

Improving asset performance begins with data. Customers first need to measure and understand baseline performance. Innovative connectivity technologies make it easier and more cost-effective to access relevant real-time data on operational domains such as safety, reliability, and optimisation.

By Sarah Bradley



## Emerson Automation Solutions: Improving Asset Performance

**E**merson Automation Solutions recognises the critical importance of ensuring that sites operate safely, effectively, and economically. Valves and supporting technologies are vital assets supporting this operation at sites.

Together, Emerson's technical engineering expertise and project management capability ensures project excellence. Also, an extensive lifecycle services footprint, highly trained service organisation, and predictive monitoring capability provide operational excellence related to valve performance.

Connectivity is essential to ensure that data received is seamlessly connected to operational applications or the appropriate expert. New designs and architectural approaches can enable the secure export of data to anyone, anywhere, with the requisite permissions. Once the data is securely obtained, a broad portfolio of scalable analytics, both on-premise and cloud-based, can be used to leverage embedded expertise and human-centred dashboards. These tools generate new insights that can be delivered to the right person at the right time, wherever they may be, to enable smart, fast, and actionable decision-making.

### Simple method

Most end users include some wireless instrumentation in plant procedures, but they could quickly add more to improve operations, cutting

energy use and enhancing safety. Industrial wireless networks and sensors can be used in a wide range of process measurements, usually offering dramatically lower costs compared to wired alternatives, with faster installation times and minimal disruption.

Using wireless technology on an electric actuator provides a simple method to harness diagnostic data stranded in these hard-to-reach valves, giving the end user an effective means of delivering control commands, which are typically conveyed through wiring.

Wireless solutions connect valve actuators that are outside the end user's main plant control infrastructure. The end user, applying wireless technology to gather data on hidden valves in their plant system, sends input control commands to valves, which are typically operated manually.





level. Adding computing power to analyse all sensor-level data in real time delivers technical superiority.

Because the device information remains relevant as the infrastructure matures, future-proofing is assured. The availability of device prognostic data means that effective predictive maintenance is provided immediately.

Products like Emerson's ASCO G3 platform extend the intelligence of pneumatic field-bus manifolds to perform IIoT data analytics locally – at the device level. To provide smarter pneumatics, a modular, scalable distributed input/output system needs to be integrated into pneumatic valve manifolds. Centralised and distributed applications can use the same modules to increase flexibility and reduce complexity.

The ASCO G3 platform provides this functionality and uses an integrated LCD graphics display for configuration, point-of-use diagnostics, and prognostics. Device-level analytical capabilities circumvent the PLC for data-gathering, while simple mobile apps convey the critical issues that affect machine and component functions. Higher-level computing resources are not required, but edge and cloud computing are supported.

Smarter pneumatics allow the simple aggregation and analytics of non-complex data, including the monitoring of valve-cylinder performance, FRL filter, leakage, and mission time.

With the proper analysis, IIoT data can allow accurate predictions to be made, avoiding

Also, utilising wireless communication for control does not interfere with existing plantwide systems. Captured data from these stranded valves provide operators with information that can be used to prevent unplanned shutdowns, by using existing diagnostics available within the current plant control system.

### Smarter pneumatics

The standards and infrastructure for the Industrial Internet of Things (IIoT) are

continually evolving, driven by programmable logic controller (PLC) manufacturers. A future-proof platform starts with embedded intelligence at the device level. Local analytics at the device level is required for a number of reasons, including delivering the ability to gather relevant and useful information on smart pneumatic devices, regardless of plant infrastructure. They also ensure there is no change to the PLC program, since all diagnostic and prognostic information takes place at the device



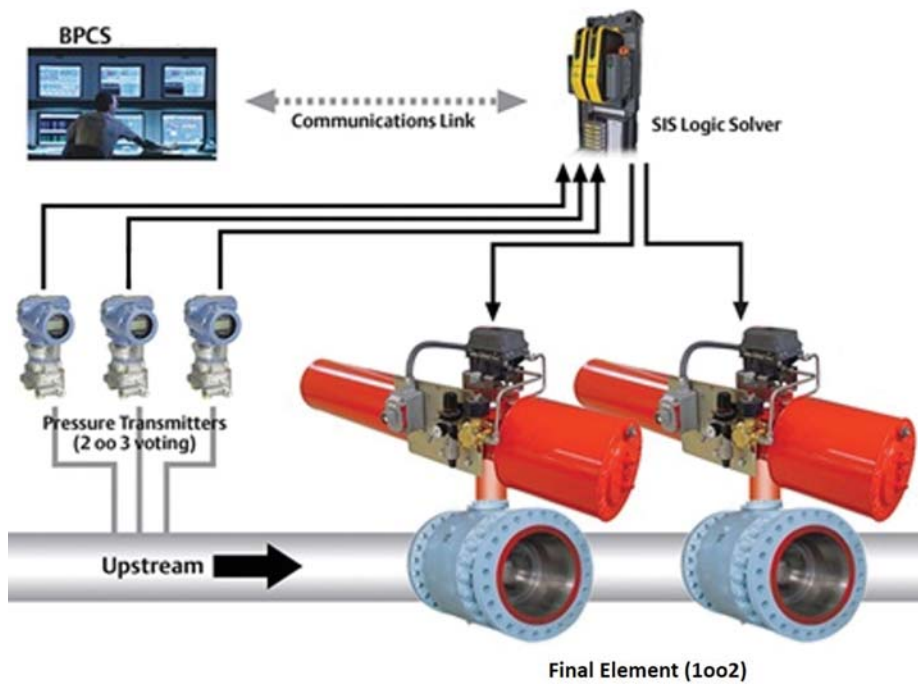
### Unlocking value

A two-solenoid safety methodology, as utilised by the emergency shutdown (ESD) block valve, provides better plant protection, improves uptime, and enables closer adherence to functional safety requirements.

The ESD block valve is part of the final element in a Safety Instrumented System (SIS), which is required by law on any equipment processing hazardous chemicals. While the primary process control system is designed to prevent incidents by way of process alarms and operator intervention, the SIS provides an additional layer of protection to prevent and mitigate the effects of potential danger.

In many SIS applications, the solenoid valve remains energised in the open position during normal operation – this indirectly acknowledges energise to trip applications. Should the system detect overpressure or other dangerous conditions; however, the valve moves to the closed position – activating the ESD valve to stop the process flow.

Despite its critical role in ensuring the safety of the facility, equipment, and personnel, the solenoid valve is rarely called into action. It can, therefore, remain in the same position for months or even years, increasing the possibility that it will fail to close on command. The most significant cause of this failure is stiction – the static friction that must be overcome for a stationary body in contact with another surface to be set in motion. Emerson expertise developed a redundant control system technology for solenoid block valves, combining an excellent level of safety with a very high level of reliability. This involved maximising the flow pathways of the manifold to achieve the fastest possible closure time, while also producing the smallest, lightest device for easy installation. By designing the technology into the manifold, Emerson also eliminated many of the sources of maintenance errors, further enhancing installation reliability.



component and system failures. This reduces downtime, maintenance and inventory costs, improves machine health, leads to higher yields of better quality, and increases overall equipment effectiveness.

### Smart, discrete valve controllers

Smart and efficient solutions allow plants, platforms, and pipelines to be managed and controlled intelligently under the

most demanding and extreme conditions. Whether it is position monitoring or control for automated on-off valves, Emerson's TopWorx™ technologies are at the forefront of this innovation in the process automation industry. Using wireless technologies and Fieldbus protocols like Foundation Fieldbus, DeviceNet, and HART reduces the cost of ownership and enables predictive maintenance.

TopWorx D-Series discrete valve controllers enable automated on-off valves to communicate via a broad range of digital protocols, providing advanced diagnostic and monitoring capabilities that support improved operational efficiency and maintenance planning.

Products in the D-Series range attach to all rotary and linear valves and actuators, operating in the most demanding environmental conditions and have multiple certifications for hazardous area deployment. They can be used in applications including SIL3 Emergency Shutdown Devices, global containment, and explosive or corrosive environments.

For example, a combination of TopWorx and Rosemount technology with Emerson Lifecycle Services expertise was used to deliver a \$530k safety shower monitoring solution at the Dow Chemical St. Charles Operation site in Louisiana. Wireless hardware for 120 safety showers, covering more than 400 acres was provided.

The TopWorx D-Series features limit switch position monitoring that confirms the information received from a properly functioning monitor. This functionality ensures that the critical on-off valve is in the correct position.

With the addition of a HART 7 position transmitter option, D-Series devices provide the advanced diagnostic and monitoring capabilities essential for improved operational efficiency and maintenance planning.

### Lifecycle services

For the overall, top-level supervision of continuous plant performance, Emerson's Lifecycle Services offering provides the expertise, technology, and processes to help customers operate safely, improve asset reliability, and optimise process capabilities. This support keeps plants operating safely, consistently, and economically, improving asset reliability and optimising plant performance to achieve business goals. The Lifecycle Services approach utilises a digital-enabled process, using a series of intelligent tools within the plant.

One of the essential tools is the Walkdown App, which verifies the installed base and allows for visual health inspections. As the name suggests, it is utilised during a plant walk down and captures all pertinent asset data, so that decisions can be made on further action. Work scoping for a scheduled shutdown, turnaround, and outage (STO) is made easier using this tool.

The Walk down App can read asset management tags fitted to assets within the plant. These tags utilise proprietary RFID read/write technology, allowing digital

## Case study 1: Smart, reliable emergency shutdowns

### The challenge:

Despite remote locations, ageing infrastructure, and disconnected plant communication networks, customers need reliable actions from their valve control systems. For example, in the Permian Basin of West Texas, many companies operating crude oil and natural gas fields face several challenges managing remote sites. A leading oil and gas company started the redesign of its well pads and was looking for alternatives to set the new standard to use for their kill valves (shutdown) used in rod pump and artificial lift applications.

The company's existing standard for these ESDs was an electric actuator with a battery backup device, which was highly unreliable given the location.

### The solution:

Emerson's Bettis™ RTS Series of smart, electric actuators with true mechanical fail-safe provided the customer with improved operational certainty and reliability for their critical ESD valves. The battery backups on the competitor's electric actuators were considered the weakest point and were extremely expensive, with battery backup increasingly seen as an unreliable way to meet the shutdown requirement.

A robust and true fail-safe solution, driven by a mechanical spring mechanism for emergency shutdown operation, improved asset reliability and operational maintenance on the critical remote sites. This solution did not require frequent maintenance in the field, making it ideal for this application.

After months of evaluating multiple solutions, the RTS FQ (Fail-safe Quarter-turn) Series actuator was selected. This device has low power consumption, SIL3 capability, a mechanical spring return function, and adjustable fail-safe operating time, making it the optimal solution for the critical on-off valve application at these sites.



improving safety and accessibility. Asset management tags significantly shorten walk downs, allowing engineers to acquire the required construction data digitally. They also enable the correct equipment to be identified for rapid ordering and supply.

Tag data can also replace missing, damaged, or obscured metal nameplates. Plant personnel can walk up to the equipment, read the tag data, save that data to a list, then export it to a spreadsheet or other database. This information can also be used for assets in remote sites, where a computerized maintenance management system (CMMS) cannot be justified, economically or physically. Users can write notes on the tag that will be available to view in future RFID reads.

### Main valve partner

All and all, by leveraging its expertise and experience across all aspects of the asset lifecycle, Emerson aims to help customers achieve Top Quartile outcomes on all valve, actuator, and regulator assets, delivering results that put them in the top 25 percent of businesses in their sector. This customer approach is defined by Emerson as its Main Valve Partner™ relationship and is characterised by early engagement and long-term lifecycle involvement. With this established close co-operation with customers, extensive project ranges, and smart, innovative analytics, Emerson provides a full, cost-effective turnkey solution to ensure continued plant operation with reliability and safety.

identification of any object without line of sight transcription. This enables better maintenance efficiency and eliminates human error. Asset management tags deliver rapid information benefits to customers. For example, if a valve has spent a significant amount of time in storage, the user can scan the RFID-readable tag to find out the shipped date. It is not necessary for the user to touch the equipment, thus

## Case Study 2: Operating and managing tank farm ESD valves

### The challenge:

Bulk liquid terminals are key logistics storage points within the oil and gas, chemical and petrochemical value chains as products move through supply chains to markets around the globe. They provide raw, intermediate, and finished product storage to producers, processors, marketers, commodity traders, third-party logistics providers, transportation companies, strategic storage, and local distributors.

Terminals are increasingly challenged to meet changing customer and market demands to move and store more products faster and safer. This requires more sophisticated actuation and ESD diagnostic systems to ensure steady throughput, without compromising safety or the environment.

The rise in the number of products has resulted in a trend for operations such as blending to move out of refineries and into terminals closer to distribution points, adding additional complexity to traditional terminal operations. This additional complexity makes diagnostics a must on the inlet ESD valves to ensure tank farm operators know that their ESD valves are operating optimally and will provide the reliable fail-safe operation when an ESD situation occurs.

### The solution:

Emerson's Bettis Smart Electro-Hydraulic Operator (EHO) is a self-contained electro-hydraulic packaged solution designed to operate and monitor actuation on a tank farm's inlet ESD valves.

The Bettis EHO provides a reliable mechanical spring for the fail-safe operation and has integrated diagnostic technology to provide tank farm operators with critical information about their ESD valve's operation. The actuator offers over 15 different alerts and alarms, can provide hydraulic pressure vs position profiling, can perform both partial and full stroke testing, is SIL3 capable, has configurable relays for discrete and alarm indication, and can easily integrate to existing communication systems either through wired or wireless configurations. The Bettis Smart EHO packages the management and monitoring of the ESD valve's operation all in one solution.

