research efforts on three key features: output quality, throughput and the range of supported media. In addition to these features, the service capabilities of the manufacturer and cost considerations make up the main decision criteria. The sales and marketing teams for both the inkjet printer manufacturer and its resellers focus their efforts on highlighting the capabilities of the equipment. To demonstrate these capabilities and narrow the buyer's focus on the printer, customer test files are often used to compare the output of several different printers. While print quality and speed are important considerations, Madison Advisors believes many companies tend to overlook the importance of workflow when conducting due diligence, which results in a diminished realization of the full value of an inkjet investment. Workflow software selection is often conducted as an ancillary project only after the capital investment has been made in the printer. It is our opinion that this decision sequence should, in fact, be reversed.
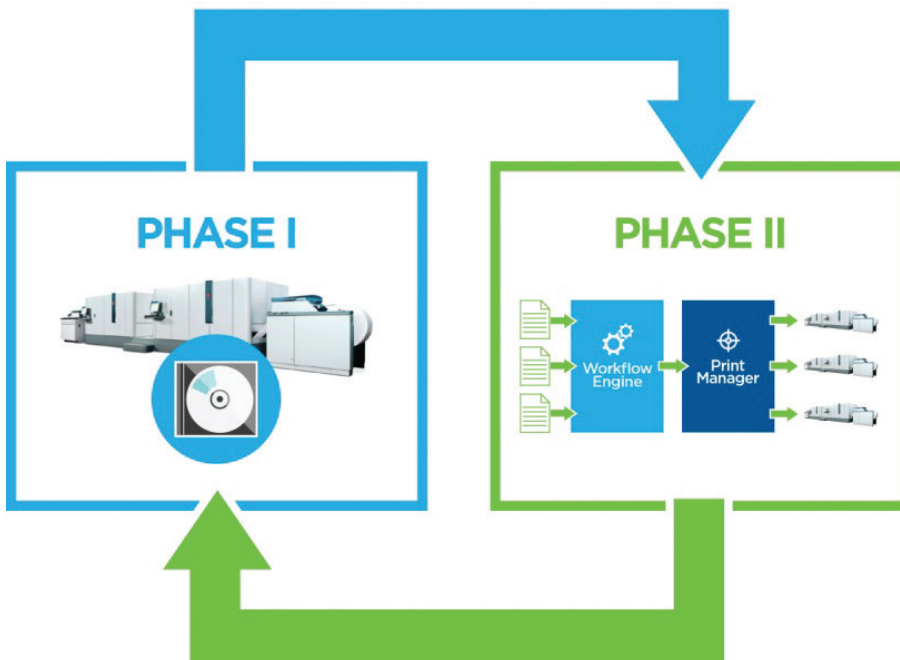

Figure 1 – Workflow Should Be a Phase 1 Focus

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In this Research Paper, Madison Advisors explores the broader context of implementing color inkjet technology for customer communications, the workflow issues that should be considered during the evaluation process and proven techniques to fully unlock the value of color inkjet. Our objective is to raise awareness of the issues prior to the investment so that companies can take the necessary process improvement steps before the hardware hits the shop floor. It should also be noted that these same steps are equally applicable to those companies that have already made an inkjet investment. By understanding all of the opportunities offered by inkjet printers, buyers can make the right investments at the right time and ultimately achieve a greater total return on investment while improving customer value proposition.

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As part of this research, Madison Advisors conducted formal and informal interviews with representatives from the main constituents in the color inkjet printing ecosystem.

Print Service Providers – Print Service Providers (PSPs) are companies that have digital printing as their main business. PSPs are also referred to as "outsourcers" or "service bureaus" in other contexts. For the purposes of this document, we interviewed PSPs that specifically focus on the transactional print and outbound mail segment.

Technology Service Providers – Technology Services Providers (TSPs) are the hardware and software companies involved in managing the flow of content from data and design through printing and insertion and into the mail system. Hardware technology providers include manufacturers of color inkjet printers, insertion equipment and postal sorting systems. Software technology providers include companies that provide document composition, post-composition, workflow and postal processing. It should be noted that in certain instances, a company might be represented in both the software and hardware categories. Where relevant, we conducted separate interviews with representatives for the hardware and software sectors. A partial list of TSP's in this market are listed in Appendix A on page 17.

Enterprise Corporations – For this research, Madison Advisors considers an "enterprise" to be a large company with a high volume of transactional print and mail. These are frequently financial services, insurance or utility companies. Some enterprises that participated in this research have outsourced their print and mail to a PSP while others continue to operate an in-plant. Enterprises, like PSPs, utilize products from TSPs to manage their production workflows.

Of particular focus during the interview process were lessons learned from the implementation and onboarding processes each participant has completed. This information was correlated with the capabilities the TSPs have in their product offerings to determine if there were gaps between requirements and capabilities.

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A wide variety of color inkjet solutions are available for the production printing market. When first introduced, these systems were continuous feed devices; however, cut-sheet inkjet printers are now entering the market. Regardless of their manufacture and paper feed mechanisms, all inkjet system have five basic components:

1. Paper transport – this is the mechanical system that moves the paper through the printer and past the print heads. There are cut-sheet and continuous feed paper transports used in the printer market today.
2. Print heads – the print heads dispense the ink to create the image. Some print heads put ink directly onto the paper and others put it onto a special "blanket" that then transfers it to the paper. The same print heads may be used by different printer manufacturers (TSPs) in building their printers.
3. Inks – the ink chemistry determines the vibrancy of the image and the color gamut for the device. Color gamut is the range of colors that a device can faithfully reproduce. Each device has a specific and unique color gamut based on the specific inks used. Most color inkjet printers use four inks, CMYK (Cyan, Magenta, Yellow, and Black), to combine into a wide range of colors. Some printers have an additional 5th or 6th color station that provides for a wider color gamut or use of a specific, or spot, color. A spot color allows for consistent color matching of one specific color and can result in lower ink usage for that color. MICR ink for check printing is another option for an additional "color." As with print heads, multiple manufacturers may use inks from the same producer.
4. Controller – the controller, or RIP (Raster Image Processor), converts the print job from PostScript or AFP to the specific signals needed to tell the printer which print nozzles to turn on and off to create the image on the paper.
5. Paper/Media – the paper, or media, selection is a key component of the overall printing process. Because inks have water in them, the paper absorbs the ink into its fibers. This absorption can reduce the vibrancy of the inks by effectively diluting them and making them slightly larger than the droplet size. This process is called dot gain. To minimize this absorption, today's inkjet papers are treated to allow for the creation of brighter and sharper images. Paper mills collaborate with printer manufacturers and keep abreast of trends in the inkjet market in order to create new papers that will obtain the best image results at a desired price point.

The interaction of the above components determines the overall image quality and system productivity. For the purposes of this research, Madison Advisors treats all color inkjet devices as equally capable.

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Understanding how to quantify the return on investment (ROI) is an important factor in the selection process for a production inkjet printer. When color inkjet printers were first introduced, initial projections were made indicating that the investment could be justified simply by eliminating the printing and supply chain costs associated with preprinted forms. Unfortunately, in many cases, the cost of printing forms inline is still slightly higher than the costs of preprinted forms. That means that the entire operational impact of a color inkjet printer must be considered to maximize the ROI.

Christopher Hill, vice president and general manager at EDM Americas and former SVP & senior director of transaction services at a large financial services organization, suggests looking at the entire operational budget, including postage, to determine the total impact on the operation. Christopher said: "Ask yourself, if my operating expenses are $1 million per month today, how can I strategically re-allocate those expenses to add a color inkjet printer and keep it at $1 million tomorrow." That entails looking for operational improvements that come from reducing the total number of printers needed, standardizing on one stock, moving inserts to onserts, creating longer run lengths, reducing the number of inserter setups and reducing postage costs. Inevitably, some staff positions may have to change or be eliminated as a part of this process because some activities may no longer be needed.

> **"Ask yourself, if my operating expenses are $1 million per month today, how can I strategically re-allocate those expenses to add a color inkjet printer and keep it at $1 million tomorrow."**
> **- Christopher Hill**

In addition to operational savings, color inkjet printers provide enterprises with enhanced opportunities to personalize communications with colorful marketing campaigns that include special offers and personalized images to cross-sell or up-sell new products and services. The increase in revenue from these marketing programs are often difficult to track and hard to quantify in an ROI calculation, so hard dollar savings from operational improvements should be the focus of ROI efforts during the initial justification process.

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In order to maximize the efficiency of a color inkjet printer, and particularly a continuous feed printer, you have to keep it printing. That means sending one job after another so that the printer doesn't stop. On a continuous feed device, paper roll changes can take about 20 minutes. Minimizing the number of roll changes in a day adds to the overall time the device can be used for production.

Many PSPs are reporting that they have more jobs with shorter run lengths. Finding ways to efficiently group and print these documents is key to optimizing the workflow.

First Steps

The two easiest steps when it comes to improving the workflow are to: (1) concatenate multiple files into one and (2) utilize Inline Forms Replacement.

Concatenation of Files

Concatenation consists of joining multiple files together, one after another, into a single file. This new larger file can then be sent to the inkjet printer to keep it running for a longer period. Each job within the combined file still has all of it original headers, footers and automation barcodes. When the output is put on an inserter, the inserter will stop between jobs to allow the operator to make any setup adjustment needed to run the next file. Ideally, the jobs being concatenated will have similar inserter requirements (e.g. same BRE envelope, same outgoing envelope, etc.) to minimize the downtime between jobs.

Inline Forms Replacement

Replacing preprinted forms with inline printing of the forms and backers on documents is a key benefit of color inkjet printers. The process is also referred to as a white paper workflow, because you are starting with a blank sheet of paper and then applying all of the graphic and data elements inline.

Eliminating the preprinted forms in your inventory helps improve the operation in the following ways:

1. Eliminates obsolescence and associated waste
2. Reduces inventory control and quality verification issues on special forms
3. Eliminates "out of stock" issues
4. Enables files with different forms to be printed on one roll of white paper
5. Allows jobs with multiple paper stocks to be moved from cut-sheet to continuous form printers

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Print Servers

A print server is a system that receives print files from multiple sources and then controls how they are sent to a printer. The print server can direct output to available print engines, support load balancing and gather accounting data. Canon Océ PRISMA Production Server, HP SmartStream, Ricoh Process Director, Xerox Free Flow, and Pitney Bowes IntelliJet Print Process Manager, to name a few, offer functionality to manage the press itself. Each solution has the capability to concatenate small files into a larger file to achieve higher productivity on the printers and inserters. In addition, these tools have the ability to apply a background form to each document that previously would have been preprinted on the base stock.

All providers of color inkjet printers offer the following capabilities in their standard print server software or through third-party add-on modules:

- the ability to transform print streams to formats the printer can process efficiently
- the ability to substitute electronic form overlays in real time, thus eliminating the need for preprinted forms
- the ability to queue and concatenate multiple files into larger files to enable continuous print runs

While these baseline capabilities are standard among inkjet printer manufacturers, Madison Advisors believes that companies need to look for additional capabilities to avoid missing the full return on investment that a color inkjet printer offers. Once a complete workflow process is defined, selecting the right software tools from the printer vendor or other technology service providers will help reduce costs and ensure all of the workflow requirements are met in the most efficient manner.

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Performing the simple steps of job concatenation and inline forms
replacement will help improve the efficiency of the color inkjet printer but they
do not take full advantage of the new, larger print file. For example, while the printer
does not need to stop at each job break, the inserter does, making it harder to obtain
postal densities that allow for a postal discount because the size of the individual jobs has
not changed.

Rather than just concatenating files, a better solution would be to merge them together to create a
true advantage from the inkjet printer. Merging involves taking out the start and end of the original jobs
and then doing a postal sort across all of the documents in all of the jobs being combined. Now, instead of
having documents from three jobs printed as A-A-A-B-B-B-C-C-C, they might be sorted and put into the new
output file as B-A-A-C-B-C-C-A-B.

Figure 2 – Print Stream Merging vs. Concatenation

A good merging solution allows the many small jobs that account for a PSP or in-plant's
highest operational cost to be merged into a large pool of output. All jobs designated to be
merged go into the pool where they are broken down into individual mail pieces. Business
rules can be setup within the workflow engine to trigger based on variety of criteria, including:

- elapsed time since last trigger
- absolute time (e.g. 5:00 am)
- remaining time in the mail piece SLA

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- number of pages or mail pieces per paper roll
- inserter batch size
- arrival of specific print jobs
- specific zip code strategies

Jobs that fit matching criteria can be aggregated until a "business rule trigger" releases the jobs to print in units optimized for the printer. Some of the capabilities that a good workflow manager with merging capabilities should have are:

- **Input Job Management** – the workflow management software must keep track of each input job while merging these jobs for optimization downstream.

- **Post-Composition Enhancement** – as a part of optimizing both the print and finishing operations, the output must be able to be inserted into a common envelope. The workflow solution must be able to route files to a post-composition processor that can make minor adjustments to the jobs such as aligning address blocks to a standard and removing redundant barcodes.

- **Merging** – enabling multiple jobs and individual documents to be aggregated into a merged file. Individual mail pieces can be merged based on criteria such as:

  - Total sheet count
  - Sheets per envelope
  - Inserter batch size
  - Similar paper and envelope stocks
  - Insertion strategy
  - Destination zip code

- **Document Lifecycle Tracking** – tagging each document with metadata so that it can be tracked and intercepted if needed or diverted to a different channel. This also allows the full processing history of the document to be reviewed for regulatory compliance and proof-of-mailing research.

- **Unify Automation Marks** – jobs submitted to the workflow engine will typically have their own automation barcodes for tracking package integrity in the production process. Once the jobs are broken up and merged with other jobs, the original automation marks are no longer valid. The workflow engine must be capable of putting a unified barcode on each page based on the merged file. This is typically done just before the merged job is sent to the print server. This process also includes creating the inserter control files and any USPS supporting files, such as a MAIL.DAT file for the contents of the merged file.
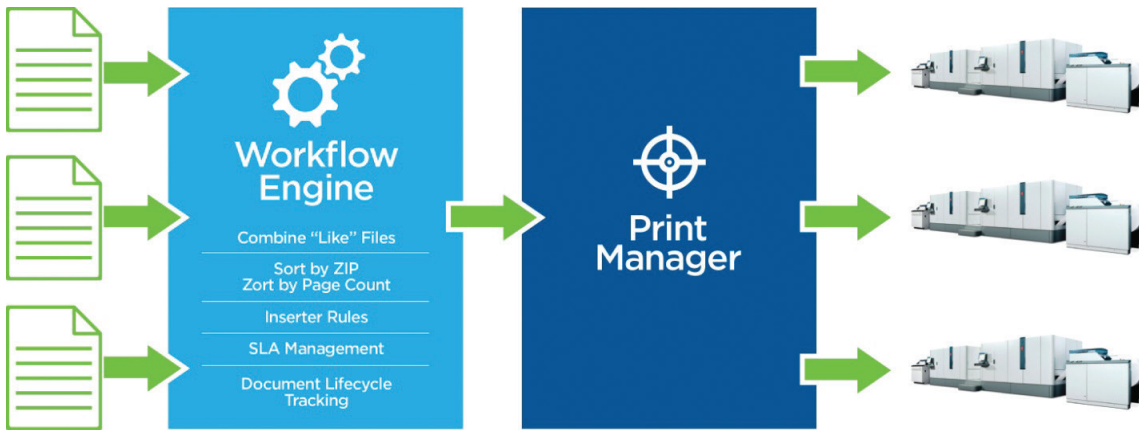
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Figure 3 – Sample Workflow Model

During our interview with Sefas Innovations, a TSP, Madison advisors learned how its software solution helped a client with an in-plant print operation use a file merging strategy to reduce the number of print jobs by 75%. This made it easier to manage the print process and virtually eliminated jobs missing their print SLAs which had the added benefit of reducing the overall stress levels in the print operation.

For jobs that use multiple stocks today, one of the holdups in moving to a continuous printing environment is the need for special perforations or punches on certain pages in the document. This might be for remittance slips or insurance ID cards. The addition of an inline variable perforation unit to the color inkjet printer configuration allows the workflow engine to embed perforation instructions in the output file so that only the specified pages are perforated. Another, less attractive, option is to perform a match on the inserter where the main document calls for a matching ID card from one of the inserter feed stations.

All in all, there are a lot of moving parts that need to be coordinated in order to optimize print jobs. TSPs offer a range of off-the-shelf software tools that provide a comprehensive set of capabilities to meet the needs of PSP and in-plant operations. Ten years ago, companies would have had to build these capabilities themselves.

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DOCUMENT PULLS AND DIVERTS

One added benefit of the products TSPs are offering today is an automated mechanism for doing document pulls. Pulls can happen prior to printing or during the insertion process. The workflow engines frequently have the ability to view documents prior to being released to the print server. During the review, it may be determined that a particular document should not be printed or that it should be printed but then diverted at the inserter for special handling. The workflow engine manages an audit log of who requested a document pull or divert and keeps that information with the document lifecycle data. Documents slated not to be printed are never placed in a job for printing. The inserter control file for documents to be diverted will instruct the inserter to divert the mail piece after insertion and provide the inserter operator with instructions about what to do with the diverted envelopes. Some diverts may need to be sent overnight or returned to a business unit for additional processing. All of the special handling needs can be specified in the workflow engine.

USPS DISCOUNTS

Small print jobs merged together into a large file can significantly improve postal densities and thus provide greater postage savings. When small print jobs are created, there is limited opportunity to improve the zip code density. By merging several small files into one, it may be possible to achieve higher densities and higher postage discounts. The improved density affects all envelopes in the destination zip code. For example, if there are 149 envelopes to a specific 5-digit zip code, they only qualify for the AADC rate (note that the 3-digit presort rate was eliminated in January 2017). By adding one additional envelope from another job, all 150 envelopes can mail at the 5-digit, saving $0.03 per envelope. Multiply this by thousands of envelopes per month and the savings can add up quickly.

Another opportunity that the merging process described above offers is to hold mail pieces for a period of time so that more pieces for the same zip code can be grouped together. This is a practice used by some presort houses with the permission of their customers. The merging system can be configured to hold a piece of mail for an extra day, for example, in order to merge it with additional mail to the same zip code or even to wait for mail to the same destination. Either of these strategies can offer savings by reducing the amount of postage needed to mail those documents.

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Up until now, we have focused on improving the workflow processes around getting jobs to the printer and then into the mail stream. There are also ways to reduce operational costs in areas outside of the print operations. A color inkjet printer offers the ability to utilize color within a document to increase a reader's comprehension.

Reducing NIGO

In the insurance industry, paperwork that is Not in Good Order (NIGO) can add significantly to the operational cost of processing a new customer application or a claim. The back and forth required to clear up any missing or misunderstood paperwork can also have a negative effect on customer satisfaction.

There are a few ways color can reduce or potentially eliminate the volume of NIGO documents, such as utilizing it to draw attention to and highlight a signature line or similar required fields on a form or specific text or instructions to stress their importance. Qualifying the return on these changes takes careful cooperation with the business units but can be included in the ROI calculation for moving work to a color inkjet environment.

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Optimizing workflows prior to purchasing a color inkjet printer is critical for maximizing ROI and justifying the capital investment. Knowing the requirements of the workflow can also assist in guiding your printer purchase as it will highlight the capabilities needed from both the printer and the software bundled with the printer. Your workflow roadmap will help guide what software features should come from the print manufacturer and which are better sourced from another TSP. Even if you have already purchased a color inkjet printer, defining your optimal workflow and mapping your current software inventory can point you in the right direction to ensure you maximize you return on investment.

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The TSPs listed below offer solutions to some or all of the challenges discussed in this paper. This list is intended to be representative rather than exhaustive. Madison Advisors can assist companies in identifying the right partners to meet their specific needs.

Canon/Océ

CEDAR Document Technologies

Compart

Crawford Technologies

DataOceans

GMC

Neopost

NEPS

OpenText

Racami

Ricoh

Sefas Innovation

Solimar Systems

Xerox

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Jeff Weldon
Senior Analyst

Jeff Weldon provides project-based advisory services in the Customer Communications Management (CCM) marketplace to enterprise accounts and print service providers. With a wealth of industry and analyst experience in digital printing and CCM software solutions, Jeff leads engagements that assist clients with technology selection and alignment and business process optimization decisions. In addition to CCM solutions, Jeff also has extensive knowledge of output management systems, including print management and workflow systems, and electronic delivery solutions.

Previously serving as a principal analyst with Madison Advisors from 2002 to 2007, Jeff rejoined the firm in 2013 after six years with Canon/Océ in its business process outsourcing group. His focus at Canon/Océ ranged from managed print services to high volume POD shops. Client solutions included software such as uniFLOW, Equitrac, and eCopy, among others. Prior to that, Jeff served as Vice President of Marketing for enterprise output vendor OPserver, Inc.; worked for The Thomson Corporation as a consultant for electronic publishing initiatives; and at Adobe Systems, specializing in the integration of Adobe Acrobat products into electronic information delivery solutions.

Jeff earned a B.S. in Computer Science from Boston University. He is a Certified Document Imaging Architect (CDIA+).

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Madison Advisors aspires to advance the multichannel communications objectives of Fortune 1000 companies that result in an enhanced customer experience. Madison Advisors specializes in offering context-specific guidance for a range of content delivery strategies, particularly those addressing enterprise output technologies and customer communications. Madison Advisors has specific and unique knowledge of the document composition market, technology vendors, best practices, and emerging scenarios.

Madison Advisors offers services and expertise primarily through high-impact consulting services along with associated solution deployment professional services. With no-nonsense, highly specialized engagements, Madison Advisors directly helps our clients achieve very hard and specific return on investment (ROI) related to their CCM, print, and electronic communications initiatives. To learn more about Madison Advisors, visit our website at www.madison-advisors.com.

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