HONORABLE MENTION:
Best Cost/Benefit Realization as a result of Process Automation Implementation

Tanghe Printing N.V.

Industrielaan 20
7780 Komen
Belgium
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Quantitative analysis/ROI and qualitative results

COMPANY PROFILE

Tanghe Printing is a modern sheet-fed offset operation with a workforce of around 35 people. The range of services—alongside offset printing activities (business reports, magazines, books, promos and calendars)—includes prepress. Prepress is equipped with Agfa’s PDF workflow, and early in 2005 :Apogee Series 3 was upgraded to :ApogeeX v2.5. To date we work with v3.0. For archive management we have been using NSS Production since early 2004. The pressroom features a Komori Lithrone 440 (4c B1 41_”) and a Komori Lithrone 40S (5c with varnish B1 41_”). The machine console systems are equipped with Komori K-Station.
We do a lot of small production runs which requires a lot of job changes. Our market comprises Belgium (40%), France (45%), Netherlands (10%) and Switzerland (5%).

Workflow prior to JDF implementation
Our non-networked workflow was generally characterized by the fact, that there was no centralized / single data pool which holds all information necessary for production and management and provides subsequent systems and application with data. We used the following separate systems:
- Document management system
- Separate database
- ebusiness-tool
- Accounting software
- Payroll software

This resulted in:

Laborious and error-prone data handling.
We had to manually enter identical administrative and/or production data into the isolated systems. The maintenance of separate tools for data processing consumed time and costs, as it required redundant labor and inevitably led to inconsistent data (typing errors, individual abbreviations).

Costly internal communication processes.
Production data / status of the jobs were not accessible to everybody involved in production. In order to gather relevant information needed for production or to answer customers’ inquiries, we had to phone each other or physically go to different offices or departments. The results were:
- Costly preoccupation of Customer Service Representative (CSR) and other members of staff for gathering important information from their colleagues or from the different systems in use.
- Delayed answering of customer inquiries regarding the job’s progress (phone calls had to be re-turned after information was gathered)
- Delayed submission of quotes (relevant info had to be gathered from different tools and by phone calls)

Lack of transparency and flexibility in the production process (no update job status).
Production planning in general, as well as information about customer approvals, available plates, modifications of the production plan, and finished jobs on the presses were predominantly communicated during our regular pro
D:4

CIP4 CASE STUDY: Tanghe Printing N.V.

Production meetings. These production meetings consumed costly manpower and led to a loss of precious production time.

• There was a morning meeting that lasted about one hour and involved six people.
• In case of machine stoppage or other malfunctions, the relevant info was not directly accessible to all personnel involved.

Delayed production data collection (PDC) and shop floor data collection.

We kept manual time sheets for shop floor / production data collection that were forwarded to the accounting department at the end of each shift. Data entry into the necessary software applications required a minimum of four hours each day to complete and was finished, at best, the following day. The results of this were:

• Time consuming process.
• In general, we lacked flexibility and transparency to run production optimally because only retrospective analysis of production data was possible. Up-to-date info about ready-for-print jobs was not available, which constricted our planning horizon.
• Invoicing was delayed.

OBJECTIVES

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

Experience with our different administration and production software tools revealed limits that we wanted to overcome with the implementation of new technology. New software solutions were to combine (where possible) the separate applications into one coherent system, or guarantee that data exchange would be provided via interfaces. It should also support all our business processes, offer comprehensive document management and provide extensive production automation capabilities. The new software should support, or even promote, future development, help to establish a standardized workflow by simultaneously remaining adjustable (configurable) to our needs.

The best solution would be a system with centralized data handling (single data pool). Redundant manual data entries would be overcome and everybody involved in production would be provided with up-to-date information about all

TESTIMONIAL

“Networked production means having a consistent platform on which everybody involved into order management or production processes has access to all important information at any time - whether he works in the office or in the field. He must be able to profit from maximum transparency so that he can optimally handle his job and at the same time to creatively work on the future and the progress of the company. In short – real networked production is of benefit for the whole business process.”

Patrick Tanghe
General Manager
Tanghe Printing N.V.
jobs. A capable and sustainable automation technology would enhance flexibility and improve efficiency in order to strengthen our competitive profile. An additional important point was that the new management software had to support the various languages that we needed (Dutch, French and English).

Because automation technology should reliably streamline information exchange between the different systems and departments, we opted for the vendor-independent JDF-format and the Hiflex Management Information system (MIS). The MIS enables the integration of our administrative and technical workflow, whereas JDF/JMF ensures the maximum possible connectivity between the different platforms.

When the implementation project started, our target was an ROI of two years.

**METHODODOLOGY**

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

Selection of a solution was heavily determined by our prior experience with isolated, non-networked and/or non-supported/non-upgradeable management software tools. Brief overview:

• Since 1982 we had been using computers for production data collection (non-networked).

• 1982-1998: Belgian software and stand alone solution: DOS application with simple estimate and historic costing application as well as a small statistics generator. The individual modules were not interconnected, and the system only had limited output capabilities. It could not be adapted to the needs of our expanding company.

• 1999-2003: New software implemented, that was selected from seven other software products from Belgium, Netherlands and France. Improvements: Windows environment, networking of administration with production. Problems:
  - Product not extensive enough; had to work with a separate database, ebusiness-tool, accounting software and payroll software.
- Upgrades repeatedly caused problems with compatibility between the diverse programs.
- No JDF-compatibility

We looked at the following systems in detail:
• Between January and April 2003 we scrutinized several MIS Systems, but concluded that none of them would provide significant additional benefits when compared to the system that was implemented at that time.

• Hiflex MIS (May 2003)
  1.) Software demo in Aachen - the presentation showed that Hiflex MIS combines the functionalities of our isolated tools into one comprehensive system and can manage all our processes.
  2.) Second software demo at Tanghe Printing with a larger group (all departments)
  3.) A two-day reference visit at a Hiflex customer site (Kraft Druck und Verlag GmbH in Et-tlingen, Germany). Demonstration of Hiflex MIS and networked production. At that time Kraft Druck had already worked intensely on the networking project (Hiflex / Creo / MAN Roland). We saw that networked production would provide a huge potentiality for automation and foresaw a similar potential in automated production in our company.

We opted for Hiflex MIS because we found that this system was the only really comprehensive, single vendor, software package, supported the languages we needed (to serve our international market) and had already been networked with production using JDF/JMF.

Different prepress workflow vendors were also evaluated. We decided to use the Agfa workflow solution given their commitment and leadership in JDF support. Initially prepress production was done with :Apogee Series 3. For the integration of prepress into a JDF networked production environment we updated to :ApogeeX v2.5 and at the beginning of 2006 to v.3.0.

In order to network our Komori presses with JDF, K-Station software was purchased.
The NSS Production system had already been successfully used for archive management since early 2004. When connecting the ApogeeX prepress workflow system via JDF to the Hiflex MIS it was no question to also integrate NSS Production to prevent inconsistent data handling between the different prepress systems.

**IMPLEMENTATION STORY**

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

The JDF implementation at Tanghe Printing N.V. started in February 2003 and progressed in several steps. Today (May 2006), Tanghe Printing profits from an integrated workflow between the Hiflex MIS, Agfa ApogeeX PDF Workflow System, and the Komori presses.

1. **IMPLEMENTATION OF THE HIFLEX MIS**

   **Start:** May 2003

   Implementation of Hiflex MIS, introduction of Hiflex Estimate and Hiflex Order Book for administrative processing, estimating, job costing, invoicing, and document management.

   Installation of Hiflex Scheduling and Hiflex Production Data Collection (Hiflex PDC). Hiflex Scheduling (JDF controller) handles the automatic planning for each cost center according to deadlines or priorities. Hiflex PDC is used for decentralized Shop Floor Data Collection.

**TIMELINE**

1. **Implementation of the Hiflex MIS**
   **Start:** May 2003

2. **Implementation of JDF connectivity to Komori Press**
   **Start:** January 2004

3. **Implementation of JDF connectivity to Agfa Prepress**
   **Start:** April 2005

4. **Implementation of JDF connectivity to NSS Production**
   **Start:** October 2005

Figure 1: Illustration of the implementation steps for the Hiflex MIS (duration approx. four months).
The implementation of the Hiflex MIS progressed quickly and smoothly. This reflects Tanghe Printing’s general mindset; we have always cultivated a positive attitude toward technical and administrative innovation, more so since these have always resulted in improvements in our production and workflow processes.

2. IMPLEMENTATION OF JDF CONNECTIVITY TO KOMORI PRESS

Start: January 2004

Implementation of the JDF (version 1.2) connectivity between the MIS and the K-Station system for the Komori presses. Automatic ‘Job Create’ in K-Station. The K-Station’s 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 (that acts as the JDF controller).
Job scheduling through Hiflex Scheduling application (digital planning board).

JMF feedback from Komori K-Station 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 Hiflex Production Data Collection and/or Hiflex Scheduling.

An update followed in November 2005: Shift of communication method from hot folder system to HTTP. Moreover, the new version of K-Station (vs. 2.11 beta 8) was installed that allows the automated assignment of PPF files generated in :ApogeeX to the JDF-created job (from Hiflex).

3. IMPLEMENTATION OF JDF CONNECTIVITY TO AGFA PREPRESS
Start: April 2005

JDF-Specification Version 1.2
Communication method: HTTP,
Agfa :ApogeeX (v.2.5), Hiflex MIS Release 2004

Automatic ‘Job Create’ in :ApogeeX via JDF. Hiflex MIS transmits administrative (order number, order description, customer name and address, contact person, etc.) and technical data (job parts such as cover/content, production plan, number of pages, inks, etc.) (see figure 1 + figure 2).

The JDF file sent by the Hiflex MIS also determines the process chain in :ApogeeX. The final prepress parameters (such as CTP resolution, screen ruling, trapping details, etc.) are automatically set by this process chain (workflow plan).

Any order amendments, such as the number of pages, signatures, etc. are first updated in the Hiflex production estimate. This ensures that project pricing, electronic job ticket and production schedule are all up to date. Automatic update of the corresponding job in :ApogeeX takes place via JDF.

This “Job Create” event also includes the correct assignment of the prepress job in :ApogeeX to the customer order number in the MIS. Hiflex monitors prepress operations provided by :ApogeeX.

FUTURE PLANS:

Today the imposition is still generated in Preps (based on the production plan from Hiflex) and imported into the Agfa system. In the very near future, we plan to use the Stripping information that is already available from the Hiflex MIS to generate the imposition layouts in :ApogeeX. For this purpose the :ApogeeX system will be upgraded to version 3.5 at the end of May 2006. This version of :ApogeeX accepts native JDF Stripping-Params that can be sent by the Hiflex MIS. :ApogeeX’s imposition engine will then automatically add color bars, control strips, trim marks, fold marks, registration marks, signature collation marks, signature name and ID.
Figure 3: Screenshot from Hiflex order book. The job is transmitted to :ApogeeX via JDF at the push on a button.

Figure 4: Screenshot from :ApogeeX showing the jobs as received from Hiflex MIS.
At the beginning of 2006 we upgraded to v3.0. Planned for the very near future: update to :ApogeeX v3.5 b. on May 30th, because this version better supports the automated processing of the StrippingParams.

4. IMPLEMENTATION OF JDF CONNECTIVITY TO NSS PRODUCTION

Start: October 2005

JDF-Specification Version 1.2
Communication method: hot folder
NSS Production (v 4.0), Hiflex MIS Release 2004

Job create in NSS Production via JDF from Hiflex MIS: with the automatic job creation in :ApogeeX via JDF, the JDF is also sent to NSS production. NSS uses the JDF-data from Hiflex MIS to generate the job’s file structure on the prepress server.

Additionally, on job completion in Hiflex MIS the NSS Production system receives another JDF from Hiflex. Thereby the final archiving of the job files is triggered by JDF.

RESULTING WORKFLOW/PROCESSES

A description of the resulting workflow, including any applicable workflow or process diagrams.

Today, the information flow from the administration system (Hiflex MIS) into production (Agfa prepress + Komori press) is an integrated, cross-vendor solution.

Figure 5: Screenshot from NSS Production showing the file structure of the prepress job.
We now have a single / centralized data pool. The entire process of networking our operations is coordinated and managed by the Hiflex MIS, functioning as a JDF controller. An exact description of the production sequence is generated during preliminary calculations and initial job costing. Once the data has been captured in the Hiflex system it can be made available to Agfa :ApogeeX or Komori K-Station via the JDF interface. Feedback from production automatically flows back into Hiflex order book, Hiflex Scheduling and Hiflex shop floor data collection and constantly updates the MIS.

Our workflow after the implementation of automation technology is characterized by enhanced transparency and flexibility. This helped us to realize considerable time and cost savings.

THE RESULTING WORKFLOW IN MORE DETAIL

Since isolated, parallel systems no longer exist, we now profit from consistent data-handling.
Data relevant for production only has to be entered once into the Hiflex MIS and subsequent systems are provided with the necessary job specifications. Redundant manual data entry is overcome. Any modification of the order is entered in Hiflex and then transferred to ApogeeX or Komori K-Station where jobs are automatically updated.

Our internal communication processes are highly automated through JDF-connectivity. Transparency and flexibility are very much improved since everybody involved in production has direct access to up-to-date job information. Hiflex MIS regularly receives feedback from production and is always up-to-date regarding the job status.

Moreover, a mail robot is used for standard communication processes which inform staff about important routines:

• Everybody responsible for production receives a list with the production times of the staff.

• Each member of staff receives an email with his own production times. Before he starts his shift and his first job he can check the data and – where necessary – supplement anything. He forwards this data directly to a central pool where corrections can be made. Due to this automated time recording / emailing we save four hours shop floor data collection per day (in comparison to former manual data entry).

• Info about minimum stock level, production data, production plan for the next day.

Automation of standard information saves us a lot of time, there is no running around the company with documents any longer, and information is not received too late, which can have disastrous consequences.

The display of up-to-date job information and the staff’s access to the relevant data enhanced transparency and flexibility very much. Consequently, we reduced production meetings. Today, our morning meeting is reduced to approx. 15 minutes (formerly 60 minutes).

JMF feedback from the Komori K-Station 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 auto
“The Return On Investment (ROI) of the JDF implementation at Tanghe Printing N.V. was 822.8 % within five years (which means that the investment is paid back 9.22 times). The Net Present Value (NPV) is EUR 886,570,-- or US$ 1,132,678,-- which equals an Internal Rate of Return (IRR) of 435%.”

The JDF-link between :ApogeeX and Hiflex ensures that job modifications are immediately transmitted to prepress. It also improves the efficiency of customer services, as even last-minute modifications are incorporated into the production process.

With the integration of NSS Production (archive management) into the JDF network by connecting it to the Hiflex MIS data structuring and organization in prepress has become automated. There is no need any longer to clean up the prepress server disk at busy times. When the job is closed down in the Hiflex system a JDF file is sent to NSS which triggers an archiving process. First of all, it is checked if the job files are consistent (all links are preserved) and afterwards the work volume of the server is cleaned up. By this the prepress operator saves the time for cleaning up the server and he can be absolutely sure, that all the files that belong to the according job are in the archive.

BEST COST/BENEFIT REALIZATION AS A RESULT OF PROCESS AUTOMATION IMPLEMENTATION

A quantitative analysis of the hard and soft ROI factors expected and realized, to include either breakeven analysis, IRR or NPV determination of hard factors and testimonial evidence from users or customers as to the realization of soft benefits.

The Return On Investment (ROI) of the JDF implementation at Tanghe Printing N.V. was 822.8 % within five years (which means that the investment is paid back 9.22 times). The Net Present Value (NPV) is EUR 886,570,-- or US$ 1,132,678,-- which equals an Internal Rate of Return (IRR) of 435%.

Since the implementation was carried out in May 2003 the calculation is not based on ideal assumptions but on empirical data taken from 2004.

Although two periods (2004, 2005) have already passed, all periods are discounted with a rate of return of 8%. The rate of return is the expected reward investors demand for investing in the project rather than carrying out alternative investments. The rate of return is often referred to as the
discount, interest, hurdle rate, or company cost of capital. Without this consideration the ROI would be even higher.

THE BENEFITS

The JDF-implementation greatly improved transparency and flexibility of our production process. JDF networking between Hiflex and Komori has allowed us to implement rationalization and to gain an important edge on our competitors. It also provides us with the tools to respond better to our customers’ delivery requirements. This is certainly also the case because we do a lot of small production runs which requires a lot of job changes.

We are always looking to increase the level of automation and further increase our productivity, reduce our costs and improve our customer service. The JDF link between ApogeeX and Hiflex MIS totally streamlines our prepress workflow, just as JDF did in the press room.

Increase in sold productivity (C)
Electronic monitoring of the production process enhanced transparency and flexibility of our print production, and simultaneously brought more calmness. As a result of the JDF project, the workload could be organized more efficiently and finally also led to faster make-ready processes.

The results are an increase of sold productivity on the presses: 15% (Lithrone 440) and 13% (Lithrone 540). Variations in shift times between the periods compared have been accounted for in this calculation. The improved run times on the presses multiplied with the associated hourly cost rates of the respective machines lead to our increase in added value. When the direct costs associated with the increase in added value are subtracted, our remaining increase in sold productivity is EUR 65,562.--.

Reduced / avoided costs (D)
After the implementation production meetings were reduced by 45 minutes per day. With an hourly cost-rate of the participants of EUR 50,-- cost savings of EUR 49,500,-- per year were realized:

\[(0.75 \text{ h} \times \text{EUR 50,--}) \times 220 \text{ days}) \times 6 \text{ members of staff.}\]

The integration of prepress took place in April 2005 and led to cost reductions in the field of press operations:
• Automatic job creation in :ApogeeX led to time savings of half an hour per day. 0.5 hours were multiplied with 220 production days per year and a hourly cost rate of EUR 50.--.

• Automatic job creation in NSS production system led to time savings of 5 minutes per job (with 1500 jobs done per year).

• Automatic assignment of PPF files to the job saves five minutes time per form. With 4000 forms per year we gained: 4000 forms x 5 minutes = 20000 minutes / 60 minutes = 333.33 hours. Multiplied with an hourly cost rate of the operator the amount results in 333 hours x EUR 50,-- = EUR 16,650,--.

• Automatic triggering of job archiving saves 10 minutes per jobs (with 1500 jobs done per year).

As :ApogeeX was implemented in April 2005, only nine months (Apr. – Dec.) were calculated for the year 2005 and as NSS was connected via JDF in October 2005 there were only 3 months (Oct.-Dec.) calculated for 2005.
Wage bill reduction (E)
The JDF linkage between the administrative workflow (Hiflex MIS) and the production workflow (:ApogeeX and K-Station) streamlined the complete order process so that today we manage our workload with one person less. Additionally, the re-keying of manual timesheets became obsolete, and this saved four hours of work per day. Since the re-keying was conducted by a less qualified person the hourly cost rate is EUR 30,-- instead of EUR 50,-- (for a CSR or press operator). The resulting savings add up to EUR 114,400,-- per year: (1 person x 8 hours x 220 days x EUR 50,--) + (0.5 person x 8 hours x 220 days x EUR 30,--). This includes all direct and indirect costs.

THE COSTS

One time costs (I)
Hiflex licenses are company-wide and include all modules on an unlimited number of workstations. Because of this model Tanghe Printing already owned the license for Hiflex Scheduling, SFDC and JDF. Nevertheless the license costs for the required modules were proportionally calculated and taken into account as if an investment would have been necessary. The one time costs listing also includes hardware, training (Hiflex / Komori), installation, the Komori licenses, upgrade to :ApogeeX v.2.5 and license for :ApogeeX link, internal startup costs, license, installation and training NSS JDF/JMF link, and ancillary IT infrastructure costs.

The amount for “Internal Startup-costs (3 weeks / 1 week)” and “IT ancillary infrastructure costs” is split according to the implementation of (1) JDF connectivity to Komori presses and (2) JDF connectivity to Agfa prepress workflow, which were carried out in different periods.

Recurring costs (J)
The recurring costs comprise the proportional Hiflex recurring fee (for license and maintenance) for the Hiflex modules Scheduling, JDF and Production Data Collection as well as external services and internal IT maintenance.
**THE CALCULATION (ROI, NPV, IRR)**

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<thead>
<tr>
<th>PERIODS</th>
<th>INVESTMENT</th>
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<tr>
<td>LICENSE HIFLEX SCHEDULING, SFDC AND JDF</td>
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<td>1 SCHEDULING PC (HARDWARE + TERMINAL LICENSE)</td>
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<td>10 SFDC PCS (HARDWARE + TERMINAL LICENSE)</td>
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<td>€ 5.120</td>
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<tr>
<td>INSTALLATION HIFLEX 4 DAYS</td>
<td>€ 4.096</td>
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<tr>
<td>K-STATION LICENSES INCL. INSTALLATION</td>
<td>€ 7.500</td>
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<tr>
<td>TRAINING K-STATIONS 2 DAYS</td>
<td>€ 2.400</td>
<td></td>
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<tr>
<td>UPDATE TO :APOGEEX V.2.5 INCL. JDF/JMF LINK</td>
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<tr>
<td>INTERNAL STARTUP-COSTS (3 WEEKS / 1 WEEK)</td>
<td>€ 6.000</td>
<td>€ 2.000</td>
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<tr>
<td>LICENSE + INSTALLATION NSS JDF/JMF LINK</td>
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<tr>
<td>TRAINING NSS JDF/JMF LINK</td>
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<tr>
<td>IT ANCILLARY INFRASTRUCTURE COSTS</td>
<td>€ 1.500</td>
<td>€ 500</td>
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<tr>
<td>I RECURRING COSTS</td>
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<tr>
<td>HIFLEX RECURRING FEE ON</td>
<td>€ 3.900</td>
<td>€ 3.900</td>
<td>€ 3.900</td>
<td>€ 3.900</td>
<td>€ 3.900</td>
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</tr>
<tr>
<td>LICENSE AND MAINTENANCE</td>
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<tr>
<td>EXTERNAL SERVICES</td>
<td>€ 2.000</td>
<td>€ 2.000</td>
<td>€ 2.000</td>
<td>€ 2.000</td>
<td>€ 2.000</td>
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</tr>
<tr>
<td>INTERNAL IT MAINTENANCE (100H)</td>
<td>€ 5.000</td>
<td>€ 5.000</td>
<td>€ 5.000</td>
<td>€ 5.000</td>
<td>€ 5.000</td>
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<tr>
<td>J ANNUAL COSTS = (H+I): € 45.816</td>
<td>€ 10.900</td>
<td>€ 10.900</td>
<td>€ 34.100</td>
<td>€ 10.900</td>
<td>€ 10.900</td>
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<tr>
<td>K CUMULATIVE COSTS: € 45.816</td>
<td>€ 56.716</td>
<td>€ 67.616</td>
<td>€ 101.716</td>
<td>€ 112.616</td>
<td>€ 123.516</td>
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<tr>
<td>L DISCOUNTED ANNUAL € 45.816</td>
<td>€ 10.903</td>
<td>€ 9.345</td>
<td>€ 27.070</td>
<td>€ 8.012</td>
<td>€ 7.418</td>
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<tr>
<td>COSTS = PV(J)</td>
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</table>
The term Return on Investment (ROI) is frequently used in different ways. In financial circles, the strict meaning of Return on Investment (ROI) is Return on Invested Capital, a measure of company performance: the company’s total capital is divided into the company’s income (before interest, taxes, or dividends are subtracted).

Most business people use “ROI” simply to mean the “Return” (incremental gain) from an action, divided by the cost of that action. In this sense, an investment that costs $100 and pays back $150 after a short period of time has a 50% ROI. This is exactly how it is used in the financial analysis of Tanghe’s JDF project.

Net Cash Flow (can be found in the line ‘Annual Net Value’ (N))
Cash flow, like income, focuses on the difference between money coming in and money going out over a time period. (Net Cash Flow = Cash Inflows - Cash Outflows). Cash flow results do not include some items found in the income statement, such as depreciation expense. Depreciation expense, for example, does not represent an actual cash payment during the reporting period, but rather an accounting charge against earnings. As a result, depreciation expense is not a “cash outflow” in the above financial analysis.
Discounted Cash Flow (DCF) (can be found in the line ‘Discounted annual value’ (P))

The DCF is a cash flow summary that has been adjusted to reflect the time value of money. It is an important criterion in evaluating or comparing investments or purchases. All things being equal, the purchase or investment associated with the larger DCF is the better decision. DCF makes use of the Present Value concept, the idea that money you have now should be valued more than an identical amount you would receive in the future. Why? The money you have now could (in principle) be invested now and gain return or interest, between now and the future time (interest rate used in the above financial analysis is 8%, (A)). Money you will not have until some future time cannot be used now. Therefore, the future money’s value is Discounted in financial evaluation, to reflect its lesser value. What that future money is worth today is called its “Present Value”.

Net Present Value (can be found in the line ‘Net Present Value’ (Q))

The net present value is a form of calculating discounted cash flow. It encompasses the process of calculating the discount of a series of amounts of cash at future dates, and summing them. Therefore the height of the net present value is depending on the length of the period for the project financial analysis. The period which we have chosen for the financial analysis of Tanghe’s JDF project is five years.

Internal Rate of Return (IRR)

The IRR for an investment is the discount rate for which the total present value of future cash flows equals the cost of the investment. It is the interest rate that produces a 0 NPV. Another way to think of IRR is this: IRR tells you just how high interest rates would have to go in order to “wipe out” the value of this investment. Like DCF, the IRR is a cash flow summary that has been adjusted to reflect the time value of money. The IRR view of the cash flow stream is essentially an investment view: money will be paid out in order to bring in gains. The higher an investment’s IRR, the better the investment’s return relative to its cost and the lower the risk.

Note:

1. IRR says nothing about the magnitude of the return. A tiny investment or expenditure may lead to a magnificent IRR. An alternative action with a smaller IRR might still be preferred if it brings in a much larger net cash flow, or DCF.
2. IRR has the most meaning when there is an initial net cash outflow, followed at least one period with a net positive cash inflow. IRR cannot be calculated with outflows only, or inflows only; IRR is thus not applicable to “cost only” analyses (such as the typical cost of ownership analysis).

3. IRR can be quite misleading if there is no large initial cash outflow. For instance, when comparing a “Lease” scenario with a “Buy” scenario for new computing equipment, the “Buy” alternative may show an IRR of, say 30%-70%, whereas the “Lease” approach may have an IRR in the thousands. This is because leasing may not involve much of an initial cash outlay. IRR is more appropriate for comparing alternatives that have roughly similar patterns of inflows and outflows.