**Klingenberg Berlin** (Submitted by Andreas Brandt, MAN Roland Druckmaschinen AG)

Klingenberg Berlin is an enterprise of the Gundlach Display+ Box, Berlin, an enterprise of the Gundlach Holding

**Products incorporated:** MAN Roland Druckmaschinen AG presses equipped with printnet PressManager™ system, including ROLAND 700 (5 units, format 74 x 104 cm), ROLAND 900/7B (5 units, format 120 x 162 cm), ROLAND 900/8 (5 units, format 130 x 185 cm) and ERP system Proseco D2.

**Background:** A machine park of six non-networked machines was to be replaced in 2004 and the number of machines reduced. In future three networked machines were to produce the then current quantity of orders and productivity substantially increased by a JDF workflow.

In the starting situation the existing MAN Roland R705 was to be integrated into the new machine park. The software Proseco D2, which covers the complete commercial area from inquiry and costing through job handling up to historic costing and statistical evaluations, was already installed but not linked with the machine park and used for job planning.

Klingenberg Berlin is specialized in display and poster printing. Accordingly the job structure is characterized by short runs. The company exposes 80,000 m² of printing plates per year with about 9,000 subjects. The average run is less than 1,000 sheets for each subject. Due to the frequent job changes, the ratio of time expenditure on the machine lies on the average approx. 70% makeready and 30% printing per job.

In order to produce the same number of jobs with fewer machines, it was important to increase the proportionate production time for each job significantly. Here optimization of the technology was important, e.g. for the reduction of waste sheets and simplified prepress operations on the one hand, and on the other hand internal communication was to be optimized by an automated workflow to prevent time-consuming misunderstandings and questions for production planning.

**Objectives:** The goal of printing plant networking is to accelerate the complete job execution with an unchanged quantity of orders and thus increase productivity.

The business philosophy of Klingenberg Berlin is to optimize production times. Non-value adding activities have to be eliminated, makeready times minimized, and machine running times increased. With a job structure containing a large number of short runs, many color changes and the use of special colors, these conditions are indispensable.

The acquisition of new machines, with simultaneous implementation of a JDF workflow between the ERP system Proseco D2 and the printing machines, was intended to improve production efficiency and economy by total quality assurance.

The increase of machine running times was to be realized by a reduction in makeready times and a reduction of process duration. The clear instruction: makeready time of 13-16 minutes per printing unit should be lowered to less than 8 minutes per printing unit. This
meant that in the case of a job for a four-color poster (130 x 185 cm) a machine had to be made ready in less than 30 minutes. These 30 minutes are the time from the last good sheet of the current job up to the first good sheet of the new job.

To make it possible to work with the most current job data, feedback was to be available for planning and historic costing.

With the multiplicity of the jobs all knowledge from old jobs should be used for faster production planning and avoidable work should be excluded. Accordingly central administration of jobs was necessary, which not only transfers color profiles but also processes all machine settings automatically.

Proseco D2 and the JDF workflow provide the ideal conditions because production can be planned and tracked efficiently. The PressManager™ production management system was to be used to call up machine settings from jobs stored in the database and take into account information from the order evaluation. Besides that the use of personnel resources was to be optimized.

**Methodology:** Prior to DRUPA 2004 Mr. Andreas Grathwohl, CEO of Klingenberg Berlin, commissioned the consulting company Eurografica to develop a solution under the defined productivity objectives (see "Objectives"). At this time it was certain that the already existing five-color ROLAND 700 printing machine and the planning software Proseco D2 had to be merged into a JDF workflow. The productivity of a networked printing plant with two additional machines was simulated on the assumption of the then current quantity of jobs by an average of 2.5 shifts per day.

The following questions needed to be answered by Eurografica: With which machines and with which workflow am I able to realize the demanded makeready time of less than 30 minutes for a four-color poster? Which work procedures in an optimized workflow will help me to save time? And how much time will it be? How do I move the planned paper quantity most effectively?

After analyzing machines from different manufacturers the MAN Roland configuration finally chosen proved to be the best variant. The large size MAN Roland machines with the formats 7b and 8 corresponded to the job specifications of Klingenberg, the machinery was to be networked with MAN Roland’s printnet PressManager™ production management system because this promised to be the most successful. With the aid of MAN Roland R&D, Proseco was quickly able to make the JDF interface available.

From the digital planning board of Proseco D2, the communication platform of manufacturing, the release for printing takes place. It was also important that the planning board correspond to the customary manual handling with the planning tickets to ensure that the printers could quickly get used to the digital production planning methods that were new to them.
Implementation: Important for the fast implementation of the JDF workflow was the good cooperation of the specialists of the printing company Klingenberg, of Proseco and of MAN Roland.

The responsible participants of the project:
Klingenberg Berlin: Mr. Andreas Grathwohl, CEO, and Mr. Klöpper, printing plant manager, ensured the internal prerequisites for smooth project implementation and the readiness of the workers for the project work.
Proseco: Mrs. Bihl wrote the interface and the planning board and passed on her knowledge in training courses for the staff of Klingenberg and MAN Roland.
MAN Roland: Mr. Eugen Stein accompanied the project from the very beginning. Mr. Ruf installed the networking of the printing machines with printnet Pressmanager™ and trained the Klingenberg staff in how to handle it.

The Proseco software had already been in use “offline” at Klingenberg for years and so there was no need for training courses in handling the software outside the pressroom.

The two ROLAND 900 machines were installed by August 2004 and in September the three printing machines were networked as an isolated solution for the time being.

In October 2004 the JDF implementation at Klingenberg was completely done within one week. In such a short time Klingenberg Berlin, MAN Roland and Proseco realized an integrated workflow between the ERP system Proseco D2 and the MAN Roland printing machines.

Immediately after this detailed training courses took place locally in Berlin. The printers were prepared for the new working processes in the networked printing plant. Apart from the pure technical knowledge it also concerned breaking down the printers inhibitions with regard to the new work procedures.

Within two weeks the complete production was changed over from offline to online. This succeeded without any production constraints.

Production planning and the production process meant fundamental changes for the printers. The "best" printer no longer stood at the "best" machine and printed the "best" (most fastidious) jobs. Now he was responsible for the planning and job preparation of all other printers, which meant big changes for the internal work routine of the employees.

Planning at Klingenberg was before personnel-related and because of the manual work on and with the pinboard partly confused and often also faulty. Also the printers had to learn to deal with the automation of the technical settings of the printing unit, e.g. ventilator tracks or inking and dampening units. For example the moment the PPF data of the new job arrives, PressManager™ compares it with already printed jobs in the PECOM database and completely merges the technical presetstings contained there into the new job. Previously this was all done manually.
At first the printers were skeptical, but after a while they were very enthusiastic about the electronic planning board and the automatic technical settings. This was a result of the thorough training.

In the workflow the technical job description provided by Proseco D2 is the basis for electronic production planning. The resources required (prepress systems, CTP platesetter, printing machines) for the individual work steps of a job are fixed in place and date. Thus the individual production plan is seen in the context of total production and assigned there efficiently. Flexibility is still ensured and the production plan can be updated manually at any time.

With the planning board all job-related changes can be seen immediately and absolutely precise historic costing is possible by manual PDA feedback. The jobs of the next two days can be overviewed problem-free, constant access to all materials data is guaranteed and external work is monitored. Preparing and changing data takes less than half the time needed previously. Discussions of production planning for following shifts are no longer necessary.

Andreas Gratwohl, CEO of Klingenberg Berlin: "With Proseco D2 we have a brilliant control instrument and an effective planning tool that enables us to react to unexpected events immediately. The information capability of our job handling has increased considerably – and besides we have today a totally transparent overview of our level of plant utilization."

The Supply Chain Management (SCM) system is also a part of this transparency. Jobs come electronically into the printing plant and can be distributed to the locations and jobs in different locations can be tracked.

**Resulting workflow/process.**

**The Klingenberg Berlin workflow after the JDF Implementation:**

The flow of information from the ERP-/MIS system Proseco D2 into the production and finally to the machine is a fully integrated JDF solution which spans all areas of the company and the entire production process.

The sales department enters the job data in the Proseco ERP system. Proseco Scheduling produces a production plan and creates a JDF file for each job. The job data is available to prepress when work begins, a manual input is no longer necessary.

A printnet Client connects the CIP3/PPF file from prepress with the job which is created in the printnet PressManager™ per JDF data. At the same time a job database is scanned and the technical data of a similar or the same (repeat-)job already printed is transferred into the new job. The now complete machine information is made available fully automatically directly at the machines without the operator needing to do anything. The presses use the printnet PressManager™ database.

The job status is passed on to the ERP/MIS system Proseco D2 by manual PDA feedback.
Illustration 1: The JDF workflow at Klingenberg Berlin. JDF connections ensure an optimal data flow between job acquisition, the Proseco production planning and the printnet ProductionManager™ for final automatic machine presetting.

**Resulting workflow in detail.**

The JDF data generated by Proseco D2 and the prepress data which contains the ink slide presettings is transferred to the printnet PressManager™. Via a job template the job-specific technical settings are automatically compared with the settings for jobs already printed which are archived in a database. The settings of the old job which could be transferred to the new job concern e.g. feeder and delivery, sheet travel or the AirGlide system. All of this happens fully automatically. In addition the jobs are effectively assigned in production planning, e.g. sorted according to same color sequences, in order to minimize inking unit washing times.

Data for historic costing such as production time and working hours and above all any waiting and auxiliary times are entered directly in Proseco D2. The PDA feedback guarantees that the job information of the machine flows regularly into the Proseco D2 planning application and is archived. Thus the planning system is always in tune with production.
Illustration 2: Screenshot of the Proseco D2 electronic planning board which illustrates the job flow and provides location-independent workflow transparency.
Illustration 3: With Prodeco D2 the JDF data is manually released to print.
Illustration 4: View of the sheet in printnet PressManager™ after automatic generation of the job. All data is checked and complete.
Illustration 5: The machine settings automatically produced by printnet PressManager™. Here is a screenshot of the printing unit settings.
Illustration 6: The settings of the ventilator tracks are generated automatically. The delivery side is seen here.
**Best cost/benefit realization as a result of process automation implementation.**

Due to implementation of the JDF workflow into the machine park the makeready times for printing a four-color poster were lowered from approx. 60 minutes to well under 30 minutes.

**The job structure:** From the job structure here you can see that 33% of the jobs have a print run below 500 sheets, 55% have a print run below 1,000 sheets, 75% below 2,000, 90% below 5,000 and 98% of the job volume has a print run of below 10,000 sheets.

<table>
<thead>
<tr>
<th>print run/ sheets</th>
<th>jobs</th>
<th>Share of job quantity in %</th>
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<tbody>
<tr>
<td>1-500</td>
<td>3,937</td>
<td>32.54</td>
</tr>
<tr>
<td>501-1,000</td>
<td>2,566</td>
<td>21.20</td>
</tr>
<tr>
<td>1,001-2,000</td>
<td>2,441</td>
<td>20.17</td>
</tr>
<tr>
<td>2,001-3,000</td>
<td>1,030</td>
<td>8.51</td>
</tr>
<tr>
<td>3,001-5,000</td>
<td>911</td>
<td>7.52</td>
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<tr>
<td>5,001-10,000</td>
<td>937</td>
<td>7.75</td>
</tr>
<tr>
<td>10,001-20,000</td>
<td>236</td>
<td>1.95</td>
</tr>
<tr>
<td>20,001-50,000</td>
<td>44</td>
<td>0.36</td>
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<tr>
<td><strong>job quantity total</strong></td>
<td><strong>12,102</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
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Table: Job structure Klingenberg Berlin 2005.

**Job processing of 1 job per hour.**
With 12,102 different jobs and an average of 2.5 shifts per day and a 5-day week this corresponds to processing of 1 job per hour:
200 days x 20 hours = 4,000 hours x 3 machines/.12,102 jobs.

Klingenberg regards each change of subject as a job. The average duration of a job, including makeready time and printing, thus takes less than one hour.

Makeready time of less than 8 minutes per printing unit is achieved in full.

>50% makeready time is saved per job on the average. Thus it's possible to process the same quantity of jobs with three machines and an efficient JDF workflow as with the six older machines before.

**The costs.**

**Calculation of the ROI:**
- From the investments in the machine park and 12,000 working hours/year this results in a **calculatory machine hourly rate of €150**.
- Owing to the JDF workflow 7 minutes preparation and makeready time is saved which results in a **saving in machine operating costs** of €720,000/year or **€3,600/day** in the case of 200 working days/year.
- Investment costs of €11,960 need to be deducted from this saving.
- The annual ROI (Return on Investment) for the JDF workflow is thus only a little more than 3 days.
- **ROI = 3.3 days**
Partial calculations.
Investment of Klingenberg in the JDF workflow.

<table>
<thead>
<tr>
<th>Object</th>
<th>Costs/€</th>
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<tr>
<td>Software Interface Proseco D2</td>
<td>8,000</td>
</tr>
<tr>
<td>Installation Interface Proseco D2</td>
<td>1,000</td>
</tr>
<tr>
<td>Training Interface Proseco D2</td>
<td>4,000</td>
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<td><strong>Sum Proseco</strong></td>
<td><strong>13,000</strong></td>
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<tr>
<td>Software printnet PressManager</td>
<td>29,000</td>
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<tr>
<td>printnet Client licenses</td>
<td>12,300</td>
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<td>Hardware printnet Server</td>
<td>1,900</td>
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<tr>
<td>Installation printnet</td>
<td>2,000</td>
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<tr>
<td>Training printnet</td>
<td>12,000</td>
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<td><strong>Sum MAN Roland</strong></td>
<td><strong>57,200</strong></td>
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<td><strong>Total costs</strong></td>
<td><strong>70,200</strong></td>
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<table>
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<tr>
<th>Ongoing annual costs</th>
<th>Costs/€</th>
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</thead>
<tbody>
<tr>
<td>Proseco D2 licenses</td>
<td>960,00</td>
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<tr>
<td>(monthly 1%)</td>
<td></td>
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<tr>
<td>Service Software Proseco</td>
<td>6,000</td>
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<tr>
<td>Service Software printnet</td>
<td>5,000</td>
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<tr>
<td><strong>Total ongoing costs</strong></td>
<td><strong>11,960</strong></td>
</tr>
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**Savings in initial investments**

Price of machine not purchased €1,900,000
Start-up investments for soft and hardware €70,200
**Savings in initial investment** €1,829,800

**Machine hourly rate**

Entire machine park €4,800,000
Depreciation time 8 years = depreciation per year €600,000
Divided by total working hours 12,000 per year €50
Plus repairs, maintenance, operating materials, etc.. €100
**Calculatory machine hourly rate** €150

**Savings in ongoing machine costs**

Previous preparation and makeready time per printing unit 13-16 minutes
Current preparation and makeready time per printing unit 7-8 minutes
Savings in preparation and makeready time per printing unit 6-8 minutes

Calculatory machine costs per year 12,000 h./€150 €1,800,000
Maximum savings with 12,000 jobs with 4 colors x 8 minutes
12,000x32min = 384,000min./.60 = 6,400 hours= € 960,000
**Minimum saving** with 12,000 jobs with 4 colors x 6 minutes
12,000x24min = 288,000min./.60 = 4,800 hours = € 720,000

Costs of €11,960 deducted from a minimum saving of €720,000
Savings amount to approx. €60,000 per month,
accordingly the calculation is: €720,000/.200days = €3,600/day (minimum)
**Minimum daily savings:** €3,600/day.
Owing to the JDF workflow, two 5-color Roland 900s and one 5-color Roland 700 produce the same quantity of jobs as six machines before at Klingenberg Berlin.

**Benefits:** Productivity was increased as planned. With the JDF workflow a machine park of three printing machines is sufficient to produce the same quantity of jobs as six machines produced before. Thanks to ever more efficient handling of the possibilities of the data workflow it's now even possible to produce approx. 20% more jobs than before with 6 machines. This has been realized by the proportionate increase of production time compared to makeready time per job. Further partial goals were achieved which equips Klingenberg Berlin for a successful future:

- Elimination of avoidable work (e.g. plate scanning, inputting job data at the printing machine)
- Complete and correct data transfer
- Off-press job preparation: the new organization uses personnel resources more effectively
- Transparent workflow by SCM (Supply Chain Management): automatic distribution of jobs to the locations is possible