Overview of the PI System in Our Factory After 15 Years of Usage

Presented by
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Solvay Chimica Italia S.p.A.
Solvay in the World

- Group founded in Belgium in 1863 working in sectors of chemistry and plastic materials.
- It is active in 40 countries with around 300 sites and plants.
- It aims to a growing presence in Asia, America and East Europe.
- It has a worldwide leadership in the market where it is present.
- Some figures (year 2010):
  - Sales: 6.8 Billion €
  - Income: 0.6 Billion €
  - Employees: 16800
In 2012 we will celebrate 100 years of industrial activity

Solvay in Italy

Chemistry and plastic materials
Over 2000 people
548 million euro of sales in 2010
It represents 8% of the Group’s activities
9 production sites
Rosignano factory

Historical notes
• Building start 1912
• Production start 1917

Current situation (2010)
• The factory occupies 2.2 km²
• Investments almost 12 M€
• People: 700 directly employed
          400 indirectly "    "  "    "
Where we are
Productions

Salt

Limestone

Water

Methane

Energy

Ethylene

SODA & Deriv.

PEROXIDE

CHLORINE e Deriv.

POLYETHYLENE (INEOS)
Production Capacity

- Soda ash: 940 kT/year
- Sodium Bicarbonate: 260 kT/
- Calcium Chloride: 140 kT/
- Caustic Soda: 190 kT/
- Chlorine and derivatives: 300 kT/
- Hydrogen Peroxide: 35 kT/
- Sodium Percarbonate: 50 kT/
Quality & Safety management

Models & Analyses

Reporting

Notification system

Web Monitoring

LIMS

Two-ways DCS Interfacing

Batch Management

PI System is...
Office Automation LAN

Virtual LAN

FireWall

PI Server interface node

FireWall

PI Server

Router/Firewall

Clients

SAP

ICS LAN

DCS LAN

DCS station

DCS Controller

Basic Scheme of the Network

Data from PI System

Users’ notes

Loading the specified date

Scrolling through shifts

Arrangement registered in PI System

Switches config. + notes to PI System

People in charge enter notes and indicates anomalies or inefficiencies for each electrical room
Every report is saved in a network folder in tif format

Main features:

1. Search of past events and how they were resolved
2. Find all notes containing a string of text
Main Goal: Access easily your data everywhere.

Web monitoring

PI Module
DB

Display coming from PI ProcessBook → PI WebParts
Web monitoring

ADVANTAGES

• Simplified Client

• Access your data from any PC in your Company net

• Views restricted to the allowed web pages

• Multi-site usage of the same installation

• Concurrent license – cost reduction
Batch Management

The PI Batch module helps to trace production or treatment phases inside the process.

What we mainly use the PI Batch module for:

- Control production loads
- Control chemical treatments
- Analyses of sensible measurements (e.g. for the respect of 2008/1/CE - “IPPC”)
- Tests for our Research facility (membrane cells for electrolysis)
### Example of PI Batch Report

#### Production charge

<table>
<thead>
<tr>
<th>Start Date</th>
<th>End Date</th>
<th>Total Load (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/01/2011</td>
<td>01/31/2011</td>
<td>263772</td>
</tr>
</tbody>
</table>

#### List of load operations

- **Selection**
- **List of loads per freight car**
- **Total loads per day**

#### Summary Report

- **Year:** 2011
- **Month:** 3
- **Load Duration:** Longer than 2 minute

<table>
<thead>
<tr>
<th>Charge Code</th>
<th>Total</th>
<th>Start</th>
<th>End</th>
<th>Time (in minutes)</th>
<th>Hour Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC A</td>
<td>61413</td>
<td>6077</td>
<td>300/01/19 10:15:00</td>
<td>15:05</td>
<td>00:00:30 00:50 Num of charge</td>
</tr>
<tr>
<td>WC A</td>
<td>61414</td>
<td>1563</td>
<td>300/01/19 10:15:30</td>
<td>15:30</td>
<td>00:00:50 1:0 30 Hz</td>
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<tr>
<td>WC A</td>
<td>61414</td>
<td>14389</td>
<td>230/01/19 17:10:50</td>
<td>17:50</td>
<td>00:00:54 0:5 28 kg</td>
</tr>
<tr>
<td>WC A</td>
<td>61414</td>
<td>30002</td>
<td>200/01/19 15:38:05</td>
<td>15:45</td>
<td>00:00:55 1:0 26 Hz</td>
</tr>
<tr>
<td>WC A</td>
<td>60810</td>
<td>25998</td>
<td>230/01/19 10:29:20</td>
<td>10:29</td>
<td>00:00:56 1:0 25 Hz</td>
</tr>
<tr>
<td>WC A</td>
<td>60810</td>
<td>30000</td>
<td>190/01/19 15:48:30</td>
<td>15:45</td>
<td>00:00:54 0:5 28 kg</td>
</tr>
<tr>
<td>WC A</td>
<td>60810</td>
<td>27003</td>
<td>170/01/19 12:28:40</td>
<td>12:40</td>
<td>00:00:55 1:0 26 Hz</td>
</tr>
<tr>
<td>WC A</td>
<td>60810</td>
<td>30000</td>
<td>155/01/19 14:41:00</td>
<td>14:45</td>
<td>00:00:55 1:0 26 Hz</td>
</tr>
<tr>
<td>WC A</td>
<td>60822</td>
<td>32028</td>
<td>130/01/19 22:49:10</td>
<td>14:10</td>
<td>00:00:55 1:0 26 Hz</td>
</tr>
<tr>
<td>WC A</td>
<td>60822</td>
<td>25042</td>
<td>110/01/19 16:42:15</td>
<td>16:30</td>
<td>00:00:55 1:0 26 Hz</td>
</tr>
<tr>
<td>WC A</td>
<td>60822</td>
<td>7515</td>
<td>110/01/19 11:15:20</td>
<td>11:15</td>
<td>00:00:55 1:0 26 Hz</td>
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<tr>
<td>ATB</td>
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<td>27700</td>
<td>000/01/19 23:21:30</td>
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<td>417</td>
<td>050/01/19 15:51:15</td>
<td>15:51</td>
<td>00:00:55 1:0 26 Hz</td>
</tr>
</tbody>
</table>

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Two-ways interface – set points to DCS

CONTEXT

• Electrolytic plant → big consumer of energy
• Declare future energy consumptions 2 days in advance
• Price of energy fixed one day later
• Respect consumption statements or hefty fined

PROBLEM

Find an optimized load shedding of the energy consumption
Two-ways interface – set points to DCS

Analysis of the past Energy price

Estimation of the future trend

Process Control

Calculation most convenient Set points

We estimate a savings of around 300 k€/year on the energy cost
PI System as a Laboratory System

PI Manual Logger Users

Validation
PI Manual Logger and PI Users

PI Manual Logger is an utility for Data Entry Operations.
**PI Manual Logger as a LIMS**

**PI Manual Logger is a utility for data entry operations**

### Our Requirements for a LIMS

- **Data entry sessions**
- **Management of Low/High limits**

### Fulfillments with PI Manual Logger

- **Tour** = list of tags for labo
- **Tour run** = data entry session
- **Low limits**
- **High Limits** values or tags
- **Delta limit**
Two levels of users:
1) Operators
2) Supervisors

Two kind of user groups:
1) Data entry group
2) Full Access group

Data Collection
Scheduling

Scheduling based on Recurrence clock
(hourly…yearly)

WWW Traceability:
What, Who, When

Audit Functionalities

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Notification of Process Alarms

Where is a warning or danger?
Notification means

We built our PI ACE application when PI Notifications did not exist
Quality/Safety management

Events that must be checked and explained

PI AlarmView

Periods of time when warning conditions happened

PI DataLink + BatchView in MS Excel
Keep under control the balance values of each steam network.

Steam producers

Steam networks

Steam transfers

Steam users

Analyses in our asset – PI AF example

Balance result

Asset configuration

Keep under control the balance values of each steam network.

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Benefits for our factory

• PI System is essential for our operations
  - Process/Quality Management, Traceability, Labo, Notifications

• Communication among different systems
  - Customized systems, web servers, DCS to DCS

• Reduction of existing systems. PI System engulfed:
  - LIMS, ad-hoc Research, Tech. DB, critical sys alarm (future)

• PI System as a basic platform for new applications
  - Batch traceab. & SAP conn. with Pimsoft for other factories
Implementation

• In-house installation
• Knowledge: VBA & VB/VB.Net + MS Excel & SQL Server
• We attended training courses at OSIsoft
• We prepared some internal courses for our end users
Questions?
Thank you