Valmet Industrial Internet

Dialogue with data
Valmet Industrial Internet

Leveraging new data-driven opportunities

Company level data
• Business planning and fleet management

Mill and plant level data
• From ERP, MES and CMMS systems
• Production management and operations optimization

Process data
• From process automation system and measurements
• Process and quality controls into targeted setpoints

Dialogue with data
• Combining process and business data from different mill or plant systems
• Utilizing advanced analytics, artificial intelligence (AI) and our know-how to discover hidden improvement potential
• Using the findings in daily process and operations optimization

Results
- Reduced raw material & energy cost
- Improved end quality
- Reduced downtime
- Optimized maintenance
Valmet develops its Industrial Internet solutions building on the unique combination of process technology, services and automation.
Valmet Industrial Internet platform components are based on certified and secure world-leading technologies.
Today, customers are extensively utilizing our Industrial Internet capabilities

- 800 - 1600 Valmet-supplied lines with Valmet DCS and QCS systems
- 420 81,000 420 Condition Monitoring (CM) references with over 81,000 I/O tags
- 350 Advanced process control installations
- 540 Online connections with customers
- 90 Performance agreements with remote connections
- Ongoing Co-creation of advanced analytics with customers
Valmet Industrial Internet (VII)

Building blocks

Applications and services
- Data visualization, reporting and guidance
- Asset reliability optimization
- Operations performance optimization
- Valmet Performance Center

Solution ecosystem brings leading industry players together to co-create value-adding applications and services.

Automation and IT platform

Process technology
Industrial Internet portfolio
Applications and services for board & paper producers

Advanced reporting and guidance
- Process performance monitoring
- On-site analysis & reporting

Asset reliability optimization
- Paper Machine Diagnostics
- Control loop performance monitoring
- Condition monitoring remote analysis

Operations performance optimization
- Real time quality prediction
- Pulp to paper optimization
- Web break prediction

Valmet Performance Center
- Connectivity
- On-demand expert support
- Remote monitoring & optimization
- Analytics as a service

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Valmet Performance Center
Easy access to the expertise you need

On-demand expert support
Remote monitoring and optimization
Data discovery and analysis process

Performance Centers for:
Energy
Pulp
Paper
Tissue
Automation
Valmet Performance Center

Your channel for data-driven performance improvement

• Easy access to the expertise you need
  – Remote tools bring our expert network close to you
  – You have a place to contact when help is needed

• Services
  – Continuous remote monitoring, controls fine tuning and optimization.
  – On-demand expert remote support
  – Data discovery and big data analysis services based on the customer’s business problem (e.g. defining root causes for process variations)

• Secured data connection with your mill
Energy optimization with remote support for paper and board machine
Energy optimization with remote support for Recycled Fluting Machine

- **Service description**
  - Process optimization both remotely and on-site to save energy
  - An operator application integrated to the machine control system
  - Energy usage shown in real time and compared to best achieved performance
  - Grade-specific energy consumption and history reports
  - Continuous monitoring and reporting by Valmet Performance Center experts

- **Benefits**
  - Increased awareness and understanding of energy used in the process
  - Improvement opportunities can be identified
  - Energy savings in electricity and steam
  - Significant cost savings
Energy optimization with remote support

Results for a containerboard customer (name confidential)

- **Corrugating Medium 105 g/m²**

<table>
<thead>
<tr>
<th>Electricity Consumption [kWh/t]</th>
<th>Steam Consumption [t/t]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct 2014</td>
<td>Dec 2014</td>
</tr>
<tr>
<td>Oct 2014</td>
<td>Dec 2014</td>
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<td>280</td>
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<td>300</td>
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</tr>
</tbody>
</table>

**Results**

- **16%** energy savings in electricity
- **10%** energy savings in steam
- **€2M/a** value

**Key facts of the containerboard machine**

- Grade: recycled fluting
- Basis weight 90–150 g/m²
- Design speed 1,200 m/min
- Trim width 6,660 mm
- Start-up 2014
Predictive Condition Monitoring
Improved reliability through real-time monitoring solutions
Performance monitoring for TwinRoll wash press

Service description and benefits

- **Service description**
  - Real-time monitoring of TwinRoll operational performance and end product quality
  - Fleet management: Data collection and modelling for predictive maintenance
  - Customer interface with KPI dashboards for analyzed and visualized performance data
  - Automated recommendations for operators
  - Continuous monitoring and reporting by Valmet Performance Center experts

- **Benefits**
  - Relevant information for maintenance and production decision making
  - Improved maintenance predictability and fleet performance
  - Fewer unplanned stops and improved performance
Performance monitoring for TwinRoll wash press

Potential results for a pulp mill

Results

Potential savings in wash losses

Potential increased lifetime of wear parts

15%
10%

- Improved washing efficiency and reduced chemical consumption through better wash liquor distribution and even pulp formation
- Fewer unplanned stops in production
- Extended machine component lifetime through predictive maintenance

Results

Potential savings in wash losses

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Reaching optimal operating window after start-up

By adjusting pulp flow and pulp consistency based on automatic recommendations it is possible to achieve the optimal operating window faster
Pulp to Paper Optimization via Advanced Process Control (APC)
Pulp to paper optimization

Paper and board properties modelling

Service description

• Collecting large data set of process and/or analyzer data
• Modelling and predicting final pulp, paper and board properties. Modelled variables include:
  – Pulp hand sheet properties: tensile, tear, bulk, SCT, CMT
  – Paper and board properties: tensile, tear, porosity, internal bond, STFI
• Quality models and predictions are implemented online and visualized for operators

Benefits

• Online strength information
• More stable final product quality
• Online quality predictions help optimize raw material and chemical consumption, energy and quality
Pulp to paper optimization (Sack Paper M/C)

Control the process to final pulp and paper properties

Service description (sack paper m/c)

• Control the process to final pulp, paper and board properties by Model Predictive Control (MPC) to reduce variability.
• Controlled variables based on process and customer needs, strength and other properties models
• Optimize process by MPC and move process toward economic optimum
• Manipulated variables:
  – Low consistency refining specific energy
  – Stock blending, flows and consistencies
  – Chemicals and starch
  – Water removal, wet pressing, draws

Benefits

• Raw material and energy savings
• Decreased breaks, increased PM speed
• Online strength information, more stable final product quality

• Basis weight 60–135 g/m²
• Design speed 1,200 m/min
• Trim width 4,440 mm
• Upgrade 2000
Pulp to paper optimization

Results for a sack paper customer (name confidential)

- Significant reduction in paper properties variation
- Improved paper machine stability and higher machine speed

**Results**

- Pulp quality window performance improved by **26%**
- Tensile strength window performance improved by **32%**

![Graphs showing results](Image)

**Graphs:**
- Tensile strength quality window
- Tear strength quality window
- Freeness and fiber length quality window

On-control data of 3 months (green color)
Valmet Control
Performance
Automation system control loop
performance improvement
Valmet Control Performance
Service description and benefits

- **Service description**
  - Automation system control loop and actuator performance is continuously monitored and analyzed by automated tools
  - Priority list of non-performing loops is reported on a regular basis
  - Valmet Performance Center experts evaluate the results and make recommendations on actions. Remote tuning is also available.
  - Customer can view control loop performance at corporate, mill, department, and loop level

- **Benefits**
  - Prioritized recommendations for maintenance, resulting in better allocation of resources
  - Reduced unplanned downtime and maintenance cost
  - Raw material and energy savings
  - Improved product quality, less quality variability
Control loop performance improvement

Results for confidential customer, fiber line and recovery line

• Control loop performance improvements are achieved by implementing recommendations, e.g. control loop variability reduction, operating point changes or fixing actuator and instrumentation issues
• Better maintenance resources allocation
• Peak performance sustained long term by stabilizing processes

Confidential customer
Fiber line and recovery line processes
• Cooking, washing, oxygen delignification, bleaching
• Evaporation, recovery boiler, causticizing and lime kiln
Continuous dialogue with data – way forward
Valmet Industrial Internet roadmap
Way forward through co-creation with customers

- Integrated customer portal and mobility
- Growing fleet of intelligent machines and more diagnostics embedded into processes
- Valmet Performance Center as a platform for digital services and big data analytics
- New contributing technologies
  - Mixed reality through Microsoft HoloLens
  - Location detection technologies
- Data driven applications and services through advanced analytics, machine learning and AI.
  - For reliability and performance improvement
- Advanced process controls for all process areas and mill wide optimization
- Vertical and horizontal integration through strong ecosystem of partners