



Managing aging plants with Emerson Solutions

Aging facilities contain risks. Equipment deterioration and antiquated system inefficiencies affect the bottom line. Facility managers have to take a good hard look at where solution-driven efficiencies can improve production, data, reliability, and safety. Moreover, with the reduction of plant personnel at many compressor stations, especially the operating and maintenance staff, some of these facilities are virtually unmanned. Emerson provides an offering called a 'Station Walk-Down' to their customers whereby Emerson's staff literally walk into a facility and evaluate all of the Emerson equipment that is installed there. Their customers appear to love it since, through these measures, Emerson makes their customers aware of everything they should do to upgrade their on-site equipment. These customers then know exactly what to plan and budget for in the way of future maintenance, which saves expenditure in the long run and, perhaps more importantly, ensures that things remain absolutely safe.

By John Butterfield

WirelessHART Package Benefits

- **Higher Production Efficiency** – Better response time, less downtime, reduced spills and clean up means more time focused on production efficiencies.
- **Improved Plant Personnel Efficiency** – Plant personnel will spend less time moving around operating and monitoring valves, and reduced hazardous area exposure.
- **Increased Personnel Safety** – There's no more need for plant personnel to climb ladders or access difficult locations on-site during bad weather, hazardous areas, or difficult situations.
- **Protect the Environment** – Reduction of incidents that may harm the environment, cost money and harm a plant's reputation.
- **Reduced Lost Batches** – Closed loop control means no human error or lapses from open loop control.

Emerson's Wireless Valve Operating System™ (VOS) and Automated Valve Package (AVP) combine a 4300 series wireless controller, actuator, accessories (for VOS) and valve (for AVP) as a complete kit. Value is created by simplifying the entire procurement process. Both the VOS and AVP assemblies can be installed on-site as a complete unit, fully documented and ready for use. Both would be ideal for any aging infrastructure.

Even though orders might not occur for months after a station-walk-down, Emerson's commitment to this on-site evaluation process proves time and time again invaluable to the customer. "With decades of hands-on experience working with customers, both large and small, who have out of date infrastructures, we analyze underperforming systems, loss of revenue impacts, and risks of failure. Customers engage us to scrutinize current capacity, measure efficiency, assess remaining useful life and risk of failure, potential areas for growth, and review overall compliance of the facility engineering and delivery systems," says Terri Melle-Johnson, Global Marketing Communications Manager, Bettis Actuation Technologies at Emerson. They then provide customized recommendations and modifications to



optimize equipment enhancements, longevity, risk reduction, and positive impact on ROI.

For example, Emerson's Bettis™ EHO Electric-Hydraulic Operator was designed for electric powered actuators applications requiring fail-safe capability when the electric powered actuator has a low power consumption requirement and requires fast close or open stroking times. Many remote aging pipelines do not have reliable electric-power sources, which is why Emerson's EHO can also be solar powered. The technology answers the critical pump station emergency shutdown service requirement with reliability and safety. Furthermore, the SMART EHO integrates with Emerson's new DCmlink Diagnostic, Configuration and Monitoring Software enhancing plant productivity by unifying all electric actuators on a common platform while allowing plant operators to gain deeper insights into asset status and performance.

Emerson's Bettis™ RPE-Series is another example of decades of expertise and innovation, helping businesses automate their production, processes and distribution capabilities to improve plant reliability. This rack and pinion actuator is designed to be rugged enough for extreme temperatures and harsh environments. "With a unique corrosion resistance design to exceed the requirements of ASTM B117, 500 hours, plant operators can install the RPE-Series knowing they are extending the life of costly assets, improving safety compliance, lowering costs, and increasing overall productivity," continues Terri Melle-Johnson. Looking to automate business pro-

cesses for the chemical, oil and gas, refining, pulp and paper, power, water and wastewater treatment, mining and metals, food and beverage, and life sciences industries, the 'Emerson way' is to combine products and technology with industry-specific engineering, consulting, project management and maintenance services. "We embrace a solutions approach to solve the toughest industry applications with leading edge innovation providing safer, more cost effective and extended asset reliability," comments Ms. Melle-Johnson. As demands on plant performance have increased and global industry regulations tighten, the level of Emerson's products have also risen to meet these challenges with improvements in materials, operational features, and software technologies all impacting life cycle and maintenance.

"Today's clients seek smart, reliable complete valve operating solutions to help improve overall business performance and profitability. Eventually, aging mechanisms will affect the actuator-valve assembly," she tells us. Currently, many of the on-and off valves in existing plants are manually operated and may not have been automated due to the high cost of hardwiring. Manual valves require operators to go to the field to manually open and close the valve, which is not only time consuming but very inefficient.

Advances in wireless technology

WirelessHART technology enables Emerson's customers to remove plant personnel from potentially hazardous environments and create real value for the customer by reducing the risk to human life. As such, by modernizing

their manual on-off valves with wireless on-off valve controllers, existing plants are creating real value. Manual valves have high operational costs. Project managers and engineers know that automation and control project approval face capital investment, and wiring and installation cost barriers. Engineers usually compromise by not regularly automating the valves leading to increasing risks, exposing personnel to plant hazards, and faulty batches and discharges compromising the surrounding environment. Using manual valves, with no monitoring, can lead to overflows and bad process batches when valves cannot be shut down on time. Lack of manual valve monitoring can also mean the batch quality could be compromised. WirelessHART monitoring, control, and automation can offset the operational challenges without added costs to wiring and installation. Moreover, accessing real-time monitoring and feedback provides a valve's specific position in relationship to the process' fill activity that the control room and batch operators can use to attain batch accuracy.

Jonas Berge, Director of Applied Technology at Emerson Process Management, says "The WirelessHART digital communication technology enables on-off valves to be automated without running any wires or using I/O card channels on the control system. Moreover, the installation is low risk since cable trays and junction boxes need not be opened. A WirelessHART gateway is installed at the edge of the plant unit and integrates with the existing control system. This control system uses Modbus/RTU, Modbus/TCP, or OPC commu-



Bettis EHO

How to avoid unplanned shutdowns, unnecessary maintenance and replacements

"Real time valve performance information is imperative to avert costly, unplanned shutdowns and unnecessary valve maintenance or replacement," states Jonas



Berge. "Just released in December 2015, our new DCMLink Software is the command and control software used for all Bettis and EIM Electric actuators. It is effectively an innovative software platform that enhances plant productivity by unifying all electric actuators on a common platform while allowing plant operators to gain deeper insights into asset status and performance."

For example, its properties enable users to configure, monitor and diagnose all electric actuators from a central location independent of protocol, actuator, or host system. The software extends the useful life of field assets by providing actuator data gathering, condition monitoring, events log and prioritization of actuator alarms in a unified and consistent user interface. It further allows customers to have real-time actuator status and remote monitoring with live trending of critical parameters of over 50 alarms.

In fact, whether it is viewing value torque profile, live trending data or actionable alarms straight from the actuator, plant operators are able to access detailed monitoring and diagnostics data, allowing them to take action before a fault occurs. It also offers advanced control and diagnostics, including torque profile curves, initiating partial stroke test or emergency shut down and alarms in NE-107 format. The current communications support included Modbus, TCP-IP, and Bluetooth.

Terri Melle-Johnson: "Emerson leads in developing a single, unified actuator platform technology for electric actuators. DCMLink provides real-time actuator monitoring and control, integrated management of asset data, profiles, alarm and event logs from one dashboard for multiple actuators. Plant operators no longer have to walk around with a laptop to upgrade multiple actuators in the plant or visit hazardous locations."

nication to send 'open' and 'close' commands to the valve via the wireless gateway and to read the feedback, while other software uses HART-IP communication to write configuration settings and read the diagnostics. The same wireless gateway is also the access point for various other wireless transmitters around the plant used for

asset monitoring to improve reliability and maintenance, sub-metering for energy efficiency, and monitoring various other points for reduced HS&E risk." WirelessHART therefore enables fast operation and status feedback and determination of valve status in real-time. Plant operators can then make critical decisions to avoid environmental spills before they occur:

Fill: The use of manual valves, with no monitoring, can lead to overflows and bad process batches when valves are not shut down on time. The lack of monitoring in manual valves can also mean process variables can compromise the quality of a batch when it is not operated in time.

Flush: Spills can result from manual flush valves left in the open position or drain valves not set properly, leading to various process or environmental issues. Discrete valves controlled with a solenoid alone are not as effective as integrating continuous feedback of the valve position.

Drain: Delays in processing caused by waiting for plant personnel to manually operate or report the status of your drain valves can be cumulative.

Transfer or Dump: Unwanted variables in the process caused by lack of automation feedback and mechanical switch issues reduce quality and compromise operations and batches. When timing is critical, the risks are even higher. Uncontrolled variables caused by manual operation delays and unreported faulty mechanical operation without increasing installation and maintenance costs with wireless valve automation can be reduced.

"In a nutshell," says Terri Melle-Johnson "they are cost effective, flexible, and secure. They have the ability to monitor and trend with predictability, relying less on manual visits and improve decision making. Further, valve diagnostic information can be easily transmitted to control rooms, where the information can be quickly assessed and decisions made. They are ideal for monitoring hard-to-reach valves and are perfect for controlled valves that have no feedback capabilities or that may have issues. Wireless HART is also a great solution for sticky valves that are sometimes a headache. Other plus points are that they provide feedback



Emerson's RPE-Series

and control capability, reduce operator error, and saves on wiring costs." WirelessHART also permits valve operations to be executed with precise timing, reducing variables and increasing batch quality. Faulty valves can be identified immediately before critical process operations are executed.

Conclusions

Historically, analog devices have had no clear way of determining if a value is invalid or even reliable. Fieldbus can save money when decisions are made using real-time, validated data. Emerson Fieldbus technology, combined with reviewing the viability of upgrading obsolete and outdated existing instrumentation systems, should be considered an ideal solution for a legacy plant. Emerson's experts work with their clients at the project phase, and operations and maintenance phase to assess the best digital plant architecture. Benefits of open standard digital plant architecture with Fieldbus technology have been proven with many installations around the world.



Emerson's Bettis actuation products are built for industrial automation applications to provide high performance and safety reliability.

Smart Fieldbus communications

Digital technology is driving change and closing the gap between digital data communication automation systems and field devices. Many aged plants still rely upon out-dated analog, cabling systems using connections of traditional control systems often involving long runs of cable from the control room to the plant. This wiring setup can be very expensive to install, complex to maintain and make fault finding extremely difficult.

Fieldbus is used for increasing productivity in, for example, chemical plants, as they allow precise measurement of operating conditions. Two-way high-bandwidth digital communications with each field device provides the type of information needed by the control system to improve productivity and reliability. It allows problem free data availability, reduces documentation, reduces signal disturbances and allows the actuator to provide precision positioning in response to modulating loop control demands or discrete Open, Stop, Close commands. Moreover, Fieldbus provides a cost-saving potential, providing seamless communication from the actuator and sensor level to the asset management level like early prediction of sensor failures and potential damages to the assets.

Fieldbus communications enable the system to become more efficient in identifying failures, archiving, performing trend analysis and process optimization, and allows for predictive maintenance and for better asset management. This drive to improve the availability of information can lead to an increase of plant life cycle and reduce the total cost of ownership. By integrating the Fieldbus technology, a plant may additionally experience a significant reduction in installation costs from the reduced wiring, connections and junction boxes, marshalling cabinets, cable trays and supports. Fewer wires require fewer cables to be purchased, fewer cable trays, conduits, and reduced termination work. "It all adds up and through implementing a Fieldbus communication system, plant operation and maintenance personnel can be notified quickly of failures and corrective actions taken quickly and safely," adds Terri Melle-Johnson.