

On the Open Road to CIM with JDF

An EFI White Paper on Computer Integrated Manufacturing

In today's market, pricing pressures are intense and profit growth is hard to find. Printers, prepress services, in-house graphics departments, and others are seeking a clear path to streamline workflows, reduce costs, and enhance profitability—and EFI® believes that Computer Integrated Manufacturing (CIM) is that path. The goal of this whitepaper is to explain how, by implementing CIM using the open JDF standard from CIP4, printers can turn these challenges facing the industry into real opportunities for success.

CIM is the application of computerization to seamlessly integrate the flow of production instructions throughout the print workflow—reducing wasted time, labor, and material—and to automate or eliminate inefficient steps. While CIM has been a cornerstone for many manufacturing industries since the late 1970s, until recently it has been difficult to implement CIM in print manufacturing. Printing is the ultimate form of *custom* manufacturing—no other industry retools its production line for every job ordered (e.g., changing paper, ink, plates, bindery configuration, layout, etc.) Despite the need for flexibility, and the wide range of input materials that print customers bring to the manufacturing process, there are indisputable trends facing printers today that make the adoption of CIM concepts imperative. These trends include:

- Shorter runs, greater job complexity, and customers demanding shorter turnaround times make it necessary to optimize equipment and staff utilization for maximum throughput and cycle time reduction.
- Relatively slow print market growth and increasing competitive price pressures are driving print service providers to offer new, diverse services in addition to finding new ways to cut costs and improve profitability.
- Print shops are continuing to add an increasing number of devices with embedded electronic controllers that allow them to be integrated with other devices;
- The wide adoption of CTP (Computer to Plate) printing, digital printing and digital proofing, as well as standard file formats, now makes it possible to apply CIM to print production workflow.

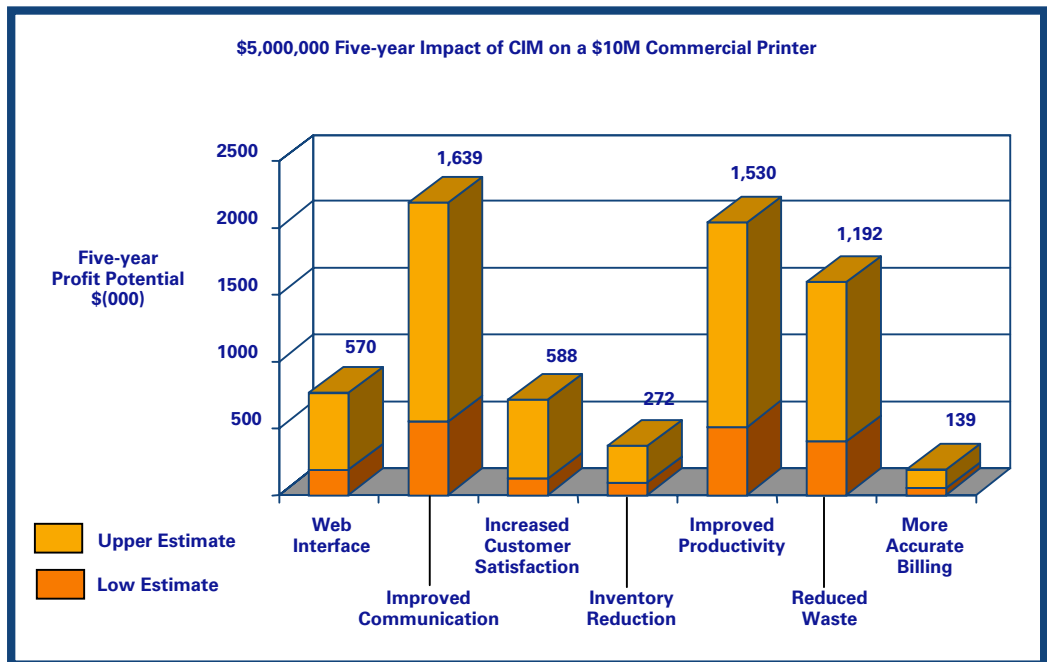
These trends can be considered challenges or they can be opportunities for those printing companies who embrace the application of CIM technologies to improve their performance, profitability and customer relationships.

Return on Investment

CIM for print is implemented both as process improvement strategies, as well as strategic capital equipment purchasing. The big question is: what is the Return on Investment (ROI) of CIM and how soon can printers, prepress services, publishers, and others capture that potential? Determining the ROI for your own company depends on many factors. A quick analysis of some of the CIM “touch points” can help you understand the degree of positive impact its adoption may bring to your operation:

- If you were able to electronically match job specifications against all other jobs in process and capabilities, could you optimize your equipment utilization?

- If you were able to compare job specifications with all the options for printing and production (i.e., offset vs. digital printing), including the costs of set-up, logistics, storage and handling, could you benefit from better applying the right tools to the job?
- If you could capture Authorized Alterations (AAs), and other pre-production activities in more timely fashion, could you increase the likelihood of getting paid for them?



- What percentage of sheets and other interim products are produced to ensure that there are enough job components in bindery? If you were able to get precise run and acceptance data in real-time, and decrease the latency (or inactivity) in your manufacturing processes, what impact would reducing this waste allowance by 50%-70% have on your bottom line?
- If you had better integration between the customer interface (i.e., Internet ordering, sales force automation, freeing CSRs to perform more valuable work than chasing job status, etc), production planning, workflow, and administrative systems such as billing, scheduling, and inventory; what could you save by eliminating keyed data entry? Or by being able to more easily handle customer requested changes? Or by better forecasting and less inventory carrying costs?
- If you could collect better job and activity data, could you improve the relationship between what is estimated and what is billed? If you could decrease the amount of time it takes to bill customers, because you have immediate access to job data (i.e., completions, shipments, etc.), could you improve cash flow?
- If customers and employees could better visualize the status of a job and all of its components in the workflow, could you benefit from improved communications?

- What is your present client turn over? If you could improve customer satisfaction with your services by consistently delivering jobs on time, with better quality, what would the impact of a 1% to 5% gross improvement in customer retention be worth?

These are all areas where implementing CIM can provide immediate, quantifiable improvements. In a recent study of the impact of CIM on commercial printing operations, it was estimated that the average commercial printer (with revenues of approximately \$10,000,000 per year) could improve its net profit by up to \$5,000,000 over the course of five years by implementing CIM. This includes both cost savings and increased sales as a result of better client retention. In the U.S. alone, that translates into up to \$185 billion dollars for the print production industry in a five-year period—and a figure four to five times that amount on a worldwide basis.

Even the most conservative estimate, which is about a fifth of the upper estimate, can mean a lot to an industry that is presently averaging net profits of less than 5% of revenues!

So when can you begin? You can begin implementing CIM and improving your ROI today, but the key to understanding where and how to start a CIM program is to understand the role of *open* standards in print CIM programs.

The Role of Standards

A few visionary printers and prepress service providers are already enjoying the benefits of CIM by working directly with developers and integrators and putting proprietary systems into place. For most printers, this custom integration option is too complicated and expensive to yield a realistic ROI. In our rapidly changing industry, closed, proprietary systems are even more expensive to maintain as new software, systems, and even upgrades to current equipment enter the shop floor. EFI believes that CIM will only be able to fulfill its promise to the printing industry through an *open standard* for everyone to build upon. These open standards must:

- Be based upon a non-proprietary language that is compatible with modern programming methods,
- Allow for job data to be exchanged between systems in a way that can be checked or validated,
- Provide a structure for job data that can be used throughout the entire lifecycle of any print job,
- Provide a flexible architecture that can be used to support all the variations of the print production process, now and tomorrow
- Include command and control of devices throughout the shop floor, and most importantly,
- Be open to the public, unbiased to any single vendor, and enjoy wide industry support.

There is only one standard for electronic job ticketing and print process automation that meets of these requirements—the Job Definition Format or “JDF” from CIP4.

The Job Definition Format

JDF is a comprehensive public standard supported by EFI and over 200 other graphic arts companies in CIP4 (EFI is one of only 14 Partner Members in CIP4— the highest level of commitment to the standard’s development efforts). JDF employs XML (Extensible Markup Language), a descriptive computer language that is used by leading software developers worldwide to exchange data between systems. It provides a common syntax and method for encapsulating metadata in a structure that is directly supported by programming languages such as C++, Java, and Microsoft

Languages, tools and architectures like .NET.



JDF is written as a “schema,” which is a structure that can be used to check or validate JDF documents automatically. (*Think of it as “preflighting” for your business and production data rather than job content.*) This structure can be used throughout the lifecycle of a job—from customer proposal or artwork to production and distribution. It is based upon a simple but time-tested architecture that relates each possible workflow process with its input and output job data and materials. There are JDF defined processes for every aspect of printing, from customer “intent,” which may be included in job specifications or sales documents, to the specific process instructions for press work, or bindery functions such as bundling or coil binding. Since the output of one print workflow process becomes the input of the next process, they are collectively referred to in JDF as “resources.”

JDF also includes a specification for a command and control language that can be used to direct work to devices on your shop floor—called the Job Messaging Format or “JMF.” A JDF-enabled workflow system or print management system can communicate with production machines that have embedded JMF controllers. Departmental controllers such as EFI Balance™ may also be used to serve as a bridge between a JDF-enabled workflow or production management systems and shop floor equipment. JMF replaces proprietary device controller languages with a *common and standard device controller language*, ultimately reducing integration and maintenance costs.

EFI’s Commitment

EFI is committed to bringing the benefits of open CIM to its customers by providing JDF-enabled systems. We are taking a leadership role by actively participating in the development of JDF and by making a commitment to our customers to preserve the openness and integrity of our JDF-enabled solutions. At EFI, we are working with the most current version of JDF and actively assisting in the development of the next version. We are also:

- Providing JDF capabilities to our customers as upgrade options to their EFI solutions,
- Ensuring that our customers have a migration path that allows them to preserve their investment in “legacy” systems,
- Ensuring that our systems both accept validated JDF and output validated JDF so that EFI solutions can be implemented individually, even with JDF-enabled products provided by other vendors, and
- Implementing JDF as it is specified and avoiding any proprietary hooks, data filters, or other non-standard elements.

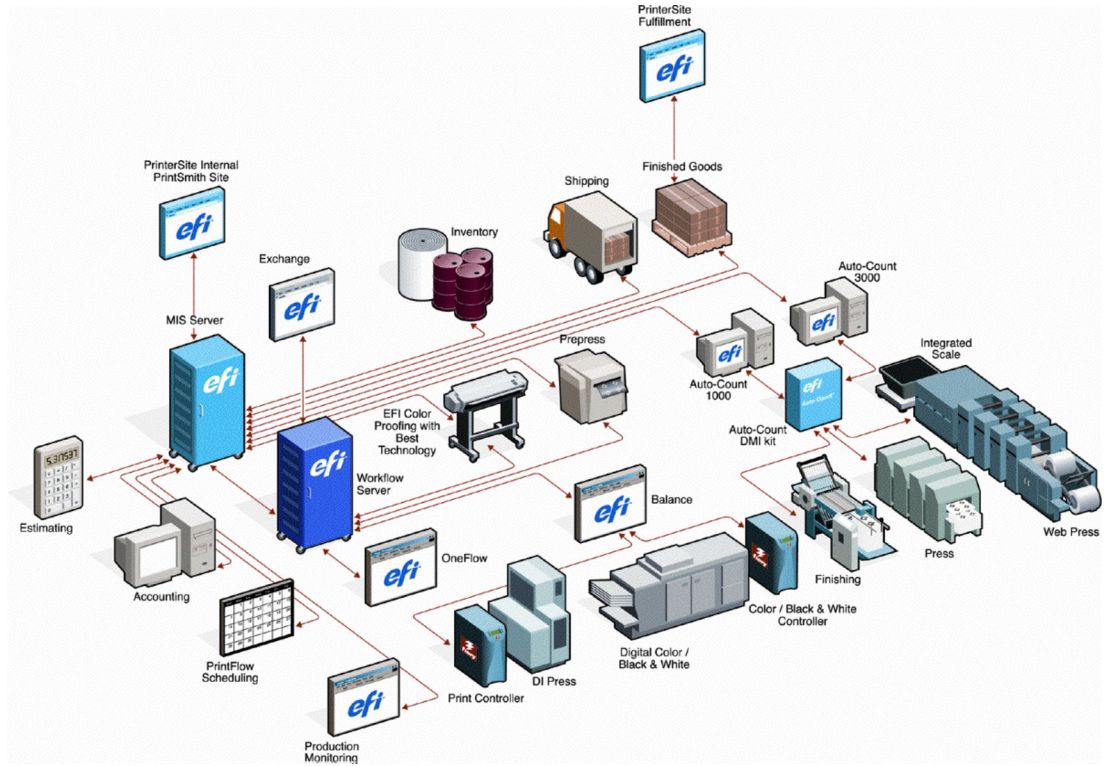
EFI will work with *any* graphic arts software and systems vendor to ensure our products integrate well with their products via JDF, provided that they make a similar commitment to implement JDF fairly and honestly. We have already integrated and tested EFI’s JDF-enabled products with JDF-enabled products from Adobe, Heidelberg, Screen, Apago, Komori, MAN Roland, Markzware, and Vio. As a customer-driven company that is committed to promoting open architecture and standards in printing, EFI will also gladly work with other vendors.

Furthermore, EFI will also provide the same exceptional support you've come to expect from us for all of our JDF-enabled products. For example, EFI has provided the open EFI Software Developers Kit (SDK) to customers with unique requirements, allowing end users to integrate pre-JDF systems. We will provide a similar level of support for JDF systems. EFI also provides online user forums for technical questions on many of its products and is committed to using customer input to guide the development process.

EFI's JDF/CIM Solutions Today

EFI's customers can begin implementing JDF-enabled EFI solutions today. We've strategically selected EFI software products for early JDF implementation, which can serve as the seed from which CIM implementation can grow. In addition, with EFI's acquisition of Printcafe, our products will work together seamlessly to provide even more capabilities. These products allow our customers to capture JDF data from client input and use JDF to organize workflow and automate their production operations. EFI's JDF-enabled solutions include:

- **EFI Exchange™** automates the print job order management process and enables print centers to leverage the Internet to communicate with their customers 24/7. Through a secure and fully customizable Web interface, customers can submit job orders online and track progress with real-time job status updates. Once orders are submitted, a range of digital tools streamline the in-shop workflow—from order receiving to remote proofing to approvals. EFI Exchange captures and provides valid JDF “intent” job data and it is designed to integrate seamlessly with EFI's full suite of workflow software, including EFI OneFlow™ for pre-press and Computer-to-Plate (CTP) workflows, and EFI Balance™ for digital print production workflows.
- **EFI OneFlow™** lets print shops automate prepress functions to streamline digital and offset printing and proofing. It integrates powerful tools to automatically convert files to PDF, preflight, trap, impose, correct, RIP, soft proof and more. EFI OneFlow captures, creates, and processes valid JDF for each of these tools and provides for integration with third party workflow tools that emit and/or consume (valid) JDF. In addition, EFI OneFlow is a JMF controller that collects data on various workflow processes and provides this to MIS systems using JDF. With EFI OneFlow, any print shop employee can master the prepress management process from one desktop and output files to DI presses, platesetters, wide format inkjet proofers and/or Fiery®-driven copier/printers.
- **EFI Balance™** maximizes print production capacity by managing multiple devices as a group. By distributing large print jobs across multiple printers—and splitting jobs between color and black-and-white— EFI Balance ensures that each engine is utilized to its full capabilities for increased productivity and maximum throughput. EFI Balance is a JMF department-level controller that can provide command and control over your prepress and digital printing devices. EFI Balance also collects job data (such as labor, material usage, start/stop time, etc.) and provides that data as JDF to MIS systems such as EFI Hagen OA.
- **EFI Hagen OA™** helps print businesses collect, share, analyze and respond to information in real time. It integrates an intelligent estimating system with high-end applications for job management, purchasing, scheduling, inventory, and fulfillment. The solution is completed with a robust and advanced accounting solution. Current Hagen users can add JDF functionality to their Hagen OA systems with upgrade “connector” options for prepress. Integration through the EFI JDF Connector has been demonstrated with MAN-Roland's PECOM, Komori's K-Station, and others.



- **EFI Auto-Count™** allows existing (or “legacy”) equipment to become part of your CIM infrastructure. By adding Auto-Count’s patented DMI™ (Direct Machine Interface) sensors, along with data collection hardware and software to your machines, you can monitor “speeds and feeds”, as well as waste data from web and sheetfed presses, as well as bindery and finishing equipment. This data can then be used to tailor job costing and estimates for future jobs, as well as to analyze the profitability of jobs that have been run.
- **EFI PrintFlow™** is a unique tool that provides the ultimate visibility into plant operations. PrintFlow Dynamic Scheduling optimizes your decision making about which machines to use for which jobs, as well as the order and sequence in which to run those jobs. It helps you decide how to staff, and whether you should take on additional work—and at what price points for maximum profitability. With PrintFlow, every cost center in your plant becomes part of your CIM equation: even equipment that doesn’t have computerized interfaces.
- **EFI Remoteproof™ with Best Technology** enables graphic arts professionals to maintain full control over the contents and color reproduction of digital data when file proofs are transferred from one location to another. EFI Remoteproof is JDF-enabled and saves users time and money by easily comparing and measuring color values of proofs and ensuring that the print result achieved at the receiving end is exactly the same as the original sent by the sender.
- **EFI JDF Connector** enables JDF connectivity to all tested JDF compatible products and tools. JDF Connector provides for integration with third party workflow tools that emit and/or consume (valid) JDF, including those from companies such as Heidelberg, MAN Roland, Komori, Screen, and others. Also, JDF Connector is a JMF controller that collects data on various workflow processes and provides this to MIS systems using JDF.

EFI is committed to providing CIM solutions that work with both new and existing equipment and software. JDF integration will be offered soon with additional EFI products, including PSI, Logic SQL, and PrintSmith. The acquisition of Printcafe



represents an example of how EFI will work to provide solutions that allow existing equipment to become part of your plant's CIM network. Solutions like EFI's Print Management Systems, PrintFlow Dynamic Scheduling and Auto-Count Direct Machine Interface (DMI) help companies optimally leverage their existing gear, while creating a roadmap and vision for the ultimate CIM production environment of the future.

EFI's JDF/CIM Solutions: Today and Tomorrow

This is just the beginning of EFI's commitment to CIM and JDF. EFI will migrate all of its products to support JDF, and, as the JDF specification evolves, we will:

- Provide an upgrade path that doesn't mitigate your investment in EFI's JDF-enabled solutions,
- Implement JMF command and control (as JMF-enabled devices hit the market in the coming months),
- Ensure that all of our JDF-enabled solutions can be *mixed-and-matched* with non-EFI JDF-enabled solutions that implement JDF in the spirit of the specification,
- Guarantee that all EFI products implement JDF honestly and openly.

The promise of CIM is a more profitable and streamlined future for print. EFI is headed down the *open* road to CIM, and *we invite you to join us!*

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About EFI

EFI®. (www.efi.com) is the world leader in digital imaging and print management solutions for commercial and enterprise printing. EFI's award-winning technologies offer document management tools from creation to print, including high fidelity color and black and white Fiery(R) print servers that can output up to 2000 pages per minute; powerful production workflow and print management information software solutions for increased performance and cost efficiency; and an array of business-critical enterprise and mobile printing solutions. EFI maintains 25 offices worldwide.

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