

*Jürgen Schönhut Memorial  
CIP4 International Print Production Innovation Award*

## **Associates International, Inc.**

**First Place Winner**

**Biggest improvement in quality production & customer responsiveness as a result of process automation**

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## Executive Summary:

Associates International, Inc. (Ai), formerly Associates Graphic Services (AGS), provides personalized, on-demand and conventional printing as well as web-based document management to large and small companies alike. Founded in 1973, Ai has become a leader in digital, on-demand technology solutions and workflow automation. Revenue for 2009 was approximately \$11 million. Leveraging its 51+ highly experienced staff, Ai provides an array of services including electronic prepress, digital printing, commercial printing, variable data marketing programs, email marketing programs, integrated campaign management, web to print storefronts (iConnect™), die cutting, mailing, and bindery services. Ai's prepress consists of a Kodak Prinergy Workflow System, Kodak InSite, Kodak digital platesetter with both large format and imposition proofing systems. Currently Ai's digital division houses three Xerox DocuColor iGen3 Digital Production Presses with CREO Color Server RIP systems plus two Xerox 6100's with booklet makers and interposers. The conventional division has all Heidelberg sheetfed equipment (2 CD 74-6 color (Perfector) with aqueous coaters (controlled through a Gretag Mabeth Image Control Unit) and (2) two-color QM 46 Printmasters. The integration we are referencing in this application involves software solutions from Avanti (MIS), Creo Spire Color Servers and Xerox FreeFlow.

The Creo/Avanti JDF extension in concert with the Xerox FreeFlow Process manager presented the opportunity to take a highly efficient workflow with no communication capabilities and add, through JDF, a communication path to all partners.

The Symbio workflow allowed for high volumes of orders to be sent to the Creo RIPS and they were manually released to the Xerox iGens. Any cost information was manually entered by the operator into the workstations and collected in the MIS. For jobs smaller than \$400, the data was not collected at all as it was deemed too costly to collect. The lack of information created severe bottlenecks in many areas such as job costing, production scheduling, inventory management and invoicing. The ability to do accurate data analytics was not possible.

Ai was capable of running hundreds of orders daily with manual touches needed for collecting job costs and job releases. Invoicing would be delayed for 7-10 days while the job costs were gathered from orders that contained an average of 3.2 line items each. Inventory management was experiencing shortages or overstocks due to lagging job entries or missed entries altogether. Production scheduling needed a more accurate way to be able to analyze the utilization of each of the 3 iGens.

The Creo/Avanti/Xerox integration transmits all job numbers, labor, paper costs and click charges back to the Avanti MIS automatically. This has enabled better analytics as well as the ability to determine workflow usage. The paper management has been resolved due to the automated management of the stocks.

Traditional invoicing has improved to less than 24 hours for all digital jobs. Even though we associated no hard dollar amounts with this improved turnaround for invoicing, it has steadily improved our cash flow. By managing our consignment inventory along with vendor invoicing and customer receipts, we have created an opportunity to collect receipts up to 45 days in advance of payments.

This Creo/Avanti/Xerox integration has provided Ai true “lights out automation” as the iGens can start up and run jobs that have come through our workflows with no operators or personnel on the premises. This has been the largest cost savings of this entire integration, allowing us to remove one complete shift of manned operation.

The main benefits of the Creo/Avanti JDF integration, in concert with Xero Process Manager and MAX module, was the catalyst for many of Ai’s cost reductions. Key benefits and cost reduction/savings realized by this integration are:

1. **MIS Compatibility** – working with our long term partners Xerox and Creo in conjunction with Avanti, our current JDF-certified MIS company was a huge benefit. The relationships already existed and previous integrations had proven beneficial. These relationships with Creo and Avanti saved Ai **\$21,000 to \$30,000** as Avanti, Creo and Ai embarked on this as a joint venture.
2. **Light’s out automation** – The integration allowed Ai to electronically capture information and job costing only available through manual input previously. By capturing the information of each line item and designating the production machine which produced it gave us the ability to do true “lights out automation” without losing key information and running blind on hundreds of jobs per day in production. Prior to this integration we had 19 hours of shift labor per day which was reduced to 9 hours per day for a labor/cost savings of **\$98,147**.
3. **Accounting** – This portion of the integration allowed for immediate capture of information which permitted invoicing of jobs run through automation or traditional digital methods immediately upon completion. Previously, jobs would bill 7-10 days after shipment are now billed within 24 hours. Our accounting department labor was reduced by **27.25%** for a savings of **\$48,848**.
4. **Enhanced accuracy and automation of inventory management** – As stated above, the JDF CIP4 certified Creo/Avanti integration automatically transmits job number, labor, paper costs, and click charges back to the Avanti MIS system for that particular job at the end of each print run. At that time, all job costs are available in the Avanti MIS system for immediate review. In addition, paper inventory is automatically adjusted. Prior to the integration, the press operator manually depleted the inventory in Avanti’s shop floor data module every time a job was run. This was a time consuming process and also opened the possibility of data entry errors which we have now eliminated.
5. **Capturing accurate costing information** – This integration allows for automated, real-time job cost for every job run on the digital presses. This eliminates the need for manual entry at workstations for all jobs. This step eliminates 2 hours per day for additional savings of **\$13,000** per year. The goal was to gain an intimate understanding of the cost of every digital job that is run in the shop to improve decision making processes. Accurate job costing enables Ai to determine customer profitability as well as product line profitability. This could potentially change the way the company services its customers and markets its products. Before the integration the digital operators would manually enter information into workstations for larger jobs. On smaller (\$400 and below) they would not enter info as it would be recorded under a monthly digital labor job number.

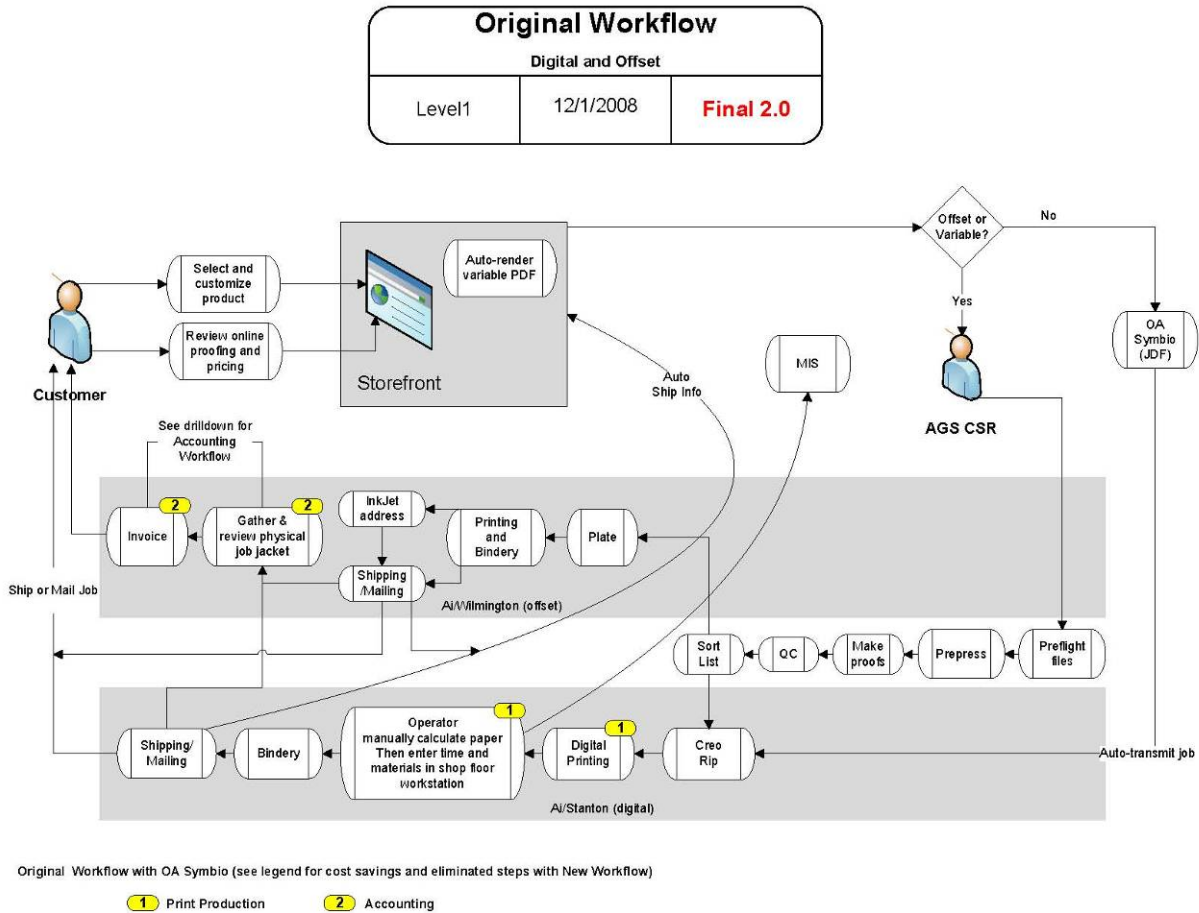
6. **Integration of Creo/Avanti JDF and Xerox Process Manager** – Jobs are created in Avanti and exported directly to the Manifest Automation from Xerox (MAX). This allows a job to go through the prepress stage without an operator as well as allowing Ai the ability to gang or batch run like pieces from our traditional digital workflow. Savings total **\$29,000** per year. This workflow was a very traditionally based workflow – CSR→PrePress→CSR (proof)→PrePress→Press. It was quite inefficient for small digital jobs.

In total, these key areas of integration amount to an annual cost savings of **\$227,370** with an ROI of **\$188,489** and payback period of **2.47** months.

Ai has been able to reduce staff by a total of 2 employees and eliminated the need for one digital print shift. Between 2008 and 2009 volumes in our printed color pages have increased from 30,145,400 to 31,433,376, a 4% increase, while reducing manned iGen operation from 19 hours per day, 5 days per week to 9 hours per day, 5 days per week. Our fixed and variable costs have been reduced by 21% with these implemented integrations.

**Section I. Background:**

Workflow diagram immediately prior to the Creo/Avanti JDF extension integration



The OA Symbio workflow won the 2008 CIPPI for “Biggest Improvement in quality production & customer responsiveness as a result of process automation”. This workflow functioned as follows:

When the customer completes checkout on the Pageflex storefront system, it makes a web service call to an open API on the Symbio solution notifying Symbio that there is an order waiting. Symbio then retrieves from Pageflex the appropriate data necessary to produce and ship the order.

Symbio uses workflow definitions to automatically impose the PDF and submit the job, with JDF instruction, to the CREO Server attached to the (3) iGen3 presses and receives the JDF information transmitted from Symbio which creates an integrated JDF job ticket as the first page of the job.

When orders comprising multiple line items are produced, the ticket contains instructions to place each item into a designated bin until all items in the order have been completed. Once all items are complete, they are easily bundled as one batch and prepared for shipping.

The shipments are automatically generated and transmitted to the appropriate carrier and shipping labels are printed. The tracking numbers are automatically sent from Symbio to Pageflex Storefront and the user gets an e-mail that their shipment(s) are on the way.

While this workflow solved many issues we had previously, it did not integrate with any other system (MIS, Accounting, or CRM) nor did it accommodate orders outside of Pageflex storefront.

## **Section II. Objectives:**

1. In keeping with our Lean methodology, we wanted to stay the course of continuous improvement on current processes by further reducing touches in the following departments:

### **Customer Service –**

- a. Eliminate the need to rekey information multiple times (Result: shipping labels, packing lists, shipping information 3 entries x 22 average jobs per day reduced to 1 entry per job )
- b. Eliminate the use of multiple order entry systems for digital and conventional work (Result: 3 systems reduced to goal of 1 system)
- c. Provide real-time access to job status within the production cycle (improve internal and customer facing communication)
- d. Eliminate use of multiple estimating, order entry and CRM systems to centralize all information

### **Print Production –**

- a. Create “lights out printing” in a digital environment
- b. Automate capture of time and materials (reduce time and errors from manual shop floor entries)

### **Accounting –**

- a. Improve cash flow by reducing days to invoice (Result: from 7-10 days to 24 hours or less from shipping)
- b. To reduce labor and touches (Result: 4 staff to 3 and reduce touches by 50%)
- c. Integrate accounting with our MIS system

**Reporting –**

- a. Develop more accurate and viable internal reporting (real time information to allow for immediate analysis and decision making)

**Section III. Methodology:**

The process of selection was based on our continuous improvement process that would improve both internal and customer facing objectives. Ai's first step began with an exercise of Value Stream Mapping to determine steps in our workflow that could be further automated. Through this discovery process, Ai determined areas that could be eliminated and/or improved. Out of these areas, Ai determined what was needed to further automate our processes. The next step was to determine if a single, more JDF compliant software could solve multiple issues. These issues were prioritized by potential savings to the bottom line. The three key areas to address were workflow automation, MIS compatibility, and accounting. Committee's for each area were formed to evaluate vendors for each of the priority categories. The criterion for vendor selection was based on the following:

1. Ability to leverage JDF capabilities
2. Compatibility with existing systems
3. Stability of the vendor company
4. Accessibility to decision makers of the vendor
5. References from completed installations
6. Training, maintenance, service and support

A comprehensive ROI calculation was then completed on the final two vendors in each of the priority areas. The digital workflow was determined first by choosing Xerox Freeflow to work in tandem with OA Symbio and because of the ease of integration with all potential vendors.

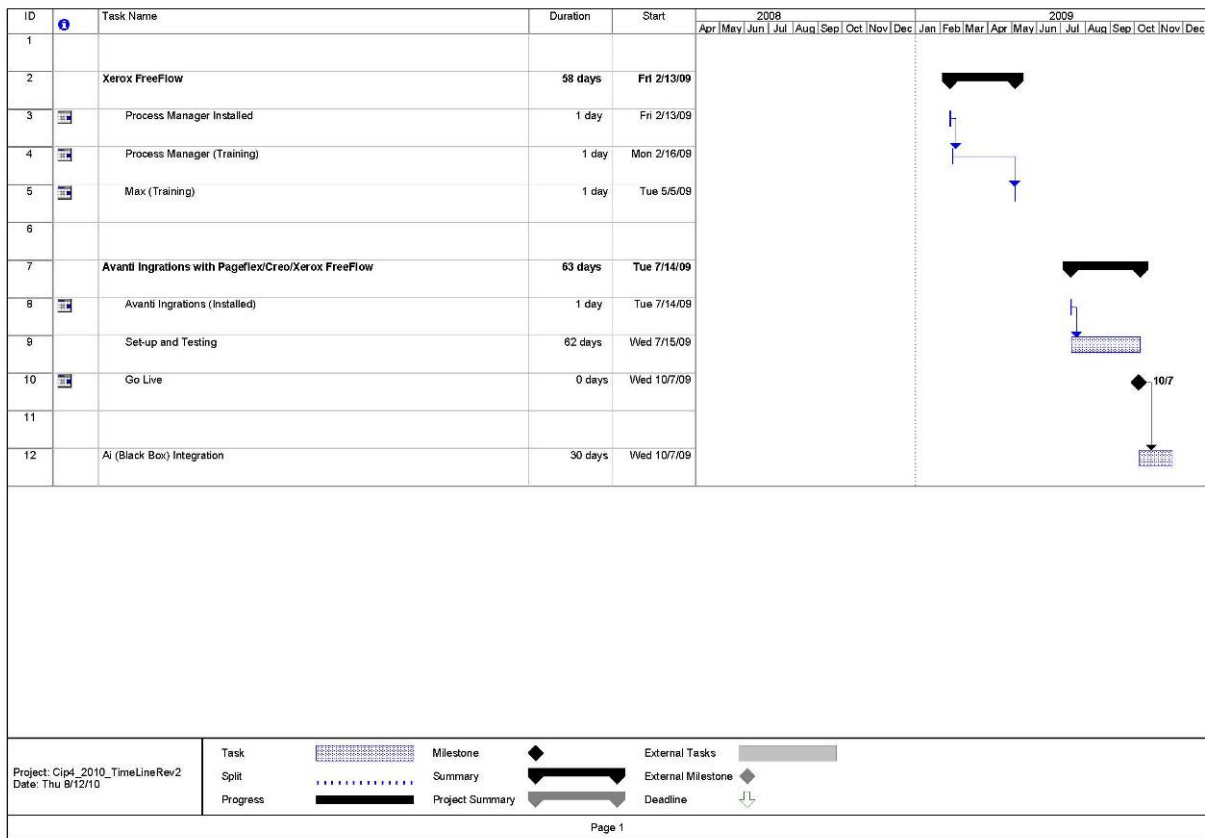
**Section IV. Implementation Story:**

Implementation of the Creo/Avanti JDF framework integration with Xerox FreeFlow began in January of 2009. Attached is a GANTT chart showing the critical path and milestones of each of the participants' integrations which include Creo/Avanti JDF, Xerox and Associates International. With these integrations dependent on each other, there were bound to be a few obstacles as follows:

1. Ai needed to be able to differentiate between various presses to capture clicks, paper and labor. Creo and Avanti revised the JDF integration to address this issue. This new JDF integration gave Ai true job costing and inventory management. Capturing utilization of individual presses allowed us the ability to set the iGens to run during hours when no operators are present (Lights Out Automation) without sacrificing data around job cost and inventory.
2. The Avanti system manifest output is hard coded. In order to eliminate the duplication of products between Pageflex and Avanti, Ai needed to create an interface to add or alter fields before submitting manifest output to Xerox FreeFlow. This interface saved **\$8,375** of MIS programming up front and is realizing ongoing savings in the following areas:

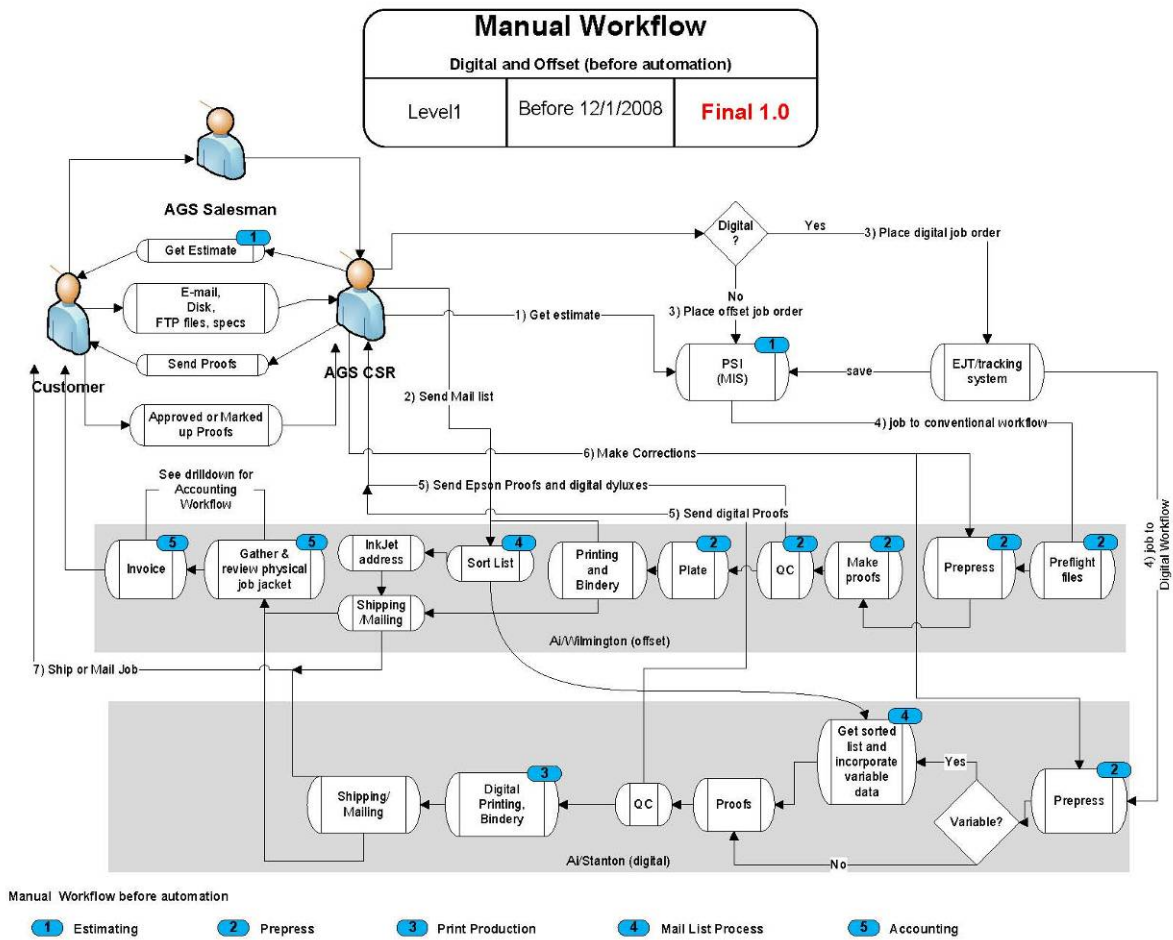
- a. New products created in Pageflex do not need to be replicated in the MIS system
- b. Provides a method to dynamically direct orders into a test environment

Training was completed with all vendors. The GANTT chart includes the training associated with each vendor Installation.



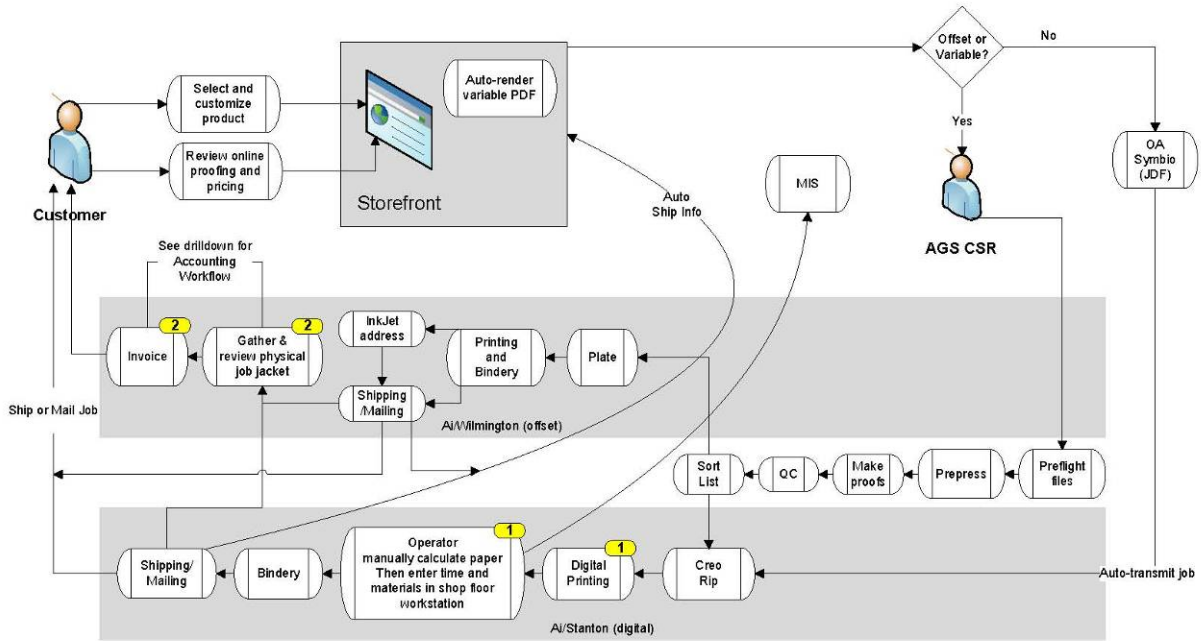
**Section V. Resulting Workflow/Processes:**

Workflow prior to any automation: Manual Workflow Final 1.0



*Workflow diagram immediately prior to the Creo/Avanti JDF extension integration: Original Workflow Final 2.0*

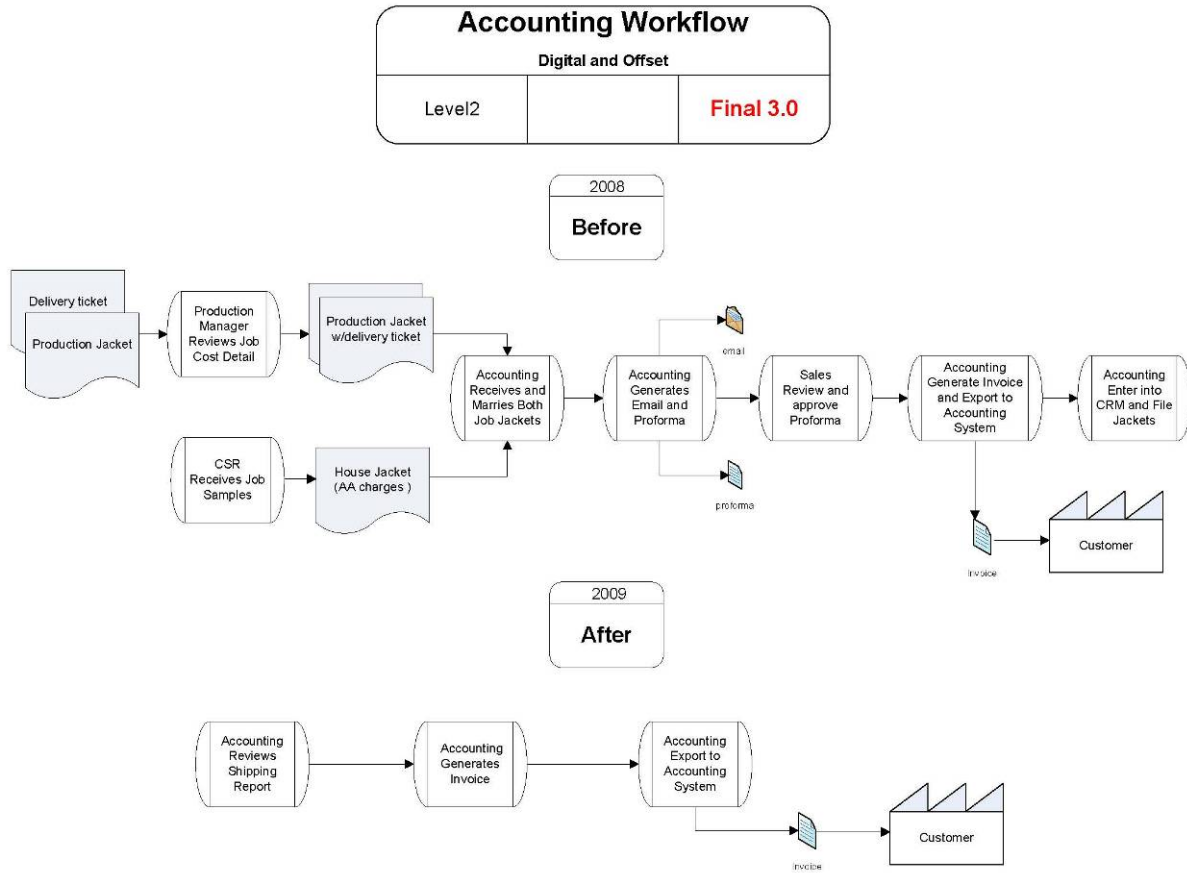
Original Workflow		
Digital and Offset		
Level1	12/1/2008	<b>Final 2.0</b>



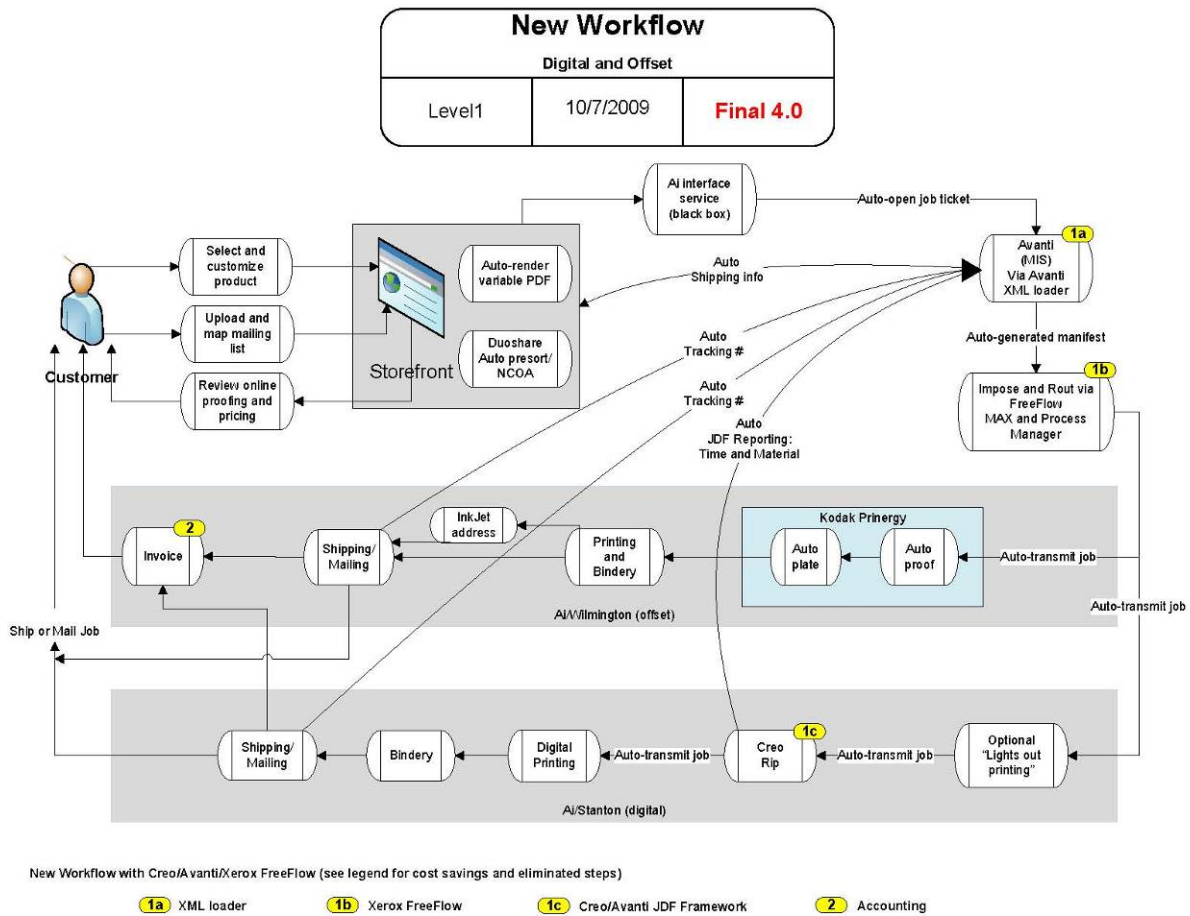
Original Workflow with OA Symbio (see legend for cost savings and eliminated steps with New Workflow)

- 1 Print Production
- 2 Accounting

*Workflow of Accounting both before and after JDF integration: Final 3.0*



*Workflow after integration of Creo/Avanti JDF extension: Final 4.0*



*Orders are initiated on the Pageflex Storefront or through our traditional workflow.*

Once the order is placed, if it contained an uploaded database for mailing, the integrated Duoshare extension automatically presorts and applies NCOA filtering to mailing lists associated with any line items. As part of this step, all paperwork including postage statement, mail labels, etc. are generated in PDF format for later use. PDFs are then rendered on the storefront for each line item.

At the same time, a custom built Ai service (black box) monitors all of Ai’s 29 storefronts for new orders, polling every two minutes. When a storefront order is flagged as “ready to download,” the service downloads the rendered PDF(s) from its remote location to a local staging folder. Simultaneously, the service transmits order information directly to the Avanti system through XML Loader and a new MIS job is automatically created. Once opened, all associated order parameters instantly propagate the MIS job. These parameters include: billing, shipping, purchase order number, freight cost, postage cost, total order quantity, line item quantity/description/price and finishing instructions.

Once the job is opened, the Avanti system automatically generates and transfers a manifest file to Xerox Freeflow by way of Xerox’s MAX integration module. This manifest includes workflow routing instructions, quantities, and other critical information. Depending on the workflow defined in the manifest, the associated PDF file is then processed through a predetermined sequence of nodes (functions). Each node transforms the

PDF in some way. Nodes include: imposition, watermarking, and joining of multiple PDFs. In addition, special conditional nodes are predefined to make decisions about further routing based on parameters like quantity ordered. In these cases, items with quantities that exceed predefined thresholds are routed to the Prinergy system to be printed using traditional offset methods. Prinergy continues the automation by immediately generating proofs and plates.

For jobs that remain in the digital workflow, Xerox FreeFlow is configured to send printing instructions to any of 3 Creo Rips/iGens in one of several ways. One option is to hold jobs until after business hours when Xerox FreeFlow triggers Creo to begin printing. This produces true “lights out” printing.” Another strategy is to hold like jobs and print them at the same time. This option maximizes economies of scale in post printing steps like cutting and bindery.

Traditionally created digital Jobs opened in Avanti are sent through a PDF based workflow and imported to the Creo Rips by the operators.

In all cases, the JDF CIP4 certified Creo/Avanti integration automatically transmits job number, labor, paper costs, and click charges back to the MIS system for that particular job at the end of each print run. At that time, all job costs are available in the Avanti MIS system for immediate review. In addition, paper inventory is automatically adjusted.

Once jobs are ready to ship, the system leverages bi-directional integrations with both FedEx and UPS. These integrations allow the Avanti MIS system to Map shipping instructions and order content directly onto packing slips and labels, eliminating the need for re-keying data. Package tracking information and freight costs are then automatically provided back to the MIS for each job from each carrier.

Jobs that are not charged to a credit card in the storefront are shipped then invoiced within 24 hours. The Avanti system has facilitated the ability to invoice from a shipping report and did away with the accumulation of paperwork and sorting through Production Jackets. Furthermore it has eliminated the need to rekey the information into a separate CRM System.

The robust reporting capabilities from the Avanti integrations with Microsoft Great Plains, Pageflex, Creo and Xerox FreeFlow have allowed Ai to internally improve operational and business decisions. The innovative and better-quality reporting provides the means to analyze data in a timelier manner.

### **Section VI. Optional Detail:**

**ROI:** In the endeavor to continue with the leading edge of technology the ROI has been substantiated both tangibly and intangibly. The installation of the Avanti integration with Pageflex/Creo/Xerox has proven its worth in the first year with an ROI of **\$188,489** and a payback period of **2.47** months. The intangible values of this integration internally are the improvement in the employee morale with less frustration by the removal of duplication of work, reducing the number of touches and the ease of access to obtain necessary information. By offering these added services with enhanced reporting capabilities has assisted Ai in sustaining customer lifetime value. In summary, the investments in innovative software have visibly demonstrated the significant ROI and the steady pace of

continual improvement to enhance our processes and procedures in the ongoing effort of practicing lean.

### **Improvement in Quality and Customer Service:**

Ai currently has 10,000+ storefront users across 29 existing iConnect™ Enterprise Storefront solutions (Ai's branded storefront solution). To date, we have handled 60,000+ line items ordered with 5.1 million+ individual pieces ordered, printed, and delivered through our workflow. We have always delivered quality products, but we are now doing it more efficiently and economically. Since this integration, we have realized a cost savings of 7.7% in staffing while digital PE's have been reduced from 1.94% to .02% and on-time delivery has increased from 95.9% to 99.1%. We attribute this improvement to "touchless printing".

### **Innovation:**

Ai took the 2008 CIPPI award winning workflow and found a way to further revise. Through the utilization of JDF integrations, we have achieved true "lights out automation". The alternative to "lights out automation" would have been the addition of a staffed production shift. The primary benefit of this is the ability for workers coming in on the first shift of the day to have production work ready to finish that was produced overnight with no human intervention which maximizes productivity.