**Background** — For 20 years, we have been providing all services of the graphic arts industry to publishing houses, to industry and trade. “High-Printality” is our brand name for printing in excellent quality, combined with speed, flexibility, specific consulting, personality and partnership.

**History of Leinebergland Druck**
1987: Founding year; start with small-format offset printing
1992: Purchase of a Ryobi single-color press in A3 format
1997: Change to a Heidelberg Speedmaster SM 52-2. First computer-to-plate system with polyester plate exposure and Delta-RIP
1999: Construction of the new factory and move into the new building. Purchase of a Heidelberg Speedmaster SM 52-4 with CPC 32 (CIP3) that is still in service today.
2000: Introduction of the Winkaar costing analysis software (today Prinance)
2001: Purchase of a Heidelberg Speedmaster SM 74-4 and of the CTP system Heidelberg Topsetter 74.
2002: In-house print converting with KI 55 folder and Heidelberg ST100 saddlestitcher. Expansion of the factory.
2004: Start of production in A1 format. The SM 74-4 is replaced by a Speedmaster CD 102-4+LX with ImageControl; the company invests in the Prinect Printready workflow with Trendsetter 3244.
2006: Initiative to improve efficiency and implement a JDF workflow integration.

Today, our company with 22 employees achieves an annual sales volume of 2.2 million euros.

**Situation before the integration**
Our situation before the integration in 2003 was certainly typical for a medium-sized company. The Prinance costing analysis software, introduced in 2000, was being used by one employee. Administration and prepress had different networks, hence data could not be transmitted digitally. There was no system that enabled us to plan production or make optimum use of resources. Feedback and status information had to be actively sought. Continuous product costing analysis was impossible. Each calculation required for invoicing had to be performed manually. Production-related expenses were difficult to prove to the customer.

![Fig. 1: Configuration before the integration in 2003](image-url)
In prepress, 6 employees worked in a single shift. Plates were produced with the Delta technology workflow and the CTP device Topsetter 74 by Heidelberger Druckmaschinen. Data were processed in many consecutive manual steps. Data were also validated manually, sometimes with additional tools that could be used as needed. The prepress network was isolated, and a digital connection to production steps upstream or downstream was impossible. The PostScript workflow was characterized by a low degree of automation. Each printing form had to be processed manually in the SignaStation. Long computing times in the RIP frequently led to waiting times and production delays. Additional work during data processing was recorded only sporadically on the printed job ticket.

In the pressroom, 6 employees worked in two shifts at a Speedmaster SM 74-4 and a Speedmaster SM 52-2. Conventional job tickets were pre-sorted in the planning department and then processed. We soon recognized the advantages of automatic ink zone setting, so we ordered the Heidelberg Prinect Prepress Interface along with the Speedmaster SM 52-4 as early as 1999. However, the Prinect Prepress Interface workstation was integrated in prepress, as the pressroom had not yet been networked. Data were transmitted to the presses “on foot” with a flash card; moreover, the Speedmaster SM 52-2 was not equipped for networking. Additional information, such as data on the materials and the print run, was not transmitted. Electronic production data collection to obtain job- or operation-specific evaluations was equally impossible.

In postpress, invoicing was done according to pre-calculated values, which could lead to shortfalls, especially in case of manual tasks. The actual services and quantities could only be recorded in a very time-consuming manner via tracers.
Disadvantages of the situation

- Management:
  - Time-consuming handling of orders
  - Time-consuming job planning
  - Bottlenecks in administration
  - Continuous product costing analysis is not possible

- Prepress:
  - Many manual steps in data processing
  - Time-consuming search for faults in the data provided
  - No automation – every printing form must be handled manually
  - Errors due to manual work
  - Long RIP times cause waiting times for employees
  - No performance measurement

- Press:
  - Long set-up times due to manual job preparation
  - Errors due to manual job preparation
  - Ink presetting only via CIP3, no transmission of additional data
  - Time-consuming loading of data from flash cards
  - No performance measurement

- Postpress:
  - No quantity measurement, hence excessive/insufficient quantities delivered
  - No performance measurement

Objectives — goals and motivation:

Quantitative goals:
- Management:
  - Increasing the sales volume through automation and integration of the various systems for optimized work processes
  - Reducing the time needed for administrative tasks (searches, job planning etc.)
  - Reducing turnaround times
  - Establishing product costing for analysis and evaluation

- Prepress:
  - Automation of plate production
  - Increasing productivity and rate of use
  - Reducing the number of manual steps in data processing
  - Reducing the error rate
  - Implementing performance measurement

- Press:
  - Increasing productivity and rate of use
  - Minimizing turnaround times
  - Reducing the error rate
  - Implementing performance measurement

- Postpress:
  - Implementing performance and quantity measurement
Qualitative goals:

- **Management:**
  - Transparency in production
  - Real-time economic evaluations
  - More time for customer support

- **Prepress:**
  - Increasing plate quality
  - More time for customer support
  - Implementing color management

- **Press:**
  - Implementing a coloring standard
  - Increasing printing quality
  - Increasing the range of services (varnish, scented varnish etc.)

- **Postpress:**
  - Increasing the range of services (die-cutting, mailing, fulfillment etc.)

Methodology — alternatives, selection criteria and the decision-making process:

**Decision criteria for the introduction of a workflow system**

The workflow system must

- be based on JDF and PDF and offer a high degree of automation
- cover the entire production process:
  - Prepress modules
  - Press integration
  - Postpress integration
- support the connection to a management information system
  - As much data as possible is to be made available to production for job creation, presetting and automation
  - It must be possible to easily integrate the existing equipment
  - The system must permit feedback of machine and production data
- be open and easy to upgrade (standardized JDF interface) to guarantee that the system can be developed further in the future with the addition of new equipment
- permit the integration of products for quality control and assurance (color measuring devices)
- Service quality of the supplier
- Cost-benefit ratio

**The following workflow systems were considered using these criteria (in 2004):**

- Prinect Printready
- Creo Prinergy
Since only Prinect Printready met all requirements at the time the decision was made, we chose Printready. Among the most important arguments in favor of this system are:

- The high degree of automation in Printready
- Sophisticated JDF interface (especially with Prinance)
- Sophisticated JDF architecture that extends beyond prepress to press and postpress
- Good past experiences with the Heidelberg Service

**Implementation Story**  
**Milestones of the integration**

**Step 1 (2003):** Start of the integration project with production data collection via Stratos iPoint terminals in the prepress, press and postpress departments. The terminals in the press department are to be replaced by the PDC function in the CP2000 control station after the consolidation of the printing machinery.

**Step 2 (2004):** Delta RIP replaced by the new prepress workflow Prinect Printready with Prinect MetaDimension. Upgrade of the SignaStation. The Delta RIP is dismantled.

**Step 3 (2004):** The Speedmaster CD 102-4+LX replaces the SM 74-4. The Trendsetter 3244 platesetter replaces the Topsetter 74 to enable the company to work with larger plates.

**Step 4 (2005):** Connection of the Prinance MIS to Prinect Printready. Jobs are now created in the prepress workflow system via JDF at the push of a button. The SignaStation automatically evaluates the sheet geometry and the selected folding layout.

**Step 5 (2006):** The Speedmaster CD 102-4+LX is connected to the network. The Speedmaster SM 52-4 is upgraded with the Prinect Online Kit. This replaces the flash card exchange between printing presses and the Prepress Interface – job and presetting data can now be transmitted online to the press.

**Step 6 (2006):** Installation of the Prinect Integration System. The complete job and presetting data can now be transmitted to the press from a single data source. The Prinect Cockpit gives the user a detailed overview of production. The Prinect Pressroom Manager module replaces our Prinect Prepress Interface.

**Step 7 (2007):** Production data collection via the Prinect Pressroom Manager/Integration System directly at the Prinect CP2000 control station. The temporary Stratos iPoint terminals are replaced. Accurate production and press data are now available for product costing analysis.

**Next steps:** The quality management system is to be certified according to the offset process standard (ISO 12647-2) An online portal is to improve customer communication  
Automatic presetting in the postpress department
Situation after the integration

The situation in our company after the integration is marked by the enlargement of our print format from A2 to A1 with the investment in the Speedmaster CD 102-4+LX, and by an increase in production by almost 40%. To cope with this, we had to increase productivity in all areas of production and adapt our organization and job management. Our initiative to improve efficiency and establish an integrated workflow contributed greatly to this end. Two employees who used to work in prepress are now project managers in job management. Their knowledge of production is a great asset to them.

The communication between job management and production has been improved. The Prinect Cockpit and the status monitor in Prinance provide the user with a detailed overview of production.

The Prinance costing analysis system is now connected to the Prinect Integration System via JDF Connector. Jobs can be created in Printready with the push of a button. The SignaStation automatically evaluates the sheet geometry on which the costing analysis is based and any selected folding layout and uses these data to create an impositioned sheet. While the SignaStation frequently acted as a bottleneck in the past, it now automatically works in the background with standard jobs. Predefined processing steps control data validation, page processing, and plate output. PDF processing resulted in a considerable increase of production reliability, compared to the PostScript workflow. With the Preset Point module, the calculation of area coverage values for ink zone presetting is now an integral part of the workflow and can be viewed at all workstations.

After the release and the plate output, the jobs are made available to the printing presses in the Prinect Integration System. The operator at the press control station can load all job-related data with one click for job preparation. While the Speedmaster CD 102-4+LX was already delivered with the networkable CP2000 control station, the Speedmaster SM 52-4 had to be upgraded with the Online Kit. In the past, the data for ink zone presetting had to be transferred inconveniently from the Prinect Prepress Interface via a flash card. Now, press and production data for status reporting and performance measurement are transmitted during normal press operation by means of individually dedicated buttons.

In postpress, the workflow integration is used for electronic feedback of performance and quantities. The use of the system for automatic presetting will be implemented in a future integration step.
The introduction of machine and production data collection in prepress, press and postpress permits the user to call up ad hoc information and draw up long-term statistics. The ad hoc information allows us to react quickly to problems or changes in production. Long-term statistics provide us with information on performance in individual operations or on the job structure, among other things. Moreover, we can permanently verify our costing analyses.

Fig. 4: Workflow 2007 after the integration

Advantages of the situation

- Management:
  - An automated product costing analysis based on “real” performance data is possible. Additional expenses become transparent to the customer and can be invoiced.
  - Fast and clear overview of the rate of utilization of production
  - Production planning is possible
  - Ad hoc information is available
  - Long-term production statistics are possible
  - Daily product costing analysis with up-to-date production data
  - Permanent verification of costing analyses
  - Statistics directly from the production system with Analyze Point

- Prepress:
  - Automatic job import from job management,
  - Automatic PDF processing, automatic imposition and plate output.
  - Job data from Prinance are directly available in Printready
• No waiting or searching times due to centralized data administration and an automated workflow
  • Electronic performance measurement with Stratos iPoint

• Press:
  • Complete job and presetting data from Prinance are available at CP2000
  • The error rate approaches 0
  • No waiting or searching times during job preparation
  • Accurate performance measurement directly at the press control station

• Postpress:
  • Job data from Prinance are available at the Stratos iPoint
  • Electronic performance and quantity measurement

**Best cost/benefit realization — quantitative analysis/ROI and qualitative results**

The JDF integration led to a significant increase in productivity in the job management, prepress and press departments. The effect is particularly noticeable in prepress, where productivity could be increased even though the staff was reduced from 6 to 3 employees. Since our sales department and job management were consistently expanded, we were able to use the additional production capacity directly for new jobs. The altered cost structure resulting from the change to a larger print format shortly after the start of the workflow integration must be considered in the ROI evaluation.

The improvements in prepress also had a noticeable effect on the productivity in the pressroom by increasing production reliability and preventing press stops. Even though CIP3 ink zone presetting had been used for some time in the company, the time required for press makeready could be further reduced with the transmission of data from prepress and the MIS. This is due in large part to the fact that the data are available online at the press instead of having to be read in from a flash card.

The introduction of machine and production data in prepress, press and postpress permits a real-time and accurate product costing analysis for every job. Services that are to be invoiced at cost can now be documented, whereas in the past, we sometimes had to accept deductions. In job management, the effort for job planning and administration has been reduced considerably, thanks to the feedback of status information. We expect a further improvement once a planning board integrated into the production system is available.

The quantitative effects of ImageControl have not yet been considered in the calculation, as a predictable effect and further savings due an integrated quality control cannot be evaluated until the introduction of Prinect Color Solution.
NPV (Net Present Value) and ROI (Return on Investment) calculation and conclusion

Calculation Leinebergland CIPPI Awards 2007

<table>
<thead>
<tr>
<th>Periods</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
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<td>Cumulative savings</td>
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<td>Total investment</td>
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<td>Additional labor cost for increased volume for work</td>
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<td>4 Total annual costs</td>
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<td>ROI (Return on Investment) in %</td>
<td>522,10</td>
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Conclusion

The Prinect Workflow Management System was the key success factor in our strategy to restructure our operations and to save cost. The above shown result of an NPV of 811,000 € and an ROI of 522 % enabled an extraordinary growth of our business. Based on the productivity gain we expanded into the bigger press for-
mat and by doing that increased our production capacity considerably. Another surprise was that we achieved the savings mainly in the Job Management and Prepress. The integrated JDF Workflow System Prinect made it possible to start improve those processes were we had a lack of sufficient tools before. Since our integration project is still on its way we did not factor in already achieved savings because we felt that we would need more time to measure the results. But we already see that the savings we achieve in our operations are much higher than reflected in the ROI calculation above. The additional benefit comes from the completely integrated Prinect Color Solutions.

Beyond the current productivity gain we already plan to become even more efficient with the next project phase. Presetting in the Bindery and online collaboration for our customers are just two processes were we see tremendous potential. The solutions for this products are already available and will be installed later this year. Due to the hassle-free installation of the Prinect Workflow modules we decided again for Heidelberg products. The professional implementation project management and the outstanding service are just two additional factors which convinced us that we have the right partner for the ambitious integration project.

The fact that we today run a JDF based Workflow system makes decisions even easier since the number of JDF products is growing and modules can be replaced by products from other vendors if needed. We feel that our Workflow provides the necessary security and the needed flexibility to be successful.