

Valmet Automation



220 years of industrial history





Unique offering covers process technology, automation and services

Automation

- Distributed control systems
- Performance solutions
- Process simulators
- Safety solutions

Energy

- Multifuel boilers up to 800MWth
- Biomass and waste gasification
- Emission control systems

Pulp and Paper

- Recycled fiber lines
- Tailor-made board and paper machines
- Modularized board and paper machines
- Tissue production lines
- Complete pulp mills

Focus in customer benefits



Valmet key figures 2017



Net sales by area

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- South America
- EMEA
- China
- Asia-Pacific



Our automation offering







Advanced automation and process monitoring solutions and services:

- Distributed Control System (DCS) Valmet DNA
- Turbine and Compressor control

- Vibration monitoring Systems
- Automation services
- Process simulators
- Safety systems and solutions

Over 4,500 automation systems





Valmet DNA for Energy

One system for all automation in energy Industries



Specialized expertise in the energy industry

FLUIDIZED BED BOILERS Flexible multi fuel combustion, combustion optimization with corrosion management.	GASIFICATION High cycle efficiency, high availability.	PYROLYSIS Environmentally efficiency, high availability.
COAL FIRED High availability, emission minimization, combustion optimization, flexible usage.	COMBINED CYCLE High availability, emission minimizing, flexibility.	WASTE-TO-ENERGY Maximizing waste disposal, emission management, environmental efficiency.
COGENERATION Flexibility, steam network management, high availability.	HYDRO POWER Efficiency, availability, river optimization.	SOLAR POWER Efficiency, availability, optimizing lifecycle maintenance costs.



Product portfolio for power plants







Valmet solutions for hydro power plants

Boosting operational efficiency in energy production



Clean technology for sustainable and profitable growth







Automation solution for hydro power plants

Valmets delivery scope





One system for all automation in energy Valmet DNA







Process controller & IO cards technical features

ACN-RT



- Typical I/O capacity 500-6000Centralised and distributed 19" Rack fitting
- Over-pressured air cooling

ACN-CS

- Typical I/O capacity 500-4000
 - Centralised, distributed and
- embedded installation (A4 footprint)
- Fan-less cooling

ACN M80 I/O



- DIN-Rail mounting
- Max. 16 modules per group
- Field signals directly connected or to terminal board via flat-cable to I/O module.

ACN-MR



 Typical I/O capacity 100-3000

• Centralised, distributed and embedded installation.

Can be fitted in I/O group



ACN-SR1

Max. 256 I/O 's
Can be fitted in I/O group

ACN M120 I/O



- DIN-Rail mounting
- Max. 16 modules per group
- Field connection via cable and connector module



Valmet DNA user interface for effective operation

Feeling of control

- Efficient problem solving •
- Time machine by one click
- History mode and replay
- Tracer for trending with alarms and events
- Analyzing alarms and events





Valmet DNA Turbine Controller & turbine protection

- Speed control
- Load control
- Island mode operation
- Primary and secondary control
- Limiters (e.g. acceleration, load)
- Start-up / shut-down sequences
- Co-ordination of turbine valves
- Position control for servomotor
- Redundant or simplex in all levels
- Fault diagnostics
- Local operability
- Overspeed protection (IEC 61508)
- Turbine Condition Monitoring System (vibration)
- Training Simulator (river and plant simulation)
- Performance Monitoring System
- Water Balance Control



Benefits

- Open platform, no black boxes
- Control and protection in one system
- High usability
- Easy and cost-effective maintenance
- Seamless coordination throughout plant and turbine controls



Valmet DNA Machine Monitoring

Prevent unplanned downtime by machine health monitoring

- Vibration based condition monitoring for rotating machinery in Valmet DNA automation system
- Common user interface for process control and condition monitoring
 - Easier to use and share information between operation and maintenance
- Common history database for all process and machine condition data
 - Efficient analysis and reporting
- One system and one engineering environment for condition monitoring and process control
 - Cost efficient to build and maintain







Raising automation level at a Swiss HPP



Felsenau HPP - more than 100 years in operation

• Owner:

Energie Wasser Bern, EWB

Location:

Bern, river Aare, Switzerland

- Plant Data:
 - 1909 3 Francis turbines, total 2,6 MW
 - 1918 2 Francis turbines, total 4,5 MW
 - 1989 Kaplan bulb turbine 11,5 MW, Francis put out of service
- Delivery scope for retrofit 2014:
 - Valmet DNA control system
 - Trend and Event Archive
 - Turbine controller
 - Water balance control
 - Generator excitation
 - Synchronization



- Power plant / River simulator
- Vibration monitoring & mechanical protection
- Electrical protection for Generator & Transformer



Customers requirements



Challenge

- Development of the city of Bern and population increase has led to the steady increase in energy consumption.
- Outdated automation system was no longer reliable.
- Ecological production process.



Solution

- Valmet DNA automation system controls the operation of the entire plant.
- Easy operation, transparency in control algorithms.
- Remote operation via control room of CHP plant



Results

- Effectiveness of the controls has been visibly enhanced, especially plant's complex water balance control.
- Higher automation level
- Full auto run-up / shut down & purge sequences
- Optimized operation point of turbine



Modular system architecture of Valmet DNA



Plant Management Applications	Valmet DNA Plant Operation Monitoring Valmet DNA Turbine Performance Monitoring
Reporting & Analyzing Tools	Valmet DNA Historian Calculation Environment Valmet DNA Report (Reporting and Trending)
Information Services (Databases)	Valmet DNA Historian Valmet DNA Operate – Alarms & Events Server Application databases (SQL Server)
Advanced Control Applications	Valmet DNA Water Balance Control Valmet DNA Turbine Controller Valmet DNA Remote Setpoint Control Valmet DNA Training Simulator (power plant & river)
Valmet DNA	User Interaction Automated Process Secured Lifecycle











Vibration Monitoring System

Everything goes automatic in Valmet DNA

Before:

- start/stop of the turbine was not full automatic
- gate control did not support different variations in automatic



- full automatic turbine start / stop
- gate control supports different variations or priorities in automatic



Everything in high resolution on video

Before:

• no history mode, no high resolution alarm list

Now:

- full trend, event archive and reporting for all values and alarms
- seamless connection to office (excel, pdf)
- high resolution alarm list

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Benefit:
Better data analyses
search functions & data access to history data
faster & more efficient fault analysis



Maximum power - in balance with environment

- Maximum flow through turbine 100m³/s
- Pond water level to be kept at fixed level (+/-5cm)
- Residual minimum water flow 10-12m³/s, through 500kW turbine





Valmet DNA turbine controller – features

Implemented standard features :

AUS M

BEREIT

AUS M

- Speed or frequency control
- Load or flow control
- Start / stop sequences
- Purge programs
- No black box
- Fault diagnostic

Additionally customer got:

 Same HW & engineering tools as plant DCS





Fulfillment of customer's HW requirements

Main requirements:

- Overspeed protection (IEC 61508)
- Availability > 99,95%
- Autonomous from rest of system
- Local operation via touch panel
- Fault diagnostic possibilities

Additionally customer got:

- Redundant TCS in all levels
- Same HW & engineering tools as plant DCS
- No black box concept, expandable (on-line!)







Valmet DNA turbine controller - Optimization

- Correlation wicket gate/ runner blades
 - Monitoring of actual correlation wicket gate / runner blades angle
 - Runner blades follow wicket gate acc. these curves
 - Different operating curves, dependent on pond level (head)
- Optimization wicket gate/ runner blades
 - Correlation adjustment to increase the efficiency
- Limitation of opening of wicket gate
 - Limitation of max. opening of wicket gate e.g. for safety reasons (cavitation, acceleration > 250% / min.)
 - Efficiency (optimum operation point in low./max. flow range)





Valmet DNA vibration monitoring system in Felsenau

- Integrated application in Valmet DNA system
- Same HW & engineering tools as plant DCS
- 4 Eddy probes
- Monitoring of unbalance, eccentricity, resonance, orbit
- TÜV approved mechanical protection acc. SIL 3



Operator interface fully integrated for fast analysis





Valmet DNA Power plant training simulator

- HPP Simulator to simulate operation, trending and reporting functions
 - to avoid malfunctions
 - to understand the plant technology
 - operator training for new staff
 - realistic simulation
 - same HW as in HPP
 - training in a safe environment
 - skilled operators for
 - more efficiency
 - better environmental aspects
 - less downtime
 - less equipment wear





Valmet DNA River simulator

- River Simulator
 - wave simulation upstream HPP Matte
 - flood (e.g. heavy weather conditions)
 - simulation of levels upstream and pond
 - how to react in the power plant
 - max. additional capacity through the turbine
 - max. displacement through the river



Wave simulation configuration HPP Matte



Enhanced effectiveness of the controls



"The control is now fully automated and all the information is easily and quickly available. The events and context are much more visible."



Improved operational effectiveness

"Our expectations for the new system have been exceeded by far. The system is in operation since June 2014 without any disturbances. I am glad that we selected your system."

Andres Wäfler

Manager of Power Plants & Contracting at Energie Wasser Bern





References

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Valmet DNA for energy



World wide power plant references





Selected references: Hydro Power Plants



2008 Maneri Bhali Stage II, India

- Electrical power 4x 74 MW
- Fancis Turbine
- DNA Automation, Turbine Controller

2012 Tammerkosken Vesivoimalaitos, Finland

- Electrical power 8 MW
- Kaplan Turbine
- DNA Automation, Turbine Controller

2012 Inkeroinen, Finland

- Electrical power 3x 4,5 MW
- Kaplan Turbine
- DNA Automation, Turbine Controller

2012 Irganaiskaya, Dagestan

- Electrical power 2x 205 MW
- Fancis Turbine
- DNA Automation

2013 Djerdap I, Serbia

- Electrical power 6x 201 MW
- Kaplan Turbine
- DNA Automation

2013 Ilarion, Greece

- Electrical power 2x 77 MW
- Fancis Turbine
- DNA Automation

2010 Allain Duhangan, India

- Electrical power 2x 96 MW
- Pelton Turbine
- DNA Automation, Turbine Controller

2010 Sewa II, India

- Electrical power 3x 40 MW
- Pelton Turbine
- DNA Automation, Turbine Controller



Selected references: coal fired power plants



2015 JIANGSU HUADIAN JURONG POWER XIASHU, CHINA

- Electrical power 2 x 1000MW,
- Fuel: pulverized coal
- Ultra supercritical boiler, 600°C, 262 bar

2007

PVO-LÄMPÖVOIMA OY KRISTIINANKAUPUNKI

- Electrical power 248 MW
- Fuel: pulverized coal
- Benson boiler



- Electrical output: 2x225 MWe
- Fuel: Pulverized coal

2015 JEA, ST. JOHNS RIVER POWER PARK JACKSONVILLE, FLORIDA, USA

- Electrical power 2x640MW (538°C, 168bar)
- Fuel: pulverized coal
- Benson boilers, 2.500 t/h steam / boiler
- DCS retrofit, original plant start up 1987/88

BAJAJ HINDUSTAN LIMITED 2015/6 LALITPUR, INDIA

- Electrical power 3x660MW
- Fuel: pulverized coal
- supercritical boiler (BHEL)



- Electrical output 2x600MW
- · Fuel: pulveriized coal
- supercritical boiler (BHEL)



Selected references: coal fired power plants



2004 MONTOUR STEAM ELECTRIC STATION, USA • Electrical power 2x750MWe (1020 °F,3830psi)

- Fuel: pulverized coal
- Benson boiler
- DNA for PP, steam turbine and simulator

2004 EESTI ELETRIJAAM NARVA, ESTONIA

- Electrical output 200 MWe
- Fuel: oil shale
- 2 x Circulating fluidized bed boiler

2001 ISRAEL ELECTRIC CO RUTENBERG 3,4, ISRAEL

- Electrical power 2x550 MWe
- Fuel: pulverized coal

2002 AES PETERSBURG PENNSYLVANIA, USA

- Electrical power 530 MWe
- Fuel: pulverized coal

2002 ALABAMA POWER GASTON WILSONVILLE, ALABAMA, USA

- Electrical power 2 * 270 MWe
- Fuel: pulverized coal

2004 EXELON EDDYSTONE, USA

- Electrical power 2x350MW (650°C,358bar)
- · Fuel: pulverized coal
- Benson boiler
- DNA for whole PP, steam turbine and simulator



- Electrical output 460 MWe
- Fuel: coal
- Circulating fluidized bed boiler, super critical



Selected references: combined cycle power plants





- Electrical output 390 MWe
- Fuel: natural gas
- Combined cycle

2002 EL PASO ENERGY, LINDEN NJ, USA

- Electrical output 760 MWe
- · Fuel: natural gas
- Combined cycle

2003 BAYMINA ENERGJI A.S. ANKARA, TURKEY

- Electrical output 800 MWe
- Fuel: natural gas
- Combined cycle

2003 EL PASO ENERGY, PORTO VELHO, BRAZIL

- Electrical output 340 MWe
- · Fuel: natural gas
- Combined cycle



Selected references: combined cycle power plants





- Electrical output 920 MWe
- · Fuel: natural gas
- Combined cycle

2004 ENERGIAKI THESSALONIKIS S.A., THESSALONIKI, GREECE

- Electrical output 400 MWe
- · Fuel: natural gas
- Combined cycle

2010 OMV SAMSUN ELEKTRIK, SAMSUN, TURKEY

- Electrical output 890 MWe
- Fuel: natural gas
- Combined cycle



- Electrical output 1200 MWe
- Fuel: Gas
- 2 single shaft GT+ST



Waste to Energy Plant References

Norway

Over 60% market

share in UK

• BIR Avallsenergi, Bergen

FR

Veolia, Prociner

Veolia, SIAP

Europe

UK

- Ineos Runcorn, Manchester phase 1
- Ineos Runcorn, Manchester phase 2
- MES Environmental, Dudley
- MES Environmental, Wolverhampton
- Waste Recycling Group, Lincolnshire
- Veolia Environmental Services, Staffordshire
- SITA Suffolk
- Viridor Oxfordshire Ardley
- Viridor Cardiff
- Cory Environmental, Riverside London
- Veolia Environmental Services, Newhaven
- Sita, Cleveland 4&5
- SSE Ferrybridge FM 1
- FCC Buckinghamshire
- H&W Mercia Waste
- SSE Ferrybridge FM 2
- Dundee Energy Recycling, Dundee
- RWE Markinch, Glenrothers
- · London Waste, London
 - ValmetPower
 - Hitachi Zosen Inova (former Von Roll Inova)
 - Keppel Seghers
 - CNIM
 - Martin GmbH
 - Other Technology or Automation Replacement



Estonia • Eesti Energi AS, Tallinn

- Austria • A.S.A., Zistersdorf • AVE Wels II • AVE Wels I • AVE Lenzing
- Italy •Trattamento Rifiuti Metropolitani, Turin
- Veolia, Piacenza
- Veolia, Energonut



