WINNER: Most Innovative Use of Process Automation Technology in an Implementation

Mediengruppe UNIVERSAL
Grafische Betriebe Manz und Mühlthaler GmbH (MGU)

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**GENERAL APPLICATION INFORMATION**

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Description of Company Services/Market: ISO-accredited sheetfed offset printing company with around 50 employees. Alongside its offset printing activities (business reports, magazines, books, promos and calendars), Universal’s service spectrum also embraces pre-press (including composition and litho), database publishing, website design and the production of CDs.

Supporting Vendors/JDF-enabled Products Implemented
1.) Hiflex GmbH
   (The Hiflex MIS (Management Information System) models and supports all business processes in the graphic arts industry and it is used for managing production and business processes at MGU. The Hiflex MIS has JDF/JMF connectivity to the KBA and Heidelberg press machines and the Creo Prinergy Workflow System / Synapse Link.)
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BACKGROUND
A description of the subject workflow environment and conditions prior to implementation

COMPANY PROFILE
Mediengruppe UNIVERSAL Grafische Betriebe Manz und Mühlthaler GmbH (MGU) is an ISO-accredited sheet fed offset operation with a workforce of around 50 people. It was formed in spring 2000 from the merger of four traditional Munich printing houses. Alongside its offset printing activities (business reports, magazines, books, promos and calendars), MGU’s service spectrum also embraces prepress (including composition and litho), database publishing, website design and CD production. The prepress technology comprises two CTP plate setters and a Kodak Prinergy PDF Workflow that was implemented in early 2005.

MGU’s press room houses a Heidelberg Speedmaster CD 74-5 (52 x 74 cm / 29”) plus two B1 (74 x 105 cm / 41”) KBA Rapida 105’s. Both KBA presses have been updated with the Logotronic Professional System. The Heidelberg Speedmaster is equipped with Prinect Data Control.

Postpress capabilities include die-cutting, cutting and folding. Stitching and binding is outsourced.

One of the main characteristics of MGU’s business is a large number of small production runs, which result in a lot of job changes.

SITUATION PRIOR TO JDF IMPLEMENTATION

NON-NETWORKED COMMUNICATION PROCESSES
Multiple data entry points / manual job-creation in subsequent systems
- Re-keying of job-data – Unconnected systems for administrative and technical order processing (MIS, Prepress, Press) required the re-keying of identical job data. This procedure could lead to typing errors, inconsistent data and costly mistakes.
- Delayed or neglected production data collection – Manual time sheets were kept as well as manual logs of: material consumption (plates, page proofs, form proofs etc.) / produced quantities / all other operations and their respective times. This led to the following problems:
  - The manual entries of this data into the administration system took place at least one day in arrears, and required
half a day, every day, to enter the data. Moreover production planning was not synchronized with any shop floor data collection, and the workflow lacked the flexibility and transparency to allow optimal production. Only retrospective analysis of production data was possible and the (short-term) planning horizon was reduced.

- Sometimes exposed plates were not accounted for on the time sheets because
  a) the employee did not want to show error plates on his account or
  b) plates were exposed during the night shift by press operators who are not used to recording plate consumptions or
  c) it was simply forgotten to write down a plate on the time sheet.

Regular inventories showed plate consumption which was inconsistent with the plates that were entered into the administration system. Any discrepancies suspended the invoicing process during an investigation period. The head of the administration department spent at least 11 hours per month on these investigations.

**Lack of plant-wide timely and accurate job-information**

- Risk of miscommunication between departments and staff as well as between customers and staff which – naturally – resulted in rework and delays. Isolated and non-networked systems; a centrally managed pool containing all relevant production data was not available.

- Constricted/limited customer service: it wasn’t possible for Customer Service Representatives (CSR) to give immediate answer to job-related enquiries, because there was no up-to-date display of customer approvals or author’s corrections. Customers had to wait while the CSR’s carried out a time-consuming process to gather job information (‡ further phone-calls / tour through the plant / getting hold of the right person).

- Lack of flexibility/transparency in the production process: especially problematic because many job changes and short production runs are the norm at MGU. This shortcoming wasted valuable productive time:

- A physical printout of the job ticket contained the relevant production data and travelled with the job. Any modification of the job required a new printout that replaced the old one and had to be distributed by the CSR. This led to a delayed circulation of data and was error-prone (‡ faulty entries). Six CSRs spent at least half an hour each day distributing new
printouts (= 3 CSR hours per day), which made this a time- and cost-consuming process.

- No immediate communication of approvals. In the absence of any information to the contrary, the jobs are printed as planned during traditional production meetings. In subsequent production meetings, when new approvals were finally announced, the production planner had to make ad hoc production decisions. These last minute changes reduced the productive time on the press.

- No real-time feedback from production, delayed info about finished jobs. This made production planning inflexible.

**Manual assignment of CIP3-files (PPF files) in the Logotron Professional system and Prinect Data Control**

After manual job creation in Logotron or Prinect Data Control the CIP3 color profiles had to be identified and manually loaded into the press system.

- Manual assignment is inevitably prone to errors, particularly when work is done under time pressure. MGU’s production processes require fast and correct make-ready procedures.

- The production planner had no information about ink coverage which he could use as a scheduling criterion.

- When a job was repeated the printed sheets of the original job could not be viewed, as the CIP3 PPF files were deleted. Sometimes the wrong archived job was copied which then lead to a re-work because of production of the wrong product.

**OBJECTIVES**

A description of the printer, publisher or prepress service’s goal and motivation, including any quantities criteria upon which the goals were established

The solution to be implemented had to integrate the communication between the different departments and systems. It should provide relevant information to all the systems and persons involved and more up to date status reports. MGU expected to gain concrete benefits in job scheduling, production control and management analysis.

Albert Contzen, joint managing director of MGU, states: "Our prime objective was to adopt the most advanced technology in the marketplace to enhance our efficiency and to raise our competitive profile."
One of the main characteristic of MGU’s business is a large number of small production runs, which result in a lot of job changes. The primary goals when networking their production were:

• To establish a smooth/automated workflow with improved, standardized communication processes in order to reduce miscommunication that resulted in rework and delays.

• To eliminate re-keying of data that was already entered in the administration system, and therefore save time by eliminating costly rework and error sources.

• To achieve the highest possible transparency and flexibility throughout the production process from timely and accurate job information, thereby reducing non-productive times. Concrete aims were:
  - To reduce make-ready times as much as possible (a bottleneck in a production characterized by many job changes) and enhance press productivity. Albert Contzen: “A big appeal for us is that make-ready is very much shorter, so output is much higher”.
  - To increase plate output while keeping or even improving the company’s quality standard.

• To improve the customer service, especially to better handle (respond to, estimate, and bill for) customer variation from job specifications while simultaneously (hassle-free) capturing all costs (particularly those occurring in prepress) for more accurate billing — this should also result in quicker payment / fewer disputed charges.

After the successful implementation of JDF connectivity to the KBA presses, MGU had no doubt that the integration of prepress (Prinergy) would also result in valuable optimizations. “We expect considerable time savings in the area of prepress job creation as well as improved capabilities when searching for historical (archived) jobs, because Prinergy receives the job information data from Hiflex MIS via the JDF interface,” explains Helmut Stoppe, joint managing director at MGU.

MGU aimed to increase of productivity of about 10%.

**METHODOLOGY**
A description of the process of selecting a solution, including alternatives and deciding factors:

MGU is member of the "Institut für rationale Unternehmensführung in der Druckindustrie (IRD) e.V.", which is a streamlining institute for the printing industry (Mr. Contzen
holds the position of the treasurer), and hence very much concerned with process automation. Being engaged in IRD he has his finger on the pulse of automation technology and has a clear overview of the options and tools that provide the means for forward-looking business management.

Hiflex MIS was selected because Hiflex was most experienced in JDF technology and had already realized several real-life JDF implementations, including three-way JDF connectivity (at Kraft Druck in Ettlingen, Germany). Hiflex JDF experience promised high-end, CIP4 conforming JDF technology as well as a very professional approach to the networking project.

As the press room featured KBA press machines and a Heidelberg Speedmaster, it was only natural to implement the Logotronic Professional system and Prinect Data Control in order to provide JDF capability to the presses.

Kodak (Creo) Prinergy PDF prepress workflow system was chosen because of the extensive options that Prinergy provides. Albert Contzen: “The crucial factor that tipped the scales in favour of Prinergy, was the potential that lies in the JDF connectivity between Creo and our corporate-level Hiflex MIS.” Hiflex was the first management information system that supports Synapse Link 2.0 in practice (available since DRUPA).

**IMPLEMENTATION STORY**
A description of the implementation effort including timeline, participants, critical path/milestones, obstacles overcome (if any), training and testing:

Preparation for networked production – in order to be able to tap the full potential of a networked production environment, MGU took care of the following preparatory issues:

- Quality management system; selection assisted/supported by the “Institut für rationale Unternehmensführung in der Druckindustrie” (IRD)
- ISO 9000 certification
- Selection and implementation of a fully JDF compliant Management Information System (Hiflex MIS).

Because process automation has been identified as a key success factor for the company’s mission, on a regular basis, MGU critically analyses the existing organizational structures and workflow situations in form of internal and external audits in order to constantly identify and enable optimizations.
IMPLEMENTATION OF NETWORKED PRODUCTION

JDF implementation at MGU started in February 2004 and progressed in several steps. Today (May 2006), the company profits from a fully integrated workflow between Kodak Prinergy in prepress, the Heidelberg Speedmaster and KBA Rapida presses, and the Hiflex MIS.

1. IMPLEMENTATION OF THE HIFLEX MIS
   START: SEPTEMBER 2003

Implementation of the Hiflex MIS started, introduction of Hiflex Estimate and Hiflex Order processing, including job costing, invoicing, and document management.

Job scheduling through Hiflex Scheduling application (digital planning board) since February 2004.

2. CONNECTIVITY TO THE LOGOTRONIC PROFESSIONAL SYSTEM OF THE KBA RAPIDA PRESSES
   START: FEBRUARY/MARCH 2004

Automatic Job Creation in Logotronic via hot folder. The Logotronic professional systems receives job information (e.g. customer name, job number, product designation) and relevant printing parameters (format, paper, run length, number of plates and inks) via JDF (version 1.2) from the Hiflex MIS (that functions as the JDF controller).

JMF feedback from the Logotronic is fed into the MIS. Production data such as:
- Progress on the job (in percent)
- Good sheets and waste
- Speed
- Status of the machine (e.g. idle, set up, production in progress) is automatically transferred into the Hiflex Scheduling application.

Update in December 2004: Shift of communication method from hot folder system to HTTP.
Update in March 2005: Shop floor data collection and production data collection (PDC) online for all production personnel. JMF feedback is now also automatically transferred into the Hiflex Production Data Collection.

3. CONNECTIVITY TO THE KODAK PRINERGY WORKFLOW SYSTEM
   START: MARCH 2005

- Implementation of the link between the Hiflex MIS and Kodak Prinergy Synapse Link 2.0
- Implementation of ‘Job Create’ (create a Prinergy job) from MIS to prepress by the push of a button in the Hiflex order book.
- Implementation of ‘Job Create’ from prepress to MIS, including the correct assignment to the order number in the MIS.
- Hiflex monitors events provided by Kodak Prinergy (approval status and prepress operations).

Start: January 2006
Activation of automatic cost booking. Since then, prepress events and approvals are translated to cost center and material data in Hiflex (less manual entry of prepress production data and shop floor data collection). Tracking error costs and authors’ corrections by mapping to specific material numbers.

4. CONNECTIVITY TO THE PRINECT DATA CONTROL OF THE HEIDELBERG SPEEDMASTER
START: MARCH 2006

Implementation of JDF (version 1.2) connectivity between the MIS and the Prinect Data Control of the Heidelberg Speedmaster. Communication method: HTTP.

Automatic Job Creation in Data Control. The Prinect system receives job information (e.g. customer name, job number, product designation) and relevant printing parameters (format, paper, run length, number of plates and inks) via JDF from the Hiflex MIS (that functions as the JDF controller).

Job scheduling through Hiflex Scheduling application (digital planning board).

JMF feedback from Data Control is fed into the MIS. Production data such as:
- Progress on the job (in percent)
- Good sheets and waste
- Status of the machine (e.g. idle, set up, production in progress) is automatically transferred into Hiflex Production Data Collection and/or Hiflex Scheduling.

5. IMPLEMENTATION OF INNOVATIVE FUNCTION TO CONVERT PPF (CIP3) INTO JDF (CIP4)
MAY 2006:
Implementation of a new and unique functionality in the Hi-
flex MIS that vendor-independently automates data transfer of all preset data (JDF and PPF) to any given JDF-capable press system. For the first time a consistent CIP4 workflow is realized.

The Hiflex system receives CIP3 (PPF-) files from prepress and combines this data (after modification) with JDF-data. The press workflow systems receive a single data stream containing both the JDF and PPF information already linked to each other (Figure 1b). The net result: a totally open solution for the automated transfer of color profiles in a multi-vendor (press) environment. There are no difference in the handling of different vendors' machines and press presetting is – vendor independent - completely automated.

The implementation of this conversion from PPF (CIP3) data into JDF (CIP4) included modules for
• Modification of CIP3 PPF to JDF 1.2 ICS (Prepress/Press) compliant files
• Calculating a preview of the printing sheet
• Visualizing a thumbnail of the printing sheet
• Permanent and centralized storing of ink profiles after job completion
• Checking and solving differences between color names in MIS (e.g. “Pantone 520C”) and prepress (e.g. “Spot 1”)

PPF COLOR PROFILES IN HIFLEX AND HEIDELBERG
PPF COLOR PROFILES IN HIFLEX AND KBA

RESULTING WORKFLOW/PROCESSES
A description of the resulting workflow, including any applicable workflow or process diagrams.

The diagram of the resulting, integrated workflow illustrates the data exchange between the Hiflex MIS and the production at MGU.
Figure 2: Screenshot from Hiflex Scheduling application showing PPF preview. Hiflex receives PPF files from Kodak Prinergy, modifies them to be consistent with JDF 1.2 ICS, and finally transfers them with all pre-setting data to the Heidelberg presses.

Figure 3: Screenshot from Prinect Prepress Interface showing the PPF color profiles in Prinect Data Control.
Figure 4: Screenshot from Hiflex Scheduling application showing CIP3 Files (PPF format) received from the Kodak Prinergy workflow system. In Hiflex they are automatically assigned to the order’s printing processes and modified to be consistent with the JDF standard (1.2 ICS). The KBA presses thus receive all pre-setting data from a single source.

Figure 5: Screenshot from KBA Logotronic System showing the color profiles as received from Hiflex MIS via JDF (together with all pre-setting data).
Today there is a seamless and integrated workflow that streamlines information exchange between the Hiflex MIS, the Kodak Prinergy PDF Workflow System, the Logotronic system of the two KBA printing presses and the Prinect Data Control of the Heidelberg press machine. Multiple data entry is overcome as the Hiflex MIS provides downstream systems with job specifications, via JDF, from data that already exists in the MIS. The scheduling is constantly updated by the online feedback from production. Production processes are improved due to enhanced transparency and flexibility. The data exchange between Prepress and Press is completely automated.

MORE ACCURACY, RELIABILITY AND EFFICIENCY THROUGH ELIMINATING MANUAL DATA ENTRY

- Single entry of job data into Hiflex order book with the choice to simultaneously create the job via JDF in Prinergy. Automatic transfer of data from Hiflex Scheduling application to the subsequent systems Logotronic and Data Control.
Double-entry of data, which often results in typing mistakes and a loss of productive time, is eliminated.

- Automatic recording of costs, accurately and updated in real-time, displaced manually kept time sheets. For each plate-output, processes and costs are all booked against the job; plate-discrepancies are overcome. This permits a 100% capture of all prepress processes / material consumption / cost center times plus automatic transfer of production data into the Hiflex MIS via JDF. The result is a saving of four-hours per day (formerly needed for data capture of manual time sheets).

**PLANT-WIDE UP-TO-DATE JOB-INFORMATION**

- Real-time cost and status tracking through integration of Hiflex MIS with production. JMF-data is constantly fed back into Hiflex Production Data Collection and Hiflex Scheduling.

- Enhanced transparency and flexibility within production. A full-time scheduler is no longer needed, and production meetings are reduced, since production relevant data is dis-

![Figure 7: Screenshot from Hiflex Scheduling application which is the digital planning board and also functions as the JDF controller. Displayed is the planning of the job sequence and the JMF feedback from production (see text page D:15).](image-url)
played in the Hiflex MIS. Electronic job tickets allow immediate communication of last-minute modifications.

"The Hiflex scheduling software furnishes us with a high-precision tool for making our production processes more transparent and our scheduling more effective. It is much easier for us to change schedules at short notice if something unexpected crops up," says Albert Contzen. "Since production scheduling is now implemented electronically, internal communications can be embedded at the click of a button – for example are the plates ready? Has the job been approved? When is the client due? Has the paper arrived on time? It's all so much more convenient."

**COMPLETE AUTOMATION OF THE WORKFLOW BETWEEN PREPRESS AND PRESS (MULTI-VENDOR) AFTER THE INNOVATION’S IMPLEMENTATION INTO THE HIFLEX MIS**

The net result of this CIP4 compliant networked production enabled by Hiflex is a single transfer of information (from a single source) that contains everything needed for press pre-setting. Today, the innovation removed the need for the manual assignment of CIP3-files, and machine presetting is vendor-independently completely automated due to the synchronization with the CIP4-datastream.

**In detail, the following workflow improvements are achieved:**

- Automatic assignment of ink key profiles to the job. When the Hiflex MIS transfers CIP4 job-data to the presses, the correct ink key profiles are already linked to the job. This rids the machine operator of error-prone manual work.
- The scheduler can see a preview of the printed sheet (after the prepress system has generated the CIP3 files) and can use the displayed ink coverage as a scheduling criterion (e.g. convoy planning of sheets which have a high color density). This feature also allows the scheduler to check and if necessary to correct the ink key profiles assigned to the job.
- The CIP3 data is not deleted, but is saved in the Hiflex System even after order completion. Thus the corresponding printed sheets can be displayed whenever the (then historic) order is selected. This is helpful, for instance, when a previous order is copied for a repeat job, as it provides an additional check that the correct order was copied.
- Automatic check of differences between color names in the MIS system (e.g. “Pantone 520C”) and the prepress system (e.g. “Spot 1”). If deviations in the color names are found they are automatically corrected. This avoids later manual modification or confusions.
The implementation of a unique functionality in the Hiflex MIS constitutes the most innovative use of process automation technology, as it completely automates the data exchange within a JDF networked environment that comprises MIS, prepress and press (press machines of different vendors).

The innovation provides the “missing link” for the realization of a consistent CIP4-workflow between prepress PPF files and a JDF-enabled (multi-vendor) press environment.

DETAILS FOR MOST INNOVATIVE USE OF PROCESS AUTOMATION TECHNOLOGY IN AN IMPLEMENTATION

A description of the innovative aspect of the process and an argument for why this is unique and new, with a comparison to traditional alternatives and a description of the primary benefit the innovative aspect of the new process:

In the traditional workflow, PPF ink-key profiles are directly sent from the prepress workflow system to the press workflow system. Beginning in February 2004 the presses receive JDF data from the Hiflex MIS for presetting. This meant that there were two data streams coming to the press workflow systems: one from the prepress workflow system (PPF) and one from the MIS System (JDF).

At MGU a standard-conform JDF connectivity between Hiflex (MIS) - Prinergy (prepress) - Logotronic (press I) – Data Control (press II) had already been realized. Nevertheless, there was still the need to manually assign the PPF ink-key profiles (CIP3 data format, received from prepress system) to the JDF job ticket (received from the Hiflex MIS) within the press front-end. Technical constraints got in the way of a complete automation of the communication processes involved and a consistent CIP4-workflow, in which all data is managed by the JDF controller (MIS System), was not yet realizable.

In general, a vendor-independent solution for the automatic assignment of PPF color profiles to a job in the press system did not exist:

To automate the assignment of PPF files to a JDF created job (within the press-system) is very difficult and depends on the functionality of the participating systems themselves. The reason for this is the fact that PPF files (CIP3 data) generally lack any naming convention standards.

Therefore most prepress-systems construct the filenames differently while at the same time most press-systems follow their own rules on how to interpret the filenames of incoming PPF submissions. It is one thing to fine-tune one prepress and one press system for an automated assignment. To do this with two or even more press-systems involved becomes impossible.

Exactly this was the problem within the multi-press environment at MGU. In consequence the PPF files had to be manually linked to the JDF created job in the press system depending on which applications were used. There was no uniform approach to feed all necessary preset data into both press management systems.
The effort of the innovation was to provide a vendor-independent automated data transfer of all preset data (JDF and PPF). The underlying concept is, that today, the press workflow systems receive a single data stream containing both the JDF and PPF information already linked to each other. The PPF data is sent from prepress to the MIS, where it is received, modified, displayed and stored. Through intelligent automation spot color names within the PPF ink-key profiles (e.g. “Spot 1”) are substituted by the spot color names as defined for the job in the MIS (e.g. “Pantone 520C”). And the PPF ink-key profiles are assigned to the order’s individual printing processes. When the JDF job tickets are sent to the presses they contain links to the corresponding PPF files for the ink-key settings. The net result: press presetting is completely automated.

In order to eliminate the manual assignment Hiflex developed and implemented the new and unique functionality that converts PPF ink-key profiles into JDF and allows a consistent CIP4 workflow.

**PRIMARY/MEASURABLE BENEFITS THROUGH JDF CONNECTIVITY AT MGU:**

- Increased press production: Since starting networked production, plate output increased by 1% and press hours increased by 5.4%. Total output has increased by 24.8% (with similar order structure). In total this leads to an increased productivity of 20% (by similar production machinery and reduced number of employees).

- Reduced or eliminated production meetings.

- Scheduling no longer full-time job (today additional task for joint managing director Mr. Stoppe).

- Wage bill reduction of one and a half people (head of press who did scheduling, person who keyed in shop floor and production data).

- Enhanced transparency by electronic monitoring of the production process

- Improved company organization and simplification of internal communication processes

- More calmness / steadiness in a simultaneously more flexible production process

MGU's savings sum up as follows:
Albert Contzen: “Our prime idea was to avoid retyping data and so to save time in the process of job preparation. During practical usage of the JDF link we then found out that due to the more accurate and faster job preparation we could also increase our productivity throughout the entire production chain. This is because we do a lot of small production runs and a lot of job changes.”

a) The extra productive hours multiplied with the hourly cost rate of the respective machines minus the direct costs resulted in an increase in added value of EUR 150,000.--.

b) Savings through the reduction of production meetings reach EUR 20,000.--.

c) Wage bill reduction of one and a half person results in EUR 115,000.--.

and led to an improvement in net profit before taxes of EUR 285,000.-- or US$ 362,624.-- per year. ROI is 607,4 %