

2005 CIPPI Award Winner

Most innovative use of process automation technology in an implementation

Druckerei Bauer KG

Druckerei Bauer KG, Vienna, Austria. Submitted by Stefan Reichhart, CEO of Hiflex GmbH.

Products incorporated: Hiflex MIS System, Muller Martini AG PrimaPlus AMRYS saddle-stitcher, and MAN Roland Druckmaschinen AG presses equipped with the PECOM system including four MAN Roland 700 presses (74x104; one 10-color, two five-color with varnishing unit, one 4-color.)

Background: Since 1992, Druckerei Bauer KG (Bauer Druck) has been using the Hiflex MIS for managing their production and business processes. In 2002, the MAN Roland presses were updated with the PECOM system.

In April 2004, JDF connectivity between the Hiflex MIS and production was installed. Bauer Druck installed the Muller Martini System Manager in order to network their Muller Martini saddle-stitcher (equipped with the “Automatic Make Ready System” (AMRYS)). This was to the first (worldwide) live, fully JDF-integrated postpress implementation using JDF/JMF. Additionally the MAN Roland printing presses were integrated using JDF/JMF for process automation.

The implementation at Bauer Druck was the world’s first fully integrated postpress JDF/JMF connectivity.

Bauer Druck’s workflow prior to the JDF implementation — Prior to the JDF implementation at Bauer Druck, their workflow required re-entry of data that was already available in the corporate-level Hiflex MIS. The first data entry was done when the customer order was specified and estimated in the Hiflex MIS (which also generated the job ticket). Entries number two and number three were necessary when the job arrived at the press machine and at the saddle-stitcher. The press machine operator had to manually key in relevant job data from the job ticket into the PECOM system (customer name, job name, order number, format, paper thickness etc.). When the job arrived at the postpress department, the machine operator had to manually re-key the relevant job specifications from the job ticket into the control console (AMRYS) of the PrimaPlus saddle-stitcher (customer name, job name, order number, run length, deadlines, and product specifications). Consequently, there was a great deal of data re-entry.

The former workflow in detail — After creating an estimate, the customer order was entered in the Hiflex MIS “order book” by the CSR (customer service representative). Next he printed the job ticket, which contains all relevant production data (coming from the technical estimate). He then forwarded the job ticket to prepress. The planner prepared the job schedule in the Hiflex Scheduling application. When he received the job ticket, he adjusted the schedule accordingly.

For the make-ready of the MAN Roland presses, job specifications (customer name, job name, order number, format, paper thickness etc.) had to be entered into the PECOM system. Although this data for the printing machines was already available in the Hiflex MIS, there was no way to transfer it electronically from the MIS to the PECOM system.

After the job had been printed, the printed product and the job ticket were forwarded to the finishing department for further processing.

A similar scenario occurred for make-ready of the Muller Martini saddle-stitcher. At the machine control console, the machine settings were adjusted according to the job specifications. The job specifications (customer name, job name, order number, run length, deadlines, and product specifications) were re-keyed into the console. As there was no JDF connectivity to the PrimaPlus saddle-stitcher, job data that was already in the MIS could not be transferred to the machine.

Problems in the make-ready workflow described above:

- Re-keying of job-specifications is inefficient: it is both time and cost-consuming and susceptible to errors (for example, typing errors; incorrect abbreviations of names and expressions in the job ticket; incomplete fields/fragmented entries). As a result, the press/postpress operator had to deal with inconsistent data as there were discrepancies between the descriptions of job data on the job ticket (derived from the Hiflex MIS) and job data entered in the PECOM system and/or in the control console of the saddle-stitcher.
- Moreover, inconsistent data handling produced problems, especially when searching for data of former jobs, i.e. search results from the PECOM system and the machine control console of the Muller Martini saddle-stitcher were error-prone.
- Unavoidable schedule changes, i.e. last minute changes of the job sequence (because of ad hoc jobs, a shortage in capacity, or machine failure) had to be corrected manually in the affected system (PECOM) or control console (Muller Martini PrimaPlus saddle-stitcher). These procedures slowed down the make-ready processes and reduced efficiency and production flexibility.

After production was completed, the press/postpress operator manually entered the produced quantity and the fact that the production run had finished into the Production Data Collection (PDC) application in the Hiflex MIS. The scheduler received feedback about the current production status from a report that was based on the data in the Hiflex PDC. This report could (and still can) be called on demand.

As production planning did not receive any real-time feedback from production, it lacked transparency and the flexibility required to optimally manage the production process.

Objectives: Bauer Druck was searching for seamless, cross-vendor communication between the corporate-level Hiflex MIS and the production systems in the press and postpress departments. The goal of this system was to improve efficiency, realize time and cost savings, and to increase productivity. This was meant to be accomplished through enhanced transparency and flexibility in the production process.

Bauer Druck, in particular, wanted to eliminate inefficient steps, such as the re-keying of job specifications into the PECOM system and the machine control console of the Muller Martini saddle-stitcher since the relevant data was already available within the Hiflex MIS.

Additionally, they wanted instant access to up-to-the minute job status and production data. Job data should be updated every minute by JDF/JMF data flowing into the Hiflex MIS. Bauer Druck's ROI target was 2 years.

Methodology: When Bauer Druck decided to implement process automation, the only alternative they considered was JDF/JMF technology, as it is the standard in the graphic arts industry. As an open standard it not only simplifies information exchange between different applications and systems but also allowed Bauer Druck to protect the value of existing investments while adding functionality in order to optimize the technical workflow.

Regarding the Management Information System (MIS), Bauer Druck had already been using the MIS since 1992, and there was no point in implementing another package, as the Hiflex MIS has been perfectly customized to the company's needs. Introducing a different MIS would have required needless time and cost investments, and probably would have reduced their existing level of functionality with respect to management of their business processes.

The prime objective, when installing the world's first, fully integrated postpress JDF/JMF connectivity and simultaneous integration of the MAN Roland presses into the technical workflow, was to use the most advanced technology for process automation and the most experienced vendor/supplier in the market. Muller Martini and Hiflex were the first to demonstrate the capability/technical feasibility of JDF/JMF connectivity between MIS and Postpress. Hiflex has been installed at the Muller Martini Demo Center (Zofingen, Switzerland) since end of 2003. Moreover, JDF/JMF connectivity between the Hiflex MIS and MAN Roland presses had already been carried out at three other Hiflex/MAN Roland customers at that time. Because of the combined experience of these three vendors/suppliers, Bauer Druck decided to go ahead with the JDF implementation as described in the next sections.

Implementation Story: Connectivity to the AMRYS system of the Müller Martini saddle-stitcher — In order to provide connectivity to the Muller Martini saddle-stitcher it is essential, that the MIS provides detailed information about the product to be produced.

It is essential to know the layout of the folding sheet (folding geometry, size of head trim, size of foot trim, position and size of overfold) and the position of the folding sheet on the printing sheet (e.g. folding and stitching with multiple ups). This information is necessary in order to know the gross-format (untrimmed format) of the product on the saddle-stitcher. The gross format is needed for the set-up of the folding stations, feeding stations and trimmer.

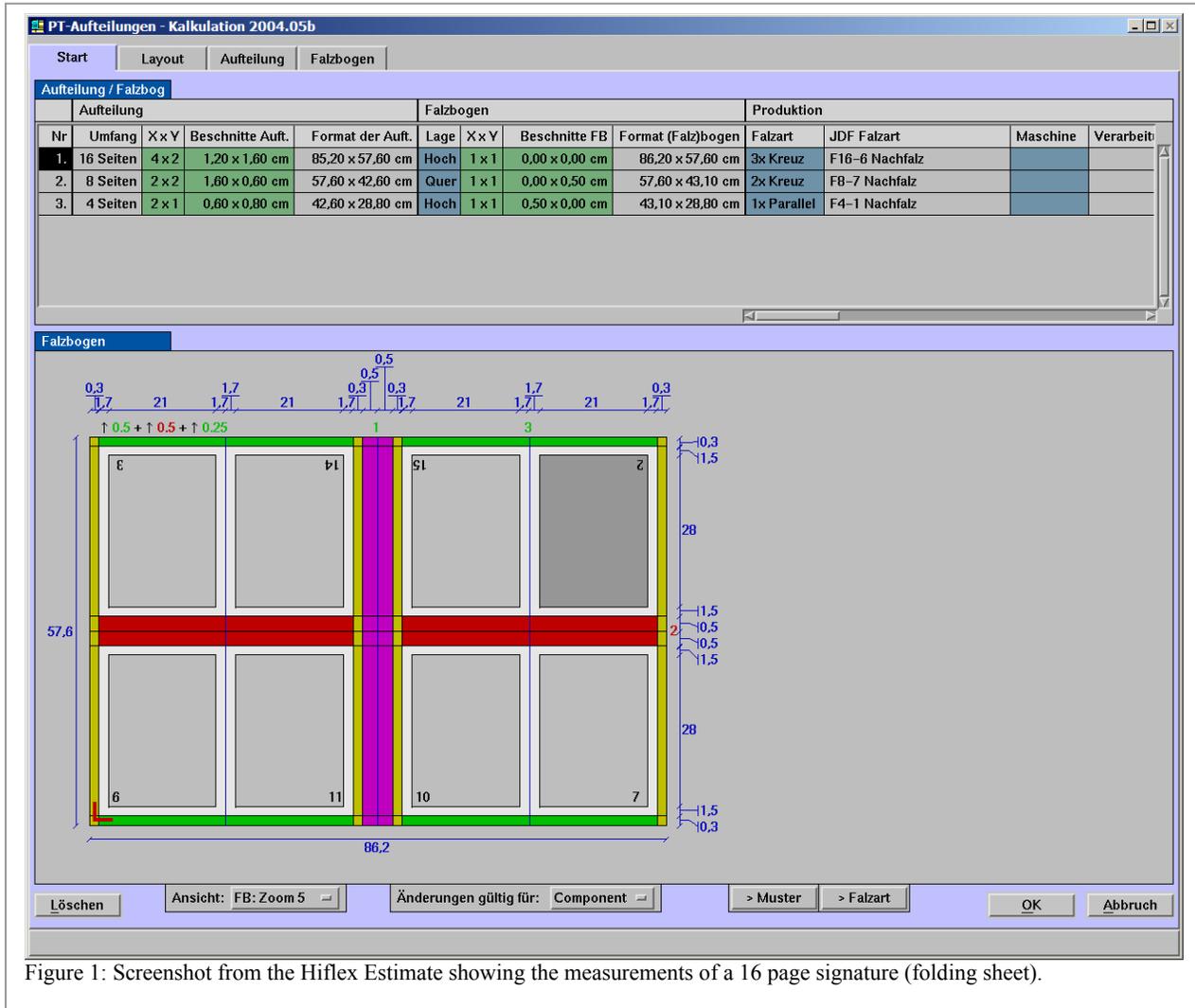


Figure 1: Screenshot from the Hiflex Estimate showing the measurements of a 16 page signature (folding sheet).

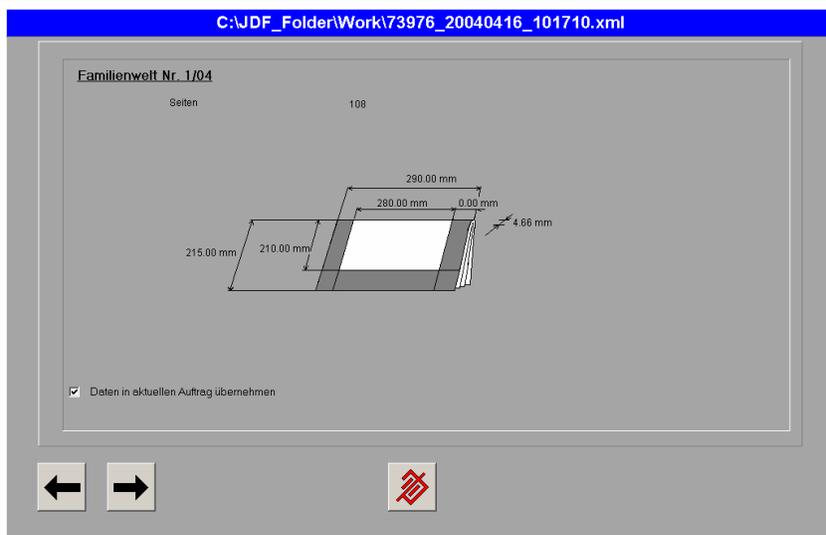


Figure 2: Screenshot from the Muller Martini System Manager showing the measurements of the product to be produced, as received from the Hiflex MIS (example).

Additionally it is essential to know the assignment of the different signatures (product parts) to the stations (e.g. 16 | 16 | 8 | 16 meaning 16-page signature on station 1, 16-page signature on station 2, 8-page signature on station 3, 16-page signature on station 4), the kind of staple (normal, small or eyelet) as well as the position of the stitching heads.

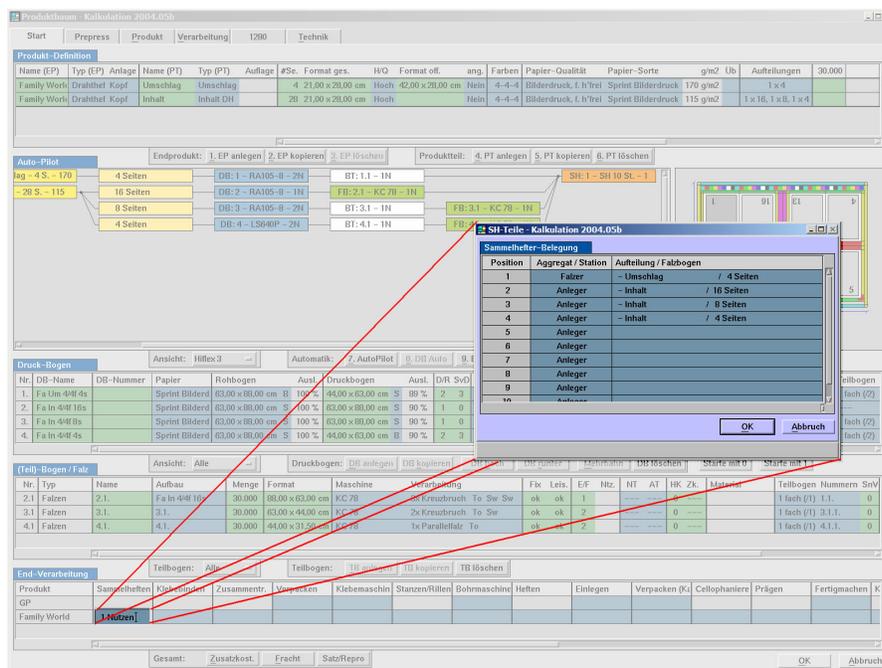


Figure 3: Screenshot from the Hiflex Estimate showing an example of how the signatures are assigned to the stations in a sub-window.

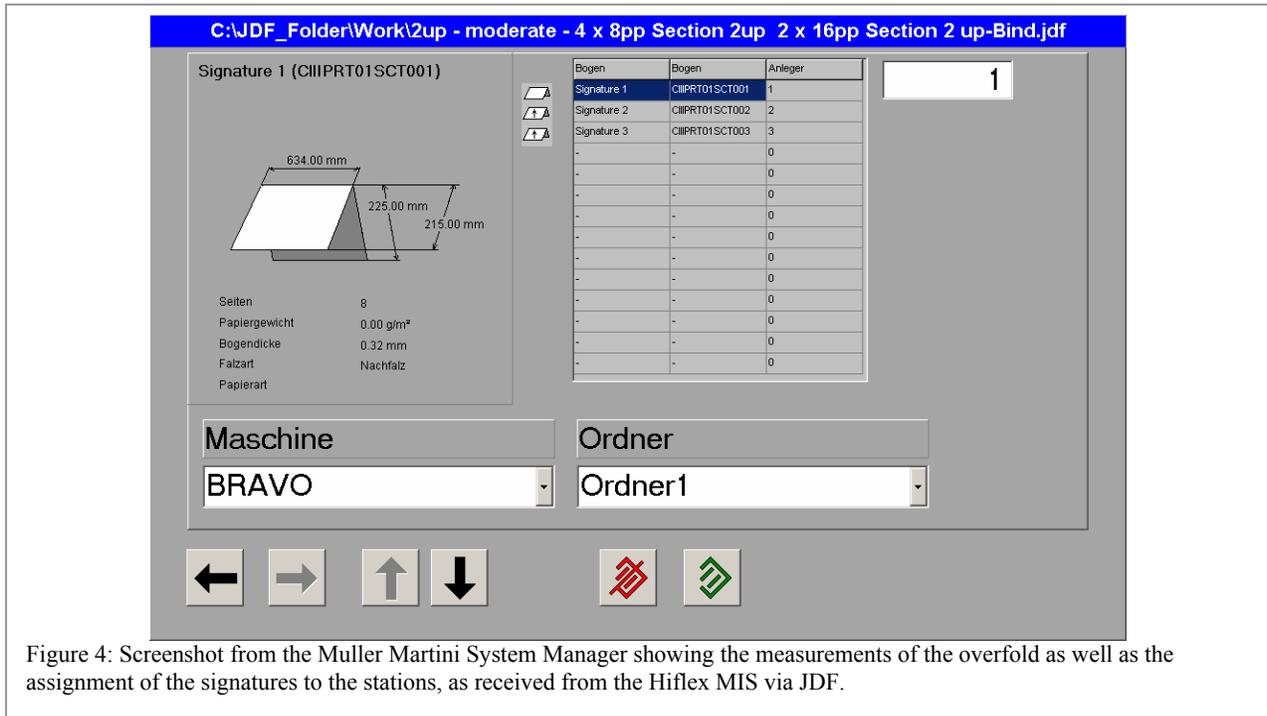


Figure 4: Screenshot from the Muller Martini System Manager showing the measurements of the overfold as well as the assignment of the signatures to the stations, as received from the Hiflex MIS via JDF.

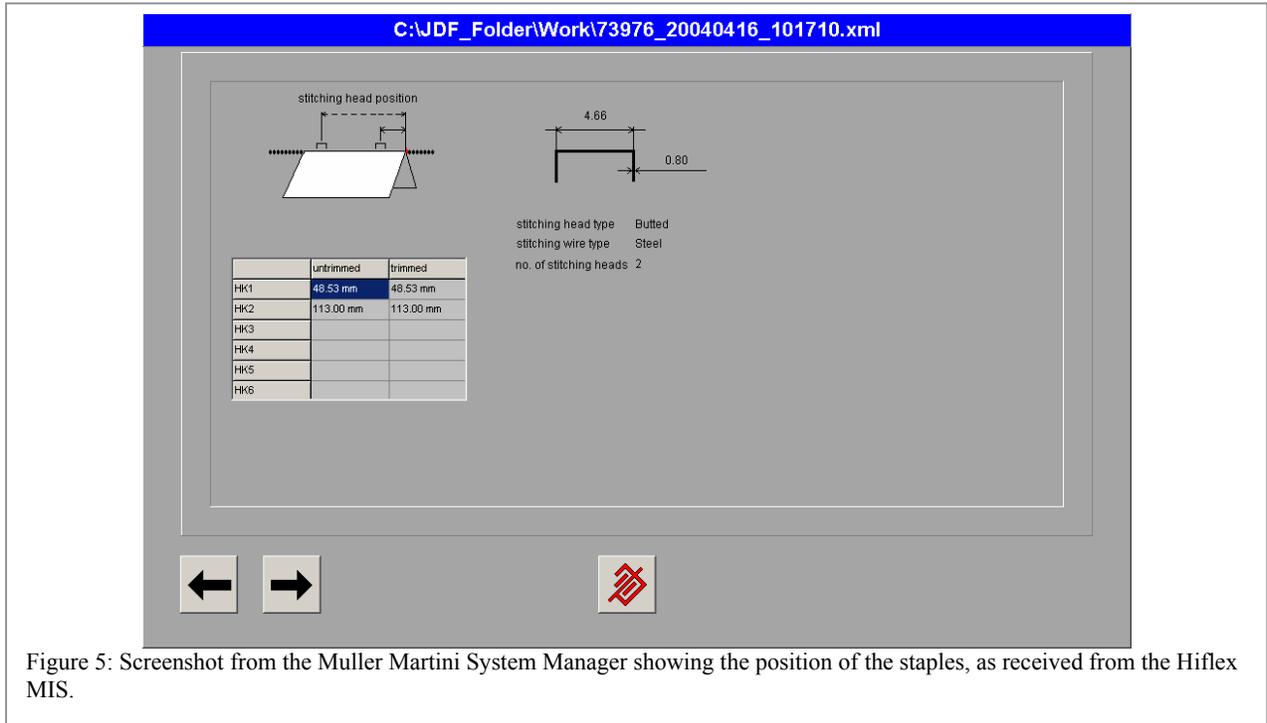


Figure 5: Screenshot from the Muller Martini System Manager showing the position of the staples, as received from the Hiflex MIS.

In order to provide the relevant data for the “Automatic Make ReadY System” (according to the product specifications outlined above) Hiflex developed special mathematical functions and formulas and implemented them in their MIS.

Because this development was very difficult and challenging it was the first saddle-stitcher (and postpress) JDF connectivity ever to be implemented (worldwide).

Participants — Bauer Druck: Mr. Julius Daniel (Head of Planning Department), Hiflex (Development Department), and Muller Martini (Development Department)

Step 1: JDF connectivity between Hiflex MIS and Postpress

- Start: April 2004
- JDF-Specification Version 1.2
- AMRYS / Muller Martini System Manager v. 1.5
- Hiflex MIS Release 27 (2003)
- Communication method: hot folder system
- Implementation of the JDF connectivity between the MIS and the Muller Martini System Manager / AMRYS of the Muller Martini saddle-stitcher. Automatic ‘Job Create’ in the AMRYS system.
- Via the Muller Martini System Manager, JDF data (e.g. customer name, job number, order number, run length, deadlines, and product specifications) are transferred from the Hiflex MIS to the AMRYS system. The data is used to fully automatically, set up the saddle-stitcher for the product to be produced (using motorized controls)

Step 2: Update of the JDF connectivity between Hiflex MIS and Postpress

- Start: May 2004
- JDF-Specification Version 1.2
- AMRYS / Muller Martini System Manager v. 1.5
- Hiflex MIS Release 27 (2003)
- Communication method: hot folder system
- JMF feedback from the AMRYS system is fed into the MIS. Production data, such as progress on the job (in percent), current production output / copies already proceeded, speed, status of the machine (e.g. idle, set up, production in progress), and waste is automatically entered into Hiflex Production Data Collection and/or Hiflex Scheduling.

Step 3: Update of the JDF connectivity between Hiflex MIS and Postpress (test stage)

- Start: April 2005
- JDF-Specification Version 1.2
- AMRYS / Muller Martini System Manager v. 1.5
- Hiflex MIS Release 27 (2003)
- Communication method: hot folder system
- Display of the folding geometry within the Hiflex MIS

Connectivity to the PECOM system of the MAN Roland presses:

Participants — Bauer Druck: Mr. Julius Daniel (Head of Planning Department), Hiflex (Development Department), and MAN Roland (Product Management Department)

Step 1: JDF connectivity between Hiflex MIS and Press

- Start: April 2004
- PECOM v. A006B2
- Communication method: hot folder system
- Implementation of JDF connectivity between the MIS and the PECOM system of the MAN Roland presses. Automatic ‘Job Create’ in the PECOM system. The PECOM control systems receive job

information (e.g. customer name, job number, product description) and relevant printing parameters (format, paper, run length, number of plates and inks) via JDF from the Hiflex MIS.

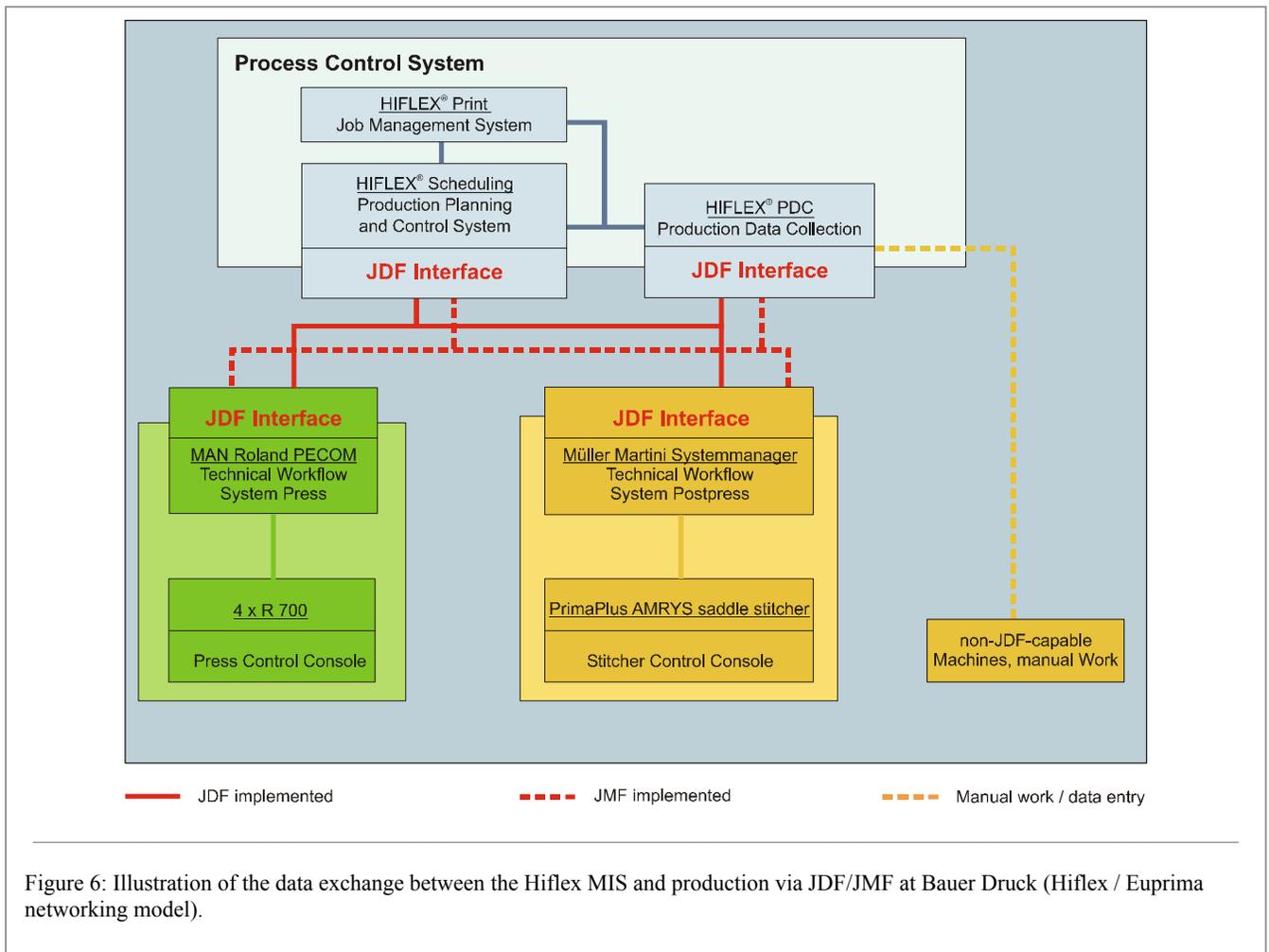
Step 2: Update of the JDF connectivity between Hiflex MIS and Press

- Start: May 2004
- PECOM v. A006B2
- Communication method: hot folder system
- JMF feedback from the PECOM system is fed into the MIS. Production data, such as job progress (in percent), good sheets and waste, speed, and status of the machine (e.g. idle, set up, production in progress) is automatically transferred into Hiflex Production Data Collection and/or Hiflex Scheduling.

Step 3: Update of the JDF connectivity between Hiflex MIS and Press

- Start: December 2004
- PECOM v. A007A1
- Communication method: HTTP
- Shift of communication method from hot folder system to HTTP.

Resulting Workflow/Process: The diagram of the resulting, integrated workflow illustrates the data exchange between the Hiflex MIS and the production at Bauer Druck:



Bauer Druck's resulting workflow after JDF implementation — Since the implementation of JDF at Bauer Druck, a seamless and integrated workflow solution has been created that streamlines information exchange between the corporate-level Hiflex MIS, the Man Roland PECOM system and the Muller Martini AMRYS system of the PrimaPlus saddle-stitcher. 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. Scheduling and the production process are improved due to enhanced transparency and flexibility.

Resulting workflow in detail — Upon order entry, the relevant technical data (e.g. time values for production, format, colors etc.) are automatically exported to the Hiflex Scheduling application, which manages the planning of the production sequence. Production planning has now become much more accurate and flexible: current and precise time values for every sheet and signature are transferred from the technical estimate to the scheduling. This also ensures that jobs can be distributed to various printing machines.

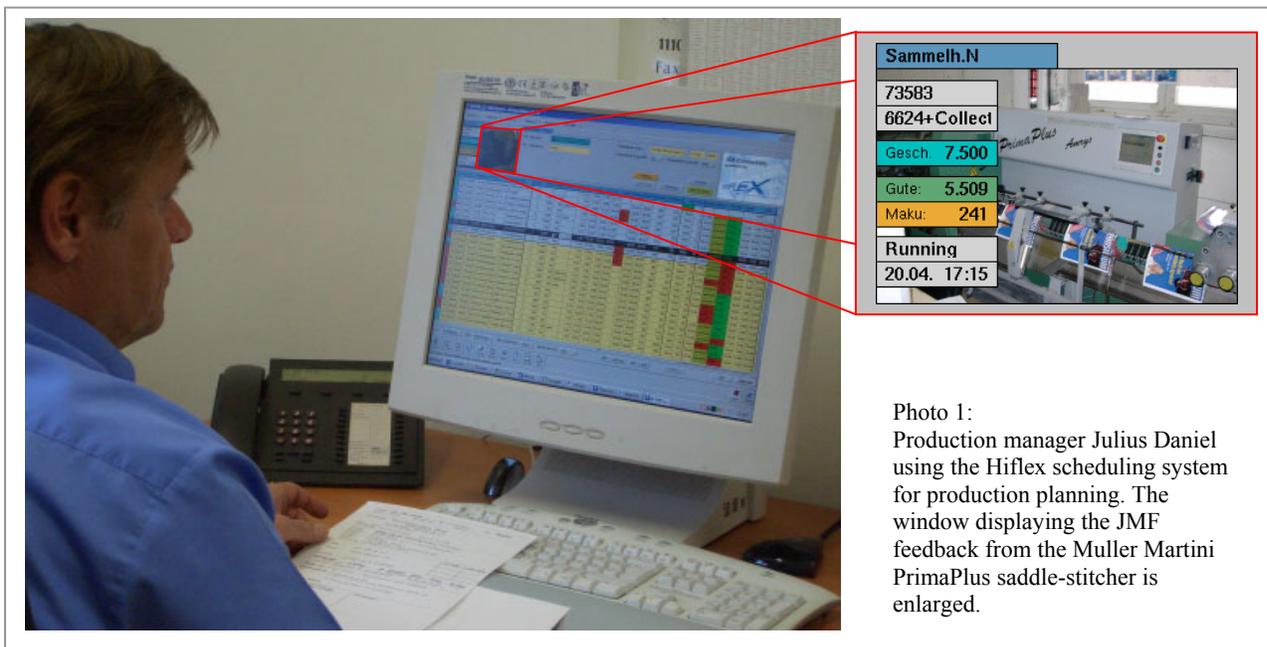


Photo 1:
 Production manager Julius Daniel using the Hiflex scheduling system for production planning. The window displaying the JMF feedback from the Muller Martini PrimaPlus saddle-stitcher is enlarged.

The Hiflex Scheduling application also acts as a JDF controller. Just before the job goes to the machine the scheduler sends job parameters (with the click of a button) via JDF from his digital planning board to the PECOM system and/or the Muller Martini System Manager for a faster make-ready.

The JobPilot in the PECOM system receives all administrative data (customer name, job name, order number, production date, delivery date) and technical data (name of printing sheet, format, press run, paper name, weight, grain, thickness, and the number and names of colors). Manual entry of job specifications into PECOM is no longer required. This saves time, reduces errors, and ensures that the data in the PECOM system (MAN Roland) is accurate and precisely matches the job ticket (Hiflex).

The JDF-data received by the PECOM system triggers a special PECOM function: automatic technical presetting. The PECOM system takes the received JDF-data and compares it with data in archived jobs stored in a PECOM-integrated database. It then proposes a similar archived job from which to take the technical presets (e.g. settings for the air gliders, ventilators, water). This data is then imported into the JDF-created job without modifying the original JDF data and without any manual intervention by the operator.

As soon as a job is ready for further processing in the finishing department, machine-relevant data (e.g. customer name, deadlines, signature size, product thickness, final trim size, staple type and position, run length and page counts of sections) are transferred from the Hiflex MIS to the Muller Martini machine control console via JDF. The scheduler only has to click a button in his digital planning board. The “Muller Martini System Manager”, which serves as a JDF gateway for all connected systems, allows direct communication between the Management Information System (MIS) and the finishing machines. From the machine console the data is passed on to the saddle-stitcher. With the “Automatic Make ReadY



Photo 2:
The Muller Martini AMRYS
PrimaPlus saddle stitcher
receives relevant job data from
the Hiflex MIS.

System” (AMRYS) the saddle-stitcher can be fully automatically set up for the product to be produced, using motorized controls. As manual entry of job specifications is no longer necessary, this process automation saves time and reduces errors.

The JDF/JMF connectivity between the Hiflex MIS and production streamlines the information flow from press to postpress. As the status of a job part is updated on the digital planning board minute by minute, the scheduler has a better overview of the job status and has more flexibility in the production process.

Data about production times and working hours are directly entered into the Hiflex MIS via JMF-event feedback:

- From the presses (machine status, speed, produced good sheets, waste and process on the job), via PECOM system
- From the Muller Martini saddle-stitcher (e.g. production status of the job, current production output or copies already processed), via MM Port.

This data flows into the Hiflex PDC and/or the Hiflex Scheduling application in real-time. The Hiflex Scheduling application displays the precise, up-to-the-minute status and job data. The job’s progress is visible to the scheduler and the CSR at all times. Planning can be constantly kept up-to-date with production activity.

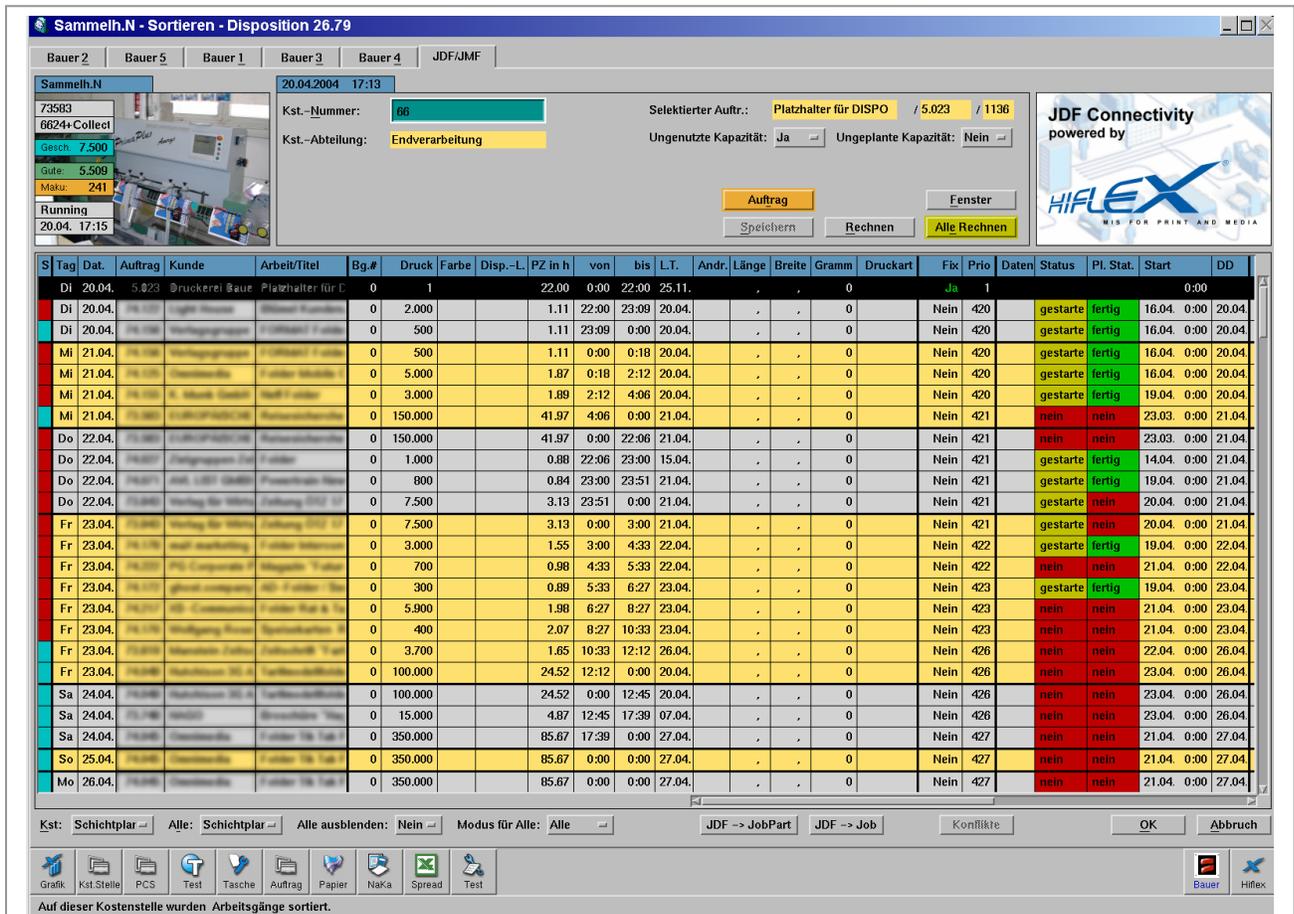


Figure 7: Screenshot from Hiflex Scheduling showing the online feedback from the Muller Martini saddle stitcher to Hiflex via JMF (displayed at the top left-hand corner of the window).

Details for most innovative use of process automation technology in an implementation: The innovation (unique and new) — What makes the implementation at Bauer Druck so innovative is the identification and sharing of very specific parameters (between Hiflex MIS and Muller Martini stitcher) related to the layout of the folding sheet, to the position of the folding sheet on the printing sheet, and to the assignment of the different signatures to the stations. Even the position of the stitching heads (and size and type of staple) is transferred between the two systems.

This goes much further than the transmission of the simple outer dimensions of a printing (or folding) sheet format. Because this development was very difficult and challenging it was the first saddle-stitcher (and postpress) JDF connectivity ever to be implemented.

Compared to traditional alternatives (former workflow) — Bauer Druck was the first JDF/JMF implementation connecting postpress with MIS and also included JDF/JMF connectivity to four MAN Roland presses. Prior to the implementation there was no alternative other than to manually re-key the relevant job specifications from the job ticket into the machine control consoles. Consequently, multiple data entry took place, which was inefficient and always ran the risk of typing errors, or incorrect abbreviations of names and expressions on the job ticket. As a result, there were discrepancies between the descriptions on the job ticket on the Hiflex MIS) and job data entered in the machine control consoles, which could lead to problems in finding/loading archived data of former jobs.

Modifications to the job or in the job schedule always caused problems in the production process. The job manager or scheduler then had to chase the job ticket and manually modify it. Moreover, the production schedule had to be manually synchronized with the job process. Today, new job parameters

are electronically updated throughout the production process (in the job ticket and--if already transferred--to the machine control systems). The production status is automatically fed back to the PDC and the scheduling via JMF. This resulted in additional efficiency, flexibility and transparency.

The primary benefit of the new process automation technology in detail — Bauer Druck's managing director Michael Bauer comments: "The JDF data transfer from Hiflex greatly reduces the make-ready time for our saddle-stitcher and MAN Roland presses. This increases the productivity of this valuable equipment. Through the direct JMF status feedback from the machine control, we acquire production status and accurate data for job costing."

With the aid of the JDF connectivity between the Hiflex MIS and the "Automatic Make ReadY System" the make-ready time of the saddle-stitcher at Bauer Druck has been reduced by two-thirds. The basic set-up of the Muller Martini saddle-stitcher comprises the set-up of eight stations. The ability to use data transferred via JDF, reduced the make-ready process for basic set-up from about 10 minutes to 3 minutes.

The faster make-ready, the improvement of the (now digital) internal communication processes, the increase in automation, transparency and flexibility--all resulting from the JDF/JMF implementation--increased the number productive hours. These extra productive hours multiplied with the hourly cost rate of the respective machines (added value) minus the direct costs resulted in an increase in added value, and led to an improvement in net profit before taxes of EUR 490,000.-- or US\$ 622,741.-- (which can be found in the profit and loss statement of the company). This is empirical data (2003 compared with 2004). The Return On Investment (ROI) of the JDF implementation at Bauer Druck was 220% in the first year which means that the investment was paid back 3.2 times paid back within the first year.

Now targeting the next level of connectivity — After the successful implementation of the JDF/JMF workflow in press and postpress the next target is set. Bauer Druck is planning to integrate their prepress workflow into the network by July 2005. Four-way integration (MIS, prepress, press, postpress) exploits the most prominent features of JDF, which is "to carry a print job from genesis through completion" while "bridging the communication gap between production and the Management Information System (MIS)".