

*Jürgen Schönhut Memorial  
CIP4 International Print Production Innovation Award*

**Winner**

**Best Process Automation Implementation  
Asia Pacific**

**Second Place Winner**

**Best cost/benefit realization and improve-  
ment in efficiency as a result of process  
automation implementation**

Times Printers Pte Ltd  
16 Tuas Avenue 5  
Singapore 639340  
Tel: (65) 6311 2888  
Fax: (65) 6862 1313

<http://www.timesprinters.com>

The logo for Times Printers, featuring the word "timesprinters" in a blue, lowercase, sans-serif font. A small pink square is positioned above the letter 'i' in "printers".

**Executive Summary —**

Times Printers is a leading offset printing company in Asia. It was established in 1968 and over the years has evolved into a dominant force in web offset printing in Singapore for both domestic and regional markets. It has approximately 350 staff.

Times Printers produces a variety of products and has its strength in producing time sensitive news and life style periodicals. It produces both perfect bound and saddle stitched products. It is also a leading producer of text books. The nature of the business, which is a 'make to order' manufacturing business, results in a highly demanding, customized and fast paced manufacturing environment with quick turnaround times of less than one day.

Times Printers has a fleet of seven Goss web presses in its web pressroom and in its sheetfed pressroom it has a wide range of presses with different sizes and capabilities to suit its variety of products. Sheetfed printing presses are installed from Man Roland, Heidelberg, Mitsubishi and Komori. Its finishing department has a comprehensive selection of Muller Martini saddle stitchers and perfect binders, and also has folding machines and sewing machines to complement the needs of the business from different suppliers.

Quality management is one of the key practices in Times Printers. It is ISO 9001:2000 certified and in addition to this, it is also UGRA PSO certified for both web and sheetfed printing. One of its key business strategies is its continuous focus on process improvements and development and adaptation of new technologies to advance its production capabilities and quality.

During the project, the main goal was to automate the horizontal business workflow, starting up from estimation via order confirmation to job ticket, including purchasing and material management to also cater for delivery notes and invoices. This horizontal business workflow was vertically integrated with the production workflow for planning, prepress, print production and finishing.

The focus on continuous improvement was one of the key reasons for the company to invest in the Heidelberg Prinect/Prinace system. The main objective of implementing this system was to integrate all business processes and transactions with production data gathering and data transactions so that the company will have a comprehensive enterprise wide resource planning system.

The intention was to automate the forecasting and planning of material and production capacity to optimally fulfill the demands of the sales orders. The Heidelberg Prinect/Prinace system is known as the ERP system (Enterprise Resource Planning System) in Times Printers. Every department in Times Printers, with the exception of the Human Resource Department, uses the ERP system for its daily transactions and data gathering processes.

Prior to the implementation of the Heidelberg Prinect/Prinace system, Times Printers used the Keren II Print Management System, it was installed in the mid 1990s. There were difficulties in integrating the various modules of the system which were not resolved. Hence the implementation of the Heidelberg Prinect/Prinace System provided

a level of integration and streamlining of processes and workflows which provided good support for the fast paced and demanding manufacturing environment in Times Printers.

### **Section I. Background —**

The Keren II system was known as the PMS system in Times Printers. It was designed to be a comprehensive system which was supposed to integrate all business processes with the production. However due to limitations in the available technology at the time, the individual modules of the system were not comprehensively integrated. For example, the estimating module in the PMS was not integrated with the order entry module and the planning module and material booking were also not integrated. Requisition for material which was planned for in the planning module had to be manually requested for via a handwritten request. Job tickets and production job plans had to be manually circulated. Delivery notes were separately produced. Invoices are depending on manual compilation of data. This situation created unnecessary double entry of data and delays, not to mention data entry errors in multiple departments.

Times Printers has had Computer to Plate (CtP) prepress equipment and workflow from Heidelberg and Kodak since 1997 and offered its own in-house DTP colour separation services (with Linotype-Hell equipment) since 1994. Prepress information in the form of CIP3/PPF files are used for presetting of ink keys on the majority of the presses for many years. Presetting on postpress equipment however is not available because of the age of the machines.

Data acquisition from the machines was introduced with the PMS system. It was done with Shop Floor Data Collection (SFDC) units. This was done with manual scanning of barcodes for job numbers, error codes, production codes and a keypad for numerical data entry. This is an overview of the environment in Times Printers prior to the implementation of the ERP system:

1. CIP4/PPF data used for ink zone presetting on presses
2. Data acquisition via bar code scanners on SFDC units on machines
3. Hardcopy job plans and work instructions circulated manually onto machines
4. Computer based systems used for estimating, order entry, inventory control, job planning but not integrated.

### **Section II. Objectives —**

With the increasing pressure to increase profit margins while being faced with the commoditisation of print resulting in lower sales margins, printing companies have to constantly innovate and improve to maintain profitability. With this in mind, Times Printers set out on this project with several objectives which were meant to improve competitiveness and profitability.

Combining the horizontal areas of the business workflow was of strategic importance. The workflow should go automatically from an estimate, to a quotation, order confirmation and subsequently to a job ticket that should be created. In addition, based on order confirmation and the feedback from production, automatically delivery notes to multiple international delivery locations (preset by the system) and invoices should be generated. A horizontal business workflow of the purchasing module with an integrated material management was another target.

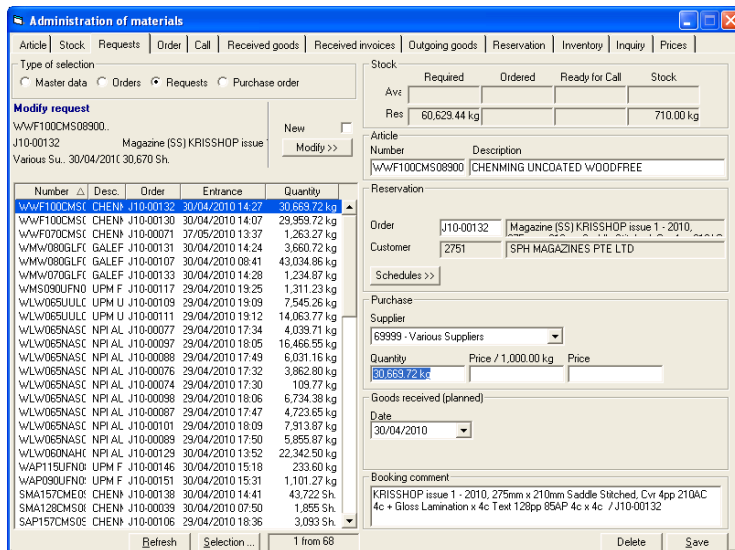


Figure 1: Integrated material management module in MIS system

After the horizontal integration of the business workflow one of the main aims was the also vertical integration into the production. This comprised of a digital job ticket flowing to all production areas without the need for hardcopy print out anymore, material management into material usage for accurate job costing and digital time sheet capturing as a basis for payroll as a next step in the near future. Automatic setting of delivery time with warning reminders if datelines might not be met and no need for re-entering are self-explanatory to reduce time spent for users of the overall system. Integrated system details such as an automatic credit control upon order confirmation and job ticket as well automatic reminders for accounts receivables are administered as well. Two additional key objectives of this project are:

1. Decrease non productive time throughout all areas of the business so that production capacity can be optimised and hence have higher throughput with the same amount of manpower and machinery.
2. Integrate sales forecasting, production control and inventory control so that real time enterprise wide resource planning can be carried out effectively.

The following goals were also planned for:

- a) Closing of financial accounts at a later date closer to the end of the month as a result of faster and timely costing
- b) Higher efficiency in scheduling and capacity planning
- c) More accurate forecasting from the Sales Department
- d) Ad hoc sales campaigns to sell free capacity
- e) Reduction in inventory and subsequent write-offs in stock depreciation

### Section III. Methodology —

Aside from the ability to meet the specifications required for the different modules in the system, there were 4 key factors which were taken into consideration of our selection methodology. The first consideration was in the use of JDF. This is because the non-

proprietary nature of JDF will allow us in the future to integrate new machinery from different manufacturers.

The second consideration was in the location of the service and support centre. This was another key factor because of the size and complexity of the project which requires a strong level of local support from the vendor when the system is operational.

The third consideration was in the size and expertise of the support staff. This factor is key again because of the size and complexity of the implementation, and also because of the peculiarities of the graphic arts industry. The 4<sup>th</sup> key factor was the capability for future integration with web based services particularly in prepress areas and integration with clients editorial and design production platform.

A Request for Quotation containing the specifications for the various modules which were required was sent out, In total there were 5 vendors who expressed an interest, most of them related to the graphic arts industry, one of them being an Oracle based ERP vendor.

Heidelberg was selected based on not only being to meet the specifications of the system but also in having the strongest local support and staff for implementing and supporting the system, and strong development in prepress areas.

After the search for the supplier, a detailed project plan has been jointly agreed upon with project management goals and tasks, steering committee, time line for milestones and necessary partners from both sides for the implementation itself.

#### **Section IV. Implementation Story —**

The implementation of the Heidelberg Prinect/Prinance ERP system in Times Printers was carried out in 4 main phases.

##### Phase 1 Information Flow Analysis.

In the first phase of this project, an extensive information flow analysis of Times Printers' business processes and transactions of all back-office and production departments was carried out. This was done with the objective of obtaining a comprehensive understanding of the system requirements and also to identify potential areas of improvements in which processes could be reduced or eliminated. The Information Analysis maps are included in Annex A.

One of the key outcomes of this phase was the recommendation to reorganise the Customer Service, Estimating, Scheduling and Purchasing Departments to. The Customer Service and Estimating Departments previously came under the purview of Sales and Marketing, in addition to this, the role of Customer Servicing was combined with the role of job planning.

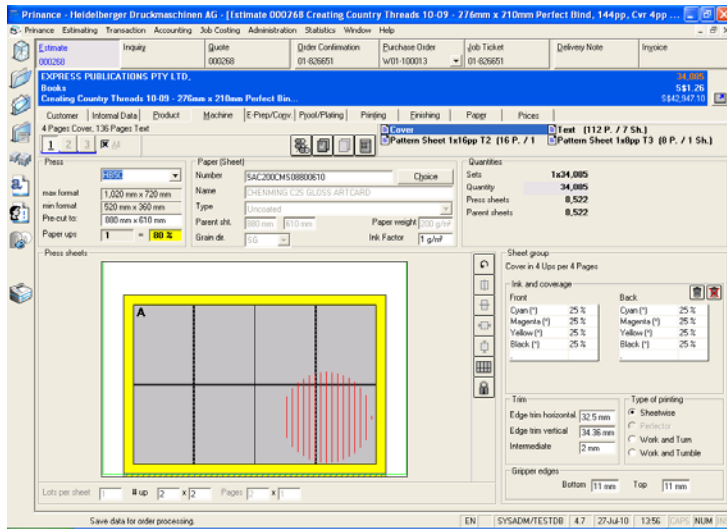


Figure 2: Estimation module of Prinance

It was recommended to separate Customer Service into 2 distinct departments of Customer Service and Planning. And also to establish a new department called the Commercial Department under which Estimating, Planning, Scheduling and Purchasing were housed. This was to facilitate more efficient coordination of information.

### Phase 2 Customisation

In this phase, the adjustments and customisation of layouts and workflows were made to suit the majority of the requirements. In this phase also the scoping of the financial requirements was done to finalise the reports and information needed to integrate between the Prinance system and the J.D Edwards OneWorld financial system which is used by Times Printers.

### Phase 3 Training

Extensive training was carried out in all departments once the respective modules and workflows were ready. This was carried out in sync with Phase 2. This phase included the training of the production operators in the use of the data terminals as well as all back-office staff, a total of more than 250 people.

### Phase 4 Rollout

This is the phase where the live modules were started up into daily usage. The initial approach was to rollout it out one print job at a time, or a series of similar print jobs from a client at a time. This required each process at each step to be carried out completely and detailed as per the ERP requirements. The flow of information and the job details should have cascaded down like a waterfall however, this approach failed due to a combination of multiple failures throughout the system.

In order to successfully adopt this approach, the level of familiarity and expertise with the system has to be very high from the onset, so that every user can play his or her part in

cascading the information of the jobs down to the end of the process. This however was not the case because while the new system was installed, the legacy PMS system was in parallel use. It was inevitable that the users fell back to the 'comfort zone' of the legacy system.

#### Corrective action and result

Therefore the rollout was replanned and a 'Brick building' approach was adopted and implemented. This involved phasing in the use of the system department by department and within each module, phasing in the use, starting from the basic information layer by layer until the full use of the system was achieved. For example in the order entry and confirmation system, the customer service personnel were only required to put in the basic information so that a job ticket and job number was created. This basic job ticket was taken by the planner to create a rudimentary electronic job plan in the ProcessNet of the Prinect system for production work instructions for the production operators.

As the customer service personnel became more confident with the use of the system, they were taught to enter in the packing instructions into the system, which then provided the next phase of instructions to flow into the system. And this was followed by the delivery instructions which resulted in the ability of the Delivery Notes to be created from the ERP system. Layer by layer the system was implemented from ground up and got more integrated.

This approach proved to be successful because it gave more time for the users to adapt to the system and to overcome the fear of making mistakes with the new system. As each new module was implemented and completed, the corresponding module from the Keren II PMS was decommissioned. The final module that was put in place was the automation for data entry into the JD Edwards OneWorld financial system.

The project team structure consisted of a Steering Committee comprising senior management and chaired by the CEO of the Times Publishing Group. The working project team reported to the Steering Committee and was led by 2 project managers, one each from Times Printers and Heidelberg. The working team consisted of an ad hoc team comprising key users from the departments. Daily meetings were held at 9 am every morning to review progress and to address issues and to plan the next steps. The Steering Committee met monthly to review overall progress and to make key decisions on critical issues.

#### **Section V. Resulting Workflow/Processes —**

Initially, the current workflow was scoped as per Annex A, however the existing systems were also compiled how they are working jointly to achieve the goals of the company.

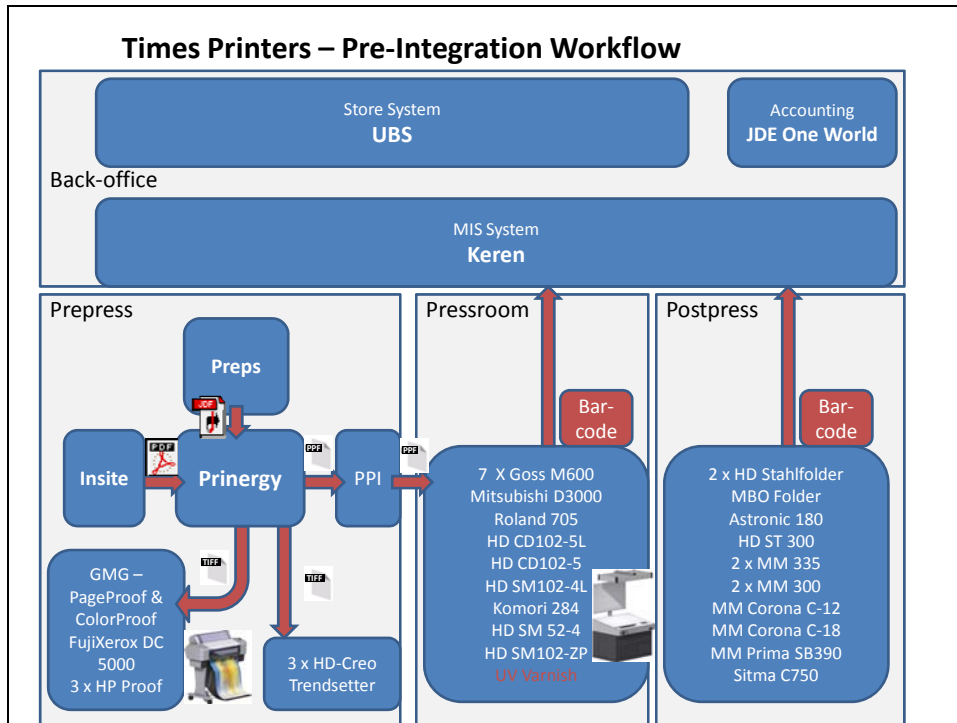


Figure 3: Pre-Integration Workflow overview

After the scoping and the detailed discussion about the main adjustments, the resulting workflow/processes and the original can be seen as per the schematics of the systems below.

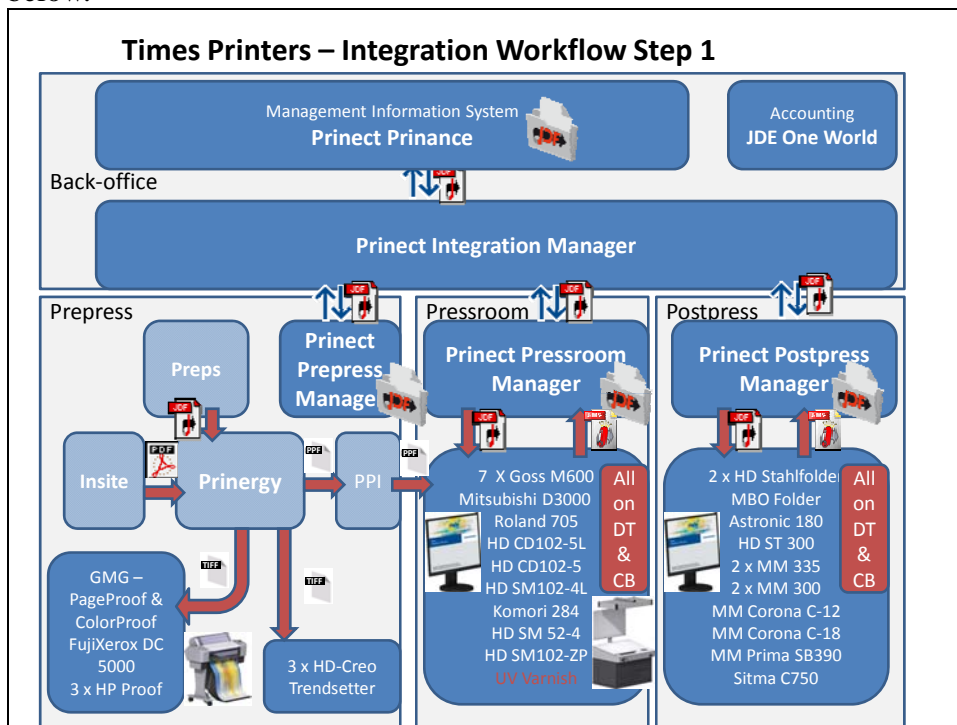


Figure 4: Integration Workflow Step 1 to get all departments working with the system

It has resulted in several key benefits and integration of processes:

1. Reorganisation of estimating, planning and scheduling departments which has resulted in more efficient flow of information and response to customers.
2. Automatic impositioning at planning stage.
3. Automatic Calculation of OEE (Overall Equipment Effectiveness) without having a clerk to collate and produce the reports.
4. Basic Customer Relationship Management module to produce marketing reports in addition to the automated sales reports (which were previously compiled manually).
5. Integrated material management for paper, from ordering and booking of incoming paper to issuing of material to production.
6. Real time and integrated scheduling. Automatic flow of information from planning into scheduling without intermediate steps and proprietary systems such as MS Excel.
7. Integration of Kodak Insite, a web to print solution, into Heidelberg Prepress Manager.
8. Automated job costing and capturing of total cost of sales for monthly financial performance reporting.

The final workflow with all work procedures adjusted can be seen in the next figure. This is the final workflow of this project. It can only be implemented if all departments have been integrated into the overall information flow and all areas are working flawless on the system. This brings out the main benefit as all typed in details are re-used over and over again.

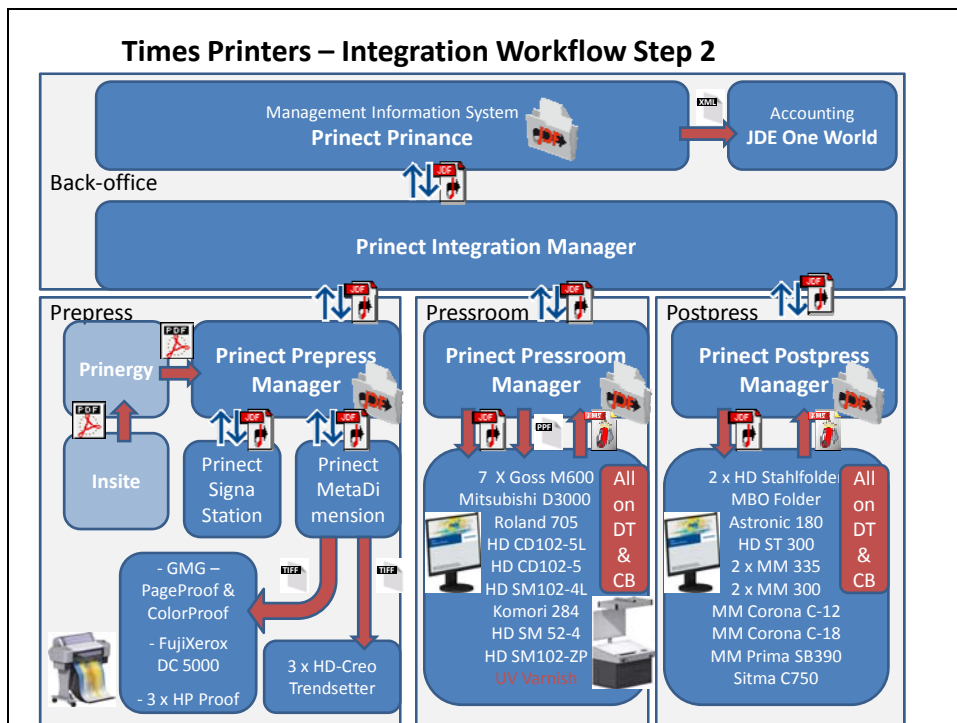


Figure 5: Final Integration step when all departments work flawless

Section VI. Optional Detail —

		Periods				
		2010	2011	2012	2013	2014
Discount rate	10%					
1 Discount factor		0.9091	0.8264	0.7513	0.6830	0.6209
<b>Benefits (in savings)</b>						
Planner		15,643.33	15,643.33	15,643.33	15,643.33	15,643.33
Purchasing		2,400.00	2,400.00	2,400.00	2,400.00	2,400.00
Store		2,683.00	2,683.00	2,683.00	2,683.00	2,683.00
Customer Service		16,262.50	16,262.50	16,262.50	16,262.50	16,262.50
Distribution		12,750.00	12,750.00	12,750.00	12,750.00	12,750.00
Schedule		12,858.33	12,858.33	12,858.33	12,858.33	12,858.33
Finance		23,050.00	23,050.00	23,050.00	23,050.00	23,050.00
Estimate		0.00	0.00	0.00	0.00	0.00
Pre- Press		0.00	0.00	0.00	0.00	0.00
Press (sheetfed)		128,807.20	128,807.20	128,807.20	128,807.20	128,807.20
Press (web)		219,215.00	219,215.00	219,215.00	219,215.00	219,215.00
Post Press		84,066.67	84,066.67	84,066.67	84,066.67	84,066.67
Sales		0.00	0.00	0.00	0.00	0.00
2 Total annual savings		258,868.02	517,736.03	517,736.03	517,736.03	517,736.03
3 Cumulative savings		258,868.02	776,604.05	1,294,340.08	1,812,076.12	2,329,812.15
Discounted annual savings		235,334.56	427,881.02	388,982.74	353,620.68	321,473.34
<b>Total investment</b>						
<b>External investment (products)</b>						
Princt/Prinance	462,500					
IT hardware	30,000					
Additional Licence	40,000					
<b>Internal investment (internal training)</b>						
Internal Project Management						
<b>Maintenance costs (recurring)</b>						
Internal IT administration						
Service cost						
Training						
4 Total annual costs	532,500.00	0.00	0.00	0.00	0.00	0.00
Cumulative costs	532,500.00	532,500.00	532,500.00	532,500.00	532,500.00	532,500.00
5 Discounted costs	532,500.00	0.00	0.00	0.00	0.00	0.00
6 Net benefit (annually) (=2-4)	-532,500.00	258,868.02	517,736.03	517,736.03	517,736.03	517,736.03
Cumulative net benefit	-532,500.00	-273,631.98	244,104.05	761,840.08	1,279,576.12	1,797,312.15
Discounted net benefit	-532,500.00	235,334.56	427,881.02	388,982.74	353,620.68	321,473.34
NPV (Net Present Value in €)	1,194,792.34					
ROI (Return on Investment) in %	224.37					

Table 1 ROI and NPV for this project

An ROI and NPV calculation was carried out with a conservative approach, the result of which is tabulated in Table 1 above. The basis of this calculation lies in two parts, the first of which is in the time savings after the implementation of the ERP system. These times savings came from increased efficiencies in business processes and transactions and also in the elimination of processes. These are the processes which are performed at

the office functions such as estimating, procurement, planning, scheduling. Cycle times of processes were timed before and after implementation.

The second part comes from the elimination of waiting times in the production arising from the optimisation of scheduling and planning. The measurement of production waiting times was performed in a series of Time and Motion studies which was carried out by Heidelberg as part of a business consultancy project prior to the implementation of this ERP project (the details of these studies however are not mentioned here because it is not within the scope of this project). The subsequent reduction of waiting times were measured and used in these calculations. The benefits in the real time monitoring of the production status was realised in quicker decision making by the schedulers in responding to the disruptions to the schedule.

Improvement in customer service were also noted although not taken into account for the measurement of the ROI. It was noted that with the restructuring of the organisation structures and refocusing of the job functions of the customer service personnel, they were able to focus on the primary function of capturing the order details accurately, monitor and inform the clients of the progress of their jobs in a more timely and accurate manner because of the availability of real time and online production data via the Prinect Cockpits.

The use of the touch screen data terminals and integration with counterbox measurement into machinery of different age and from different manufacturers is of key importance. All machinery which had control stations which could not be upgraded to the latest versions were linked automatically via the JDF (by means of counter boxes which measured the pulses from the machinery). The use of these data terminals allowed the distribution of production information to the machines and eliminated the use and manual distribution of hardcopy information. These DataTerminals are also consequently planable and scheduleable inside the process net and therefore a continuous optimization is made possible for overall production efficiency. Automatic JDF-based scheduling will be a major enhancement in optimizing the capacity of the machinery. The current plan to increase sell-able production hours is seen conservative as sales people need to go out and sell as well.

The last stage of integration of the financial and costing functions resulted in the ability to close the accounts at a later date in the month. This allowed for more accurate capturing of costs and a dramatic reduction in time spent for the month end closing. The realtime cost performance analysis also allowed for timely and accurate monitoring of job performance and feedback for improvements in the estimating rates and parameters and will lead to a self-optimizing estimating structure in the months and years to come.

One of the most important benefits of the ERP system was the real time information which it provided for the weekly Resource Planning meetings. It provided the senior management attending the meetings with real time information for decision making. From these meetings, decisions on stock levels, availability of stocks for production and availability of capacity to match with sales forecasts and sales campaigns have followed and will do based on actual data. With view on this, one of the main benefits is also the reduction in aging stock and subsequently a reduction in depreciation at the end of the fiscal year for aging stock.

Annex A

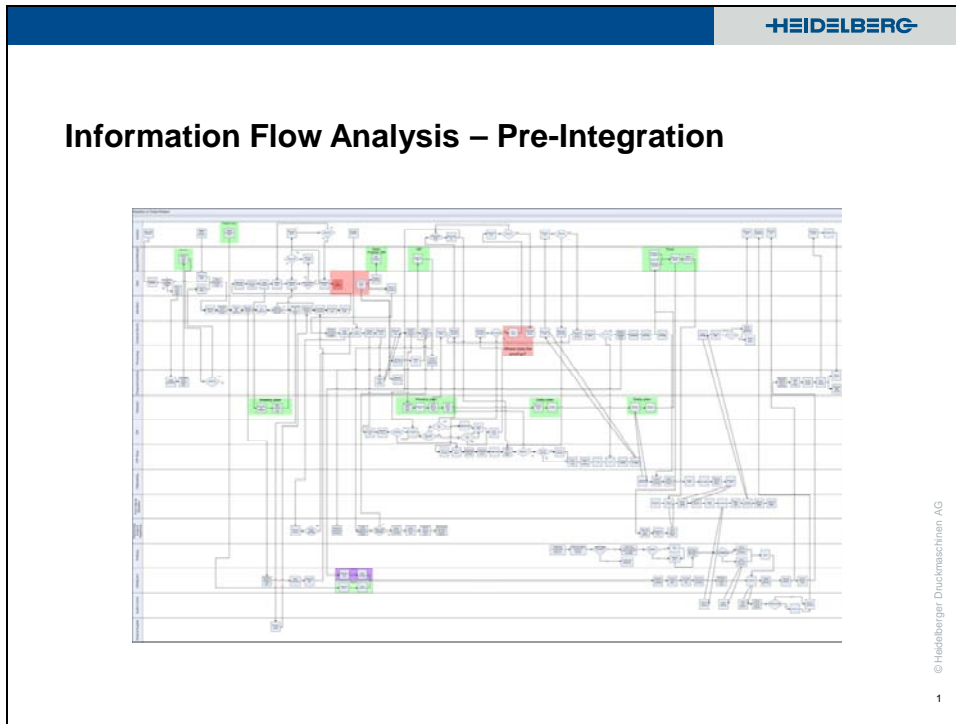


Figure 6: Information flow analysis before project

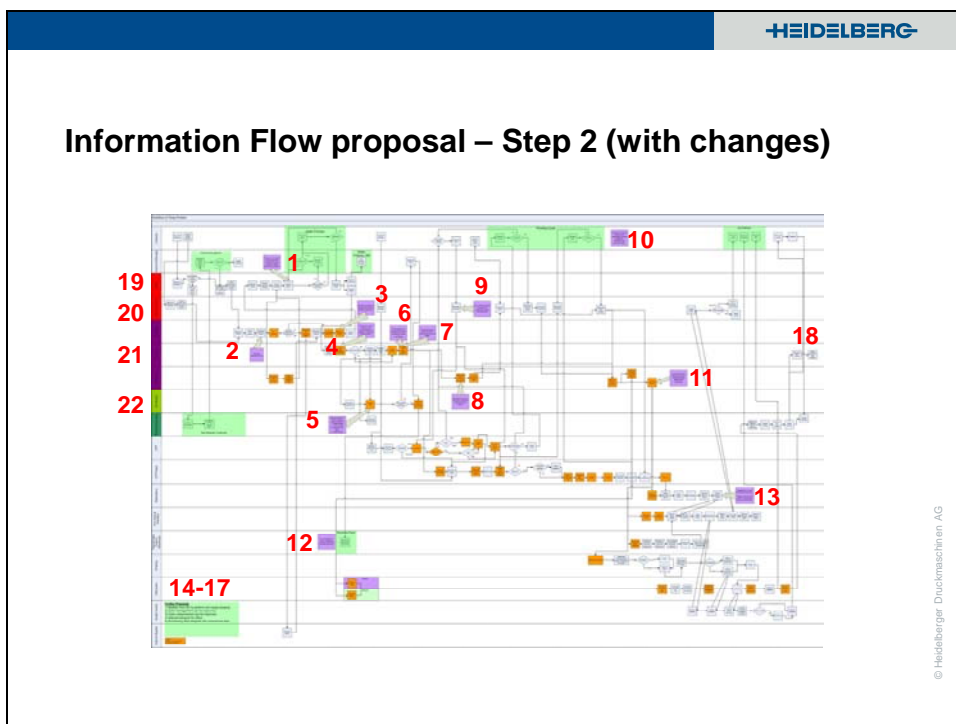


Figure 7: Information flow analysis with main proposals to change