PLANT OF THE YEAR 2015

MOL Danube Refinery, Szazhalombatta, Hungary Plant of the Year 2015 Award Winner

More Is Even Better
MOL Danube adds intelligence and wins its second Plant of the Year award.

PROJECT OBJECTIVES

- Increase operational reliability and availability by 1%
- Establish a predictive maintenance strategy
- Optimize maintenance cost
- Reinforce CAPEX project support, investment justification

SOLUTION

- Transitioned from a corrective maintenance strategy to preventive and predictive
- Implemented on-line condition monitoring system for rotating, static equipment and instrumentation and process control
- Organization change to align with refinery objectives
- Focus on key areas to improve efficiency and availability

RESULTS

- Saved $2 million in reduced maintenance costs and avoided unscheduled shutdowns;
- Reduced commissioning time 20% with HART;
- Increased plant's profit potential with increased loop-control accuracy and data availability;
- Saved two days of unscheduled downtime or at least €637,000 when data let staff diagnose and repair a head pressure control's intelligent positioner, instead of removing the entire valve;
- Reduced valves selected for repair during a planned shutdown from 60% to 5% for an estimated savings of €54,600 per unit per shutdown.
- To provide its diagnostics, maintenance and integration methods to MOL Danube's other processes and departments, at least 10 projects are planned, underway or completed. They include:

- Flow scanner development and implementation during turnarounds;
- Calibrating all pressure transmitters with Emerson AMS;
- Safety interlock monitoring by the process information department;
- Examining the plant's operations envelope, and checking for process technology deviations;
- Collect parameters in the distillation and hydrocracking units, and start an integrated operating window (IOW) program for maintenance to keep operations within those windows;
- Integrate the DCSs more closely with SAP-PM;
- Implement Uptime umbrella reliability to equip operating units with FIMS, including revamping I/O interfaces, installing *Wireless*HART adapters, and replacing control valve positioners;
- Further implementing *Wireless*HART and other wireless systems;
- Monitor control room and satellite control room temperatures, contract for HVAC services, and use OSIsoft PI to maintain setpoint temperatures.

IN ONE OF the all-time greatest cases of not resting on laurels, MOL Danube Refinery near Budapest has become the first repeat winner of FieldComm Group (FCG) Plant of the Year Award in its almost 15-year history. MOL Danube's engineers and technicians integrated more than 4,135 HART valves and instruments with its computerized maintenance management system (CMMS) and controls to win in 2010, and more recently, expanded and extended their proactive maintenance strategy to other applications and departments to achieve similar benefits.
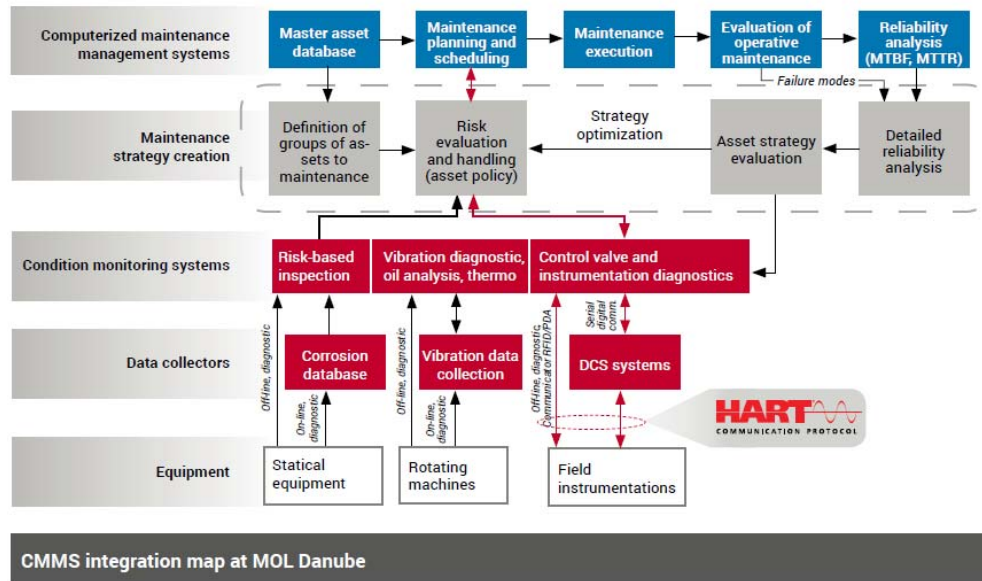
Not only have they continued to add smart devices and enhanced their valve diagnostics and predictive maintenance, but they're saving $350,000 per year on potential shutdowns with smart device monitoring; set up a cross-functional, risk-assessment team that evaluates 20,000 device notifications per year, and started a digital transformation program.

PHASE 1: CONNECTION AND INTEGRATION

Located in Százhalombatta, Hungary, MOL Danube was named 2010 Plant of the Year following a six-year effort to implement a Field Instrumentation Management System (FIMS) for its maintenance facilities, which were supported by HART and FOUNDATION Fieldbus components, communications and data. MOL Danube's engineers and technicians networked 4,135 of the valves, instruments and other devices in critical control loops directly to the FIMS. This created an online diagnostic system with instrument signals connected directly to the plant's CMMS and controls. They also developed a two-way connection between FIMS and MOL's SAP enterprise resource planning (ERP) system, which uses SAP-PM preventive maintenance software.

Close to 2,575 of the valves and instruments are in Emerson Process Management's AMS with Valve-Link software for diagnostics, while 1,347 are connected via Yokogawa Electric's Plant

Resource Manager (PRM), and 219 are connected to Honeywell Asset Manager. In all, 413 instruments are connected via FOUNDATION Fieldbus.

Figure 2: Intelligent instruments, rotating devices and static devices at MOL Danube are networked up through data collectors and condition monitoring systems to the refinery's asset evaluation and maintenance level and its computerized maintenance management system (CMMS) using SAP-PM preventive maintenance software. *Source: MOL Group*

"This project began by integrating process instrument diagnostics and device utilization with CMMS, AMS and SAP, combining islands of systems that used to be separate, and creating triggers for launching transmitters, control valves and positioners," says Gábor Bereznai, head of maintenance engineering at MOL Danube. "This was done by having the diagnostic system inform the CMMS about the valves. This data could then be used in morning meetings with our maintenance guys and other staff, help us do risk assessments, and identify other problems."

József Bartók, head of maintenance instrumentation and electrical engineering at MOL Danube, adds, "Online diagnostics provided by HART and FOUNDATION Fieldbus instruments do more than preventive maintenance. They ensure stable operation of the system and increase control precision. This adds directly to the bottom line. In a given unit, inaccuracy of loops controlling the applied separation processes, which are typically traced back to de-tuning the control valves, couldn't be identified without using intelligent valve positioners with HART. Now, valve failures can be screened out and losses can be minimized with repeated calibration."

Bereznai adds MOL Danube's integration began on one delayed-coker unit in 2000, later moved to include benzene isomerization unit, and now embraces 15 critical units, which make up most critical units of the refinery and covers total gasoline- and benzene producing operations. In all, the facility has 58 total units with 95% using distributed control systems (DCS) and safety programmable logic controllers (PLCs). Overall, MOL Group has 40,000 instruments with most installed at MOL Danube, including 30,000 with HART 4-20 mA, 8,000 with pneumatic and standard 4-20 mA, and 2,000 with FOUNDATION Fieldbus. As the only Hungarian MOL refinery conducting crude distillation since 2001, MOL Danube's capacity is 8.1 million tonnes per annum (mtpa).

Thanks to its initial integration efforts, MOL Danube achieved several benefits, including:

• Saved $2 million in reduced maintenance costs and avoided unscheduled shutdowns;
• Reduced commissioning time 20% with HART;
• Increased plant's profit potential with increased loop-control accuracy and data availability;
• Saved two days of unscheduled downtime or at least €637,000 when data let staff diagnose and repair a head pressure control's intelligent positioner, instead of removing the entire valve;
• Reduced valves selected for repair during a planned shutdown from 60% to 5% for an estimated savings of €54,600 per unit per shutdown.

KEEP ON GOING

To forge ahead after winning their 2010 Plant of the Year Award, Bereznai, Bartók and their colleagues have launched expansions and multiple diagnostic and maintenance projects to bring similar benefits to other facilities at MOL Danube. So far, they've pushed its use of FieldComm Group technologies up to 3,680 HART devices, 413 Foundation Fieldbus devices and 42 *Wireless*HART devices and six gateways, which receive signals from 32 wireless devices usually measuring temperature and corrosion. They're also planning to adopt HART-IP (Internet protocol) with their OSIsoft PI historian and software. This adds up to about 4,700 intelligent instruments on the 15 units connected to SAP-PM CMMS.

"MOL Danube has executed many reliability improvements since 2008 by using OSIsoft PI as an operations technology (OT) data infrastructure for predictive, proactive analytics," adds Tibor Komróczki, head of process information and automation at MOL Danube. "PI delivers strategic business value through 400,000 tags in four high-availability (HA) collectives. Server virtualization and HA configuration have reduced maintenance and hardware costs and increased system availability. The system contains 300 smart-element and 150 notification templates complemented by 61,000 event frames including dynamic solutions. MOL is also rolling out Microsoft Azure-based machine learning (ML) to let enterprise intelligence reinforce use of data and establish analytics-based decisions. Digital transformation is reengineering workflow around enhanced and consistent information and changing data management paradigms."

PHASE 2: DUPLICATE AND BRANCH OUT

To provide its diagnostics, maintenance and integration methods to MOL Danube's other processes and departments, Bereznai reports at least 10 projects are planned, underway or completed. They include:

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"We decided to launch more projects because a wider circle of departments were interested and we got a lot of support from management," says Bereznai. "This all started with combining and integrating valve diagnostics and field instrumentation systems, but it's expanded beyond them to include safety interlocks, heat exchangers and other applications."