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Mantenimiento Predictivo em Válvulas Industriales

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  - Field Care

• Real Cases
Metso
Flow Control
Metso is one of the leaders in valve industry

Leading product brands Neles®, Jamesbury® and Mapag®

Field service expertise from over 55 Metso Flow Control service hubs and over 30 valve service centers around the world.

Metso has delivered millions of valves, control valves, and on-off valves globally over the last nearly 90 years

One of the leading suppliers of intelligent valve controllers

Metso standard and severe service globe valves represent an important element in Metso’s extensive portfolio of control valves
Metso has world-class technology centers in all continents

- **Helsinki, Finland**
  - Specialized in Neles engineered valves and intelligent positioners
  - Technology center inauguration 2011

- **Shrewsbury, USA**
  - Jamesbury valves
  - Main locations to support North American markets
  - Facility expansion 2012

- **Horgau, Germany**
  - High performance Mapag butterfly valves
  - Acquisition 2008

- **Vadodara, India**
  - Serving Indian market
  - Service and supply center
  - Inauguration 2011

- **Sorocaba, Brazil**
  - Serving Brazilian and South American market
  - Service and supply center
  - Inauguration 2009

- **Chungju, South Korea**
  - Neles globe valve center
  - Acquisition 2012
  - New technology center inauguration by end of 2014

- **Shanghai, China**
  - Regional service
  - Standard Neles and Jamesbury product manufacturing globally
  - New Technology center inauguration 2010

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Our portfolio meets all of your control valve needs

- Proven performance in oil & gas, refining, petrochemical, pulp & paper, power and others
- Adaptable to a wide range of applications and process conditions
  - From general to severe services
- Optimize process performance and stability at the lowest cost
- Remote diagnostics for highly cost-effective predictive maintenance

Backed by world-class product, application and service experts
Metso’s control valve portfolio

The most comprehensive control valve line available

**Top entry rotary valves**
Top 5 - The heavy-duty problem solver.

**Globe valves**
Globe valves compliments Metso’s product offering for all applications.

**Segment valves**
Series RE – Ideal for high capacity applications.

**Triple and double eccentric disc valves**
Neldisc and Wafer-Sphere - High performance control.

**Eccentric rotary plug valves**
Finetrol – an optimal control performance.
Valve Predictive Maintenance
Performance
Flow Control services that help you improve profitability

- Availability
- Performance
- Risk control
Minimized resource usage
Flow Control services that identify process performance opportunities

**Performance monitoring**
We implement monitoring solutions that can identify the source of process inefficiency at the unit, process, control and field device levels.

**Control performance**
Our system experts work with you to optimize control performance by identifying, prioritizing and resolving control issues.

**Process optimization**
Our process experts apply years of practical experience to help improve your operations at the process level so as to deliver optimal economic performance.
Flow Control services that identify process performance opportunities

Field device performance

We identify under-performing or incorrectly configured field devices and recommend actions to return to optimum production performance.

Performance upgrade

Production efficiency can be improved by implementing the latest system and device features through planned periodic upgrades to hardware and software.
Business Solutions

**Availability**
- Maximize availability while minimizing costs
  - Customer Care
  - Intelligent Maintenance
  - Intelligent Shutdown
  - Spare Parts
  - Asset Information
  - Asset Quality

**Performance**
- Minimize resources used to deliver production targets
  - Performance Monitoring
  - Process Optimization (includes APC)
  - Control Performance
  - Field Device Performance
  - Performance Upgrades

**Risk Control**
- Control risks that would adversely impact a plant and/or business
  - Safety
  - Environment
  - Competence
Valve Predictive Maintenance
Methods used by Metso
Objective of the Nelscope Analysis

The objective of the Nelscope test is identify potential fail problems that can affect the operational performance of the control and on-off valves. The method assure a precise decision about to keep some valve in operation or to send the valve to repair.

- Air leakage through the actuator
- Air leakage through the connections
- Position problems by vibration
The Nelscope is a system that is installed at the valve in order to collect data and test the performance: position sensors and pressure transmitters.
Nelscope

Control valve
Nelleak

Detecting and quantifying leakages in valves by acoustic emission
Nelleak is a data collector system based on acoustic emission. Uses a SW to process the collected data so that can quantify the leakage (measurement in dBA and quantification in l/min or t/y). It’s used a acoustic emission sensor connected to a portable collector intrinsically safe.

The principle of the acoustic emission comes from the detection of the noise generated by the dynamic flow of a medium passing through a valve when closed.
Basics about the Nelleak

Objective
• Detection and measurement of leakages through the trim of the valves.

Benefits
• Minimize process losses
• More protection to the environment
NelLeak - Recommendations

High criticality valves related to tightness

- We suggest a predictive plan with defined route and frequency
- Adjust the frequency according to the criticality of each valve
- Usage of trends and history analysis
General Description

• 3 points of measurement
  - Upstream, body and Downstream

• Quick analysis
  - Quick checking of the results
  - Quick analysis of the data

• Results available by
  - Reports
  - Recommendations
NelLeak specification

• Method: Accoustic Emission
• Types of valves: Ball, Relief, Plug, Globe, Butterfly
• Pressure range: 0.5 - 140 bar
• Sizes: 1” - 18” (standard)
• Emission Range: 85 dB (dynamic range)
In line predictive test to Relief and Safety Valves
Nelsafe

KT3000 AccuTEST Safety Valves Testing System

System Description

1. Data Acquisition Case
2. Load Rig
3. Drive Motor
4. Easy Connection Adapter
5. Load Cell
6. Coupler Adapter
7. Stem Adapter
8. Acoustic Sensor of Magnetic Base
9. Cables for Data Acquisition
10. Equipment Storage Case
Nelsafe
Summary

Predictive tool for pressure safety and relief valves
Identifies problems related to calibrations
Diagnostic of problems of calibration and maintenance – valve stucked, etc
Support to shutdown planning
Positive impact to the insurance policies of the plants
Nelsafe
Operational principle

• Tests done during the normal operation of the plant – normal working pressure;

• Operation pressure – set up pressure + data related to the bore area ➔ determine the force needed to start to move the disc (SIMMER)

• Spring (load cell) coupled to the stem and acoustic sensor connected to the outlet of the valve
FIELDCARE™
Intelligent Field Device Configuration & Condition Monitoring
FDT/DTM Technology
What are FDT and DTM?

- **Open technology**
- **Supported by FDT group**
- **FDT (Field Device Tool)**
  - Open software specification for field device management
  - Specification defines software interfaces for FDT frame application and a DTM (Device Type Manager),
  - FDT is independent of the communication protocol.
- **DTM Device Type Manager:**
  - Contains the graphical user interface for device operation
  - Can be used in any FDT frame application
FDT Group

- FDT Group was started in early 2003 as an informal association by ABB, Endress+Hauser, Invensys, Metso, and Siemens.

- The mission of the group is to promote the acceptance and usage of FDT technology in the Process Automation, Factory Automation and Hybrid industries.
Frame Application and DTM’s work seamlessly
DTM Types

Device DTM
Valves, Transmitters, Motors

- Graphical user interface for a device:
  - setting parameters
  - Diagnostics / Optimization

- Shows features and functionality as manufacturer wants

Communication DTM
PC Communication cards, Multiplexers, HART-IO, Couplers, Gateways, Linking devices
DTM’s Come From Device Manufacturer

- Device manufacturer generates device DTM
  - parameterization
  - other features (diagnostics)
  - visual outlook

- “Generic DTM” for HART devices or “Profile DTM” for Profibus devices

- Certification tool (dtmINSPECTOR) available to ensure DTM works in frame applications according to FDT specification 1.2
FDT Today – Market & Support

Market
• Over 100 companies are using FDT technology today
• More than 3500 certified DTMs are available
• More than 15 FDT-enabled host applications are available today
• FDT tools are in use at hundreds of locations worldwide

Support
• Certified DTMs to ensure interoperability
  - Metso DTM’s Certified
• Certified Host Systems (FDT Frame Applications) to ensure interoperability
FieldCare™
Intelligent Field Device Configuration & Condition Monitoring
FieldCare™

Configuration and Condition Monitoring Software for Smart Field Devices

• Based off an open standard (FDT/DTM) to allow for the use of best in class devices.

Supported Communication Protocols:
  - HART
  - Foundation Fieldbus
  - PROFIBUS-PA

Open Device support for 3rd Party Devices through DTM

Available Versions:
  - FieldCare Device Setup (FREE download)
    • Point-to-point use
  - FieldCare Professional
    • configuration and condition monitoring of devices in a network
DTMs for Metso Field Devices

Metso DTM Setup freely downloadable from our web site:
http://www.metso.com/valves, click on “Documentation / Software Downloads”

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Open Device Support Shows All Features for Easy Device Management

• When DTMs are available:
  - One tool makes device management more effective
  - FieldCare™ shows all information, no need for vendor specific tool
  - FieldCare shows information as intended by manufacturer
  - FieldCare can manage any DTM
  - Allows to use best in class devices without worrying about system support
FieldCare™ Shows Device Information Similarly Regardless of FieldBus

• Device specific information shown similarly
• Visual outlook is same
• Bus specific parameters may vary regarding to field bus
• Field buses
  - HART
  - Profibus PA
  - Foundation FieldBus
FieldCare™ Condition Monitoring Aims to Focus Field Device Maintenance Actions

- Automatic polling for notification of problem areas in real time
- Condition Monitoring information available:
  - as web report (HTML page) in intranet
  - as e-mail
  - as message in pager or mobile phone
- Status shown as color coded on web report
- Condition Monitoring support files for over 175 devices plus generic files
Device Checklist

• Used to make a list of devices that need to be maintained
  - i.e. during the next shutdown.

• Symbol “i” in Condition Monitoring is used to show the devices in the Checklist.
  - New alarm and warnings can be easily recognised

• Add notes for devices in checklist
  - i.e. spare parts needed, recommended maintenance actions, etc.

• All notes and actions for the device are saved to the checklist history.

• Checklist Report shows all the devices that are currently on the checklist. Can be used for work list showing which devices need maintenance during shutdowns
Metso Valve Manager / Performance view
Parameter History

The History function enables you to check device parameter changes and to restore previous changes to the DTM and to the device.

- There is a table for each History view
- Table contains current values of the parameters and old values from a time you select.
- To restore previous values to individual parameters, click the < button
- To restore all the values for the view in question, click the << button
- Then click Download to send the value(s) directly to the device.
Valve Diamond

- DTM Valve Diamond is a summary of statistical diagnostics measurements. When you upload Valve Diamond view, you can see at a glance whether there are any problem areas in valve performance.
- Diamond outlook has changed from 1.12. Otherwise operation principle is the same.
Test Comparison

- In the DTM navigation tree, there is a Compare Tests view for each kind of test. In Compare Tests views, you can check and compare test results.

- Click **Select A** to open a list of completed tests. In the list, click the test and then click **Select Test**.

- Click **Select B** to reopen the list of completed tests. Select another test and then click **Select Test**.

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Performance View

- Metso Valve Manager™ Performance view shows a summary of valve assembly status. In the view, you can also see additional information on statuses and recommendations for corrective actions.

- Performance view is loaded automatically when the DTM is opened in online state.

- The Deviation and Pressure Gauges are refreshed automatically every 10 seconds.
Performance Index

- Performance Index consists of five columns that illustrate the following aspects of the control:

  **Control**: overall performance of the valve, actuator and positioner
  **Positioner**: indicates how healthy the ND9000 positioner is
  **Actuator**: indicates general condition of actuator
  **Valve**: indicates general condition of valve
  **Environmental factors**: indicates temperature and supply pressure conditions
Performance Index

• Performance index is affected by ND9000 diagnostics data, e.g. friction, deviations, age of device, device status and diagnostics warning limits.

• To identify the reason behind decreased performance, move the mouse on the bar in question.

• At the base of each bar there are some NAMUR status icons. Move the mouse on the status icons to see a tooltip that shows the reason for the status.
Performance View Report

- Performance View Report shows:
  - Monitored variables
  - Reason for the status or decreased performance
  - Recommended action to fix the problem

- Report can be also printed as a PDF format
What does the diagnostics of ND9000 include?

Third generation diagnostics
- User friendly metrics for control performance, valve, actuator, positioner and external factors
- Deviation and pressure ratings graphically
- Trouble shooting guide

Second generation diagnostics
- Lifecycle diagnostics
  example: control valve stiction
- Counter diagnostics
  example: actuator full strokes count
- Online diagnostics
  example: pneumatics problem
- Event log of 8000 events

First generation diagnostics
- Offline tests
Real Cases
Intelligent Maintenance
Braskem UNIB-RS Copesul complex, Brazil

Background
- Braskem is the largest petrochemical company in South America and 5th largest in the world
- Copesul complex produces more than 1,200 Kt per year of ethylene & other hydrocarbons

The Issue
- Find partners who can help increase maintenance efficiency
- Introduce tools and methods to support preventive and predictive maintenance

Our Solution

**Intelligent Maintenance**
- System and Device Monitoring
- Resident Engineers
- Project and Engineering
- Repairs

A resident Metso technician carries out predictive maintenance testing and analysis for valve maintenance planning.

The Results
- Decrease of 36% in maintenance costs
- Majority (76%) of the valves are maintained without removing them
- Safety and compliance to environmental regulations has improved

“Not only have we saved in maintenance and inventory costs, but we have also increased the reliability and the performance of our field equipment.”

Mr. Nelzo Luiz Neto da Silva
Maintenance Coordinator, Braskem Copesul complex, Brazil
## Intelligent Shutdown
**CMPC Santa Fe Mill, Brazil**

### Background
- CMPC is the largest Chilean pulp company and the world’s 5th largest pulp supplier.
- The Santa Fe Mill near Nascimento produces bleached eucalyptus pulp with two fiber lines.

### The Issue
- Maintain valve availability while reducing maintenance costs and resources in yearly shutdown.

### Our Solution
**Intelligent Shutdown**
- System & device audits
- Preventive maintenance
- Repairs

Metso technician prepared shutdown maintenance plan for valves based on diagnostic analysis. The valves were overhauled in Metso service center.

### The Results
- Less than 20% of the control valves needed taking out for service.
- 70% drop in maintenance costs compared to sister line where all critical valves were taken out (reduce scaffolding, construction, inspection and repair costs).
- Maintained target availability for valves.

> “Maintenance costs optimization of control valves, based on predictive maintenance philosophy, allows us to allocate resources to other important maintenance activities at the mill.”

**Mr. Javier Gonzalez,**
Electrical & Instrumentation Superintendent of CMPC Santa Fe Mill.
Intelligent Shutdown
Suzano Pulp Mucuri, Brazil

Background

- Suzano Pulp is the second largest producer of eucalyptus pulp in the world
- Mucuri is a pulp mill produces 1000,000 tpy of eucalyptus pulp

The Issue

- Reduce overall maintenance cost significantly in the shutdown
- Over 200 control and on-off valves to be overhauled
- Metso proposed focusing of maintenance actions according predictive device audit

Our Solution

Intelligent Shutdown

- System & device audits
- Projects & engineering
- Repairs

Metso technicians carried out valve audit and analysis in order to reveal condition. Maintenance actions was performed according to findings.

The Results

- Device audit, field work, repair and testing of over 200 process valves were organized within 2 weeks time period
- Only 30% of valves needed removing from the pipe and 40% valves had minor adjustments without have to be removed.
- Delivering a 200 k€ (44%) saving in maintenance costs

“The partnership with Metso for this activity provided greater reliability in the decision to repair valves and a reduced cost.”

Mr. José Ribeiro da Silva
Executive Maintenance Manager
**Field Device Performance**  
**Celulose Nipo-Brasileira (Cenibra) Ipatinga Mill, Brazil**

### Background
- Cenibra is one the largest pulp producers in Brazil, and is also a pioneer in eucalyptus pulp production
- Ipatinga Mill’s two lines produce 1.2 Mt per year of ECF bleached eucalyptus pulp
- Fiber lines are utilizing Metso’s Advanced Process Controls (APC)

### The Issue
- Transfer maintenance from corrective mode towards predictive maintenance
- Find a systematic way to detect and correct poorly behaving basic controls
- Focus maintenance actions on field devices really needing attention

### Our Solution

#### Control Loop Performance
- Metso performed continuous control loop and field device monitoring remotely. Shutdown planning and process upgrades were done according to the recommendations.

#### Field Device Performance

### The Results
- Maintenance plan for early shutdown was planned according Control loop and Field Device Performance recommendations
- System revealed a hidden problem in critical Digester Pressure Release valve already at early state of monitoring

“Recommendation to check the digester loop helped us a lot. It allowed take care of hidden problem before it became critical problem. We are curious to see how this system will work. We already have FieldCare for preventive evaluation of valves, but we have expectations to see further with this concept.”

**Mr. José Antonio de Oliveira**  
Instrument and Electrical Maintenance Coordinator
Safety
Anonymous crude oil refinery, UK

Background
- One of Europe's leading independent crude oil refineries with capacity for processing over 200,000 barrels of crude oil per day
- The main refining products are gasoline, diesel and jet fuel

The Issue
- Maintain the functionality of emergency safety valves with preventive approach
- Support all critical safety valves equipped with ValvGuard safety valve controller

Our Solution

Safety
- System and device audit

A Metso technician carries out regular device audits and diagnostic analysis in order to reveal condition of the critical safety valves.

The Results
- Ensure reliability of the critical emergency valves
- Helps to maintain customer's SIL requirements
- Brings savings to maintenance costs by focusing maintenance actions only on the ESD valves needing attention

“The regular reviews by the Metso engineers and the diagnostic reports provide clear guidance for the customer maintenance activities. In addition, the on-site presence of the Metso engineers provides expertise not only on the ESD applications, but also on other valve related issues.”

Mr. Mark Gale
National Service Manager, Metso Automation UK
Metso Flow Control
Predictive Portfolio – Industrial valves

- Automated Valves (on line e off line)
- On off and manual valves
- Pressure relief Valves
Some documented availability results

While helping our customers reach their target system availability, we have helped various customers achieve the following results:

• 36% maintenance cost saving in a petrochemical plant
• 70% maintenance cost reduction in a pulp mill shutdown
• 40% maintenance cost savings in a steel mill
• 71% reduction in spare parts inventory in a Nickel producer
Some documented performance results

By ensuring long-term process stability, we have helped various customers achieve the following results:

• €1.5 million/year energy savings in a plastics plant
• €1.5-3 million/year raw material and energy savings per oil refinery
• €2.4 million/year savings in a paper mill with better stability
• €5 million/year energy savings in a pulp mill
• €2 million/year yield increase in a pulp mill