

Integrated safety

Online diagnosis reduces failure risk of safety loops

PlantWeb Smart SIS architecture increases plant safety with the help of digital intelligence. It enhances field-proven process automation architecture by allowing production plants to be upgraded to a higher safety standard. Smart SIS makes use of extensive diagnostic functionalities – from sensors through the control system to safety valves – to provide an integrated, consistently safe instrumentation and control loop.

Safety systems serve to take chemical plants to a safe state in case of a problem. A safety loop usually consists of a measuring sensor, a control system and a shutdown valve. In contrast with process valves, which are constantly in use, shutdown valves are needed only in case of a fault. They represent a static system, which is not allowed to fail in an emergency situation. A quick glance at the statistics is sufficient to confirm that approximately 50% of all loop failures are accompanied by a valve failure. In 42% of these cases, the measuring instrument is at fault, while only 8% of all losses are attributable to the control system. Traditional safety systems avoid failures using techniques such as bypass valves or annual plant shutdowns, which allow the valve to be operated with the full stroke. This is the only way to ensure that they do not stick. This procedure is both complex and expensive as well as increasing the risk to personnel, who have to carry out the work in the field, and requires a large

number of manual actions to remove the circuit from operation and then start it up again. The PlantWeb Smart SIS architecture from Emerson Process Management is designed to overcome these problems. Smart SIS solutions are built from proven PlantWeb technologies – including intelligent field devices, predictive diagnostics and digital communications – that are already demonstrating their value in thousands of mainstream process automation projects around the world. For safety applications, PlantWeb Smart SIS solutions assure a SIL3 approach that includes transmitters and valve controllers certified to IEC 61508 as well as SIL3-rated safety systems.

Powered by PlantWeb technologies, Smart SIS solutions are easily integrated with mainstream process control systems to enable a facility-wide overview, while maintaining the separation of safety-critical elements required by IEC standards. Safety data and alarms are presented on Emer-

son's DeltaV operator console, stored in its Historian and passed to the AMS Suite Intelligent Device Manager for integrated documentation and management.

Safety System as a key component

The DeltaV Safety System is the heart of the PlantWeb Smart SIS safety management architecture. Comprised of sixteen-channel modular logic solvers, the Safety System can be deployed in distributed fashion to perform programmable electronic system functions for virtually any safety need. The Safety System is rated for SIL1-3 safety applications in compliance with the stringent international standard IEC 61508 for safety functionality, and has been designed to integrate all the necessary tools to fulfil the customer design requirements of IEC 61511. To help simplify process manufacturers' compliance efforts with IEC 61511, the Safety System delivers a Version Control and Audit Trail (VCAT) within the DeltaV Safety System software and AMS Intelligent Device Manager. Changes to the Safety System are recorded, including the date, time, author and alarm limits. Plant Messenger directs events with corrective actions to the relevant department by e-mail, text message or pager. Plant Historian documents all events automatically. The DeltaV Safety System uses the diagnostic functionalities integrated in field devices to increase the availability of the overall PlantWeb Smart SIS safety management solution. Scheduled partial stroking of final control elements improves the safety level, reduces the number of hazardous personnel trips into the field and extends the mandatory proof test interval.

The scaleable Safety System makes the sep-

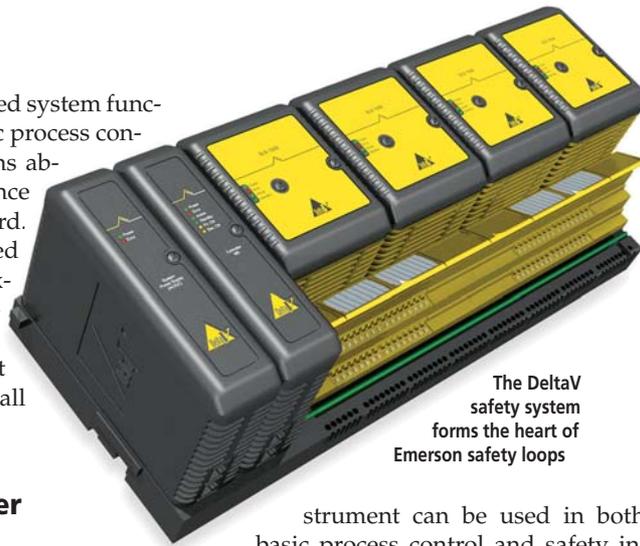


Safety-related systems must take the plant to a safe state in case of a problem

ation of safety instrumented system functions from mainstream basic process control system (BPCS) functions absolutely secure in accordance with the IEC 61508 standard. Each modular, self-contained Safety System unit has sixteen configurable I/O channels and can be installed wherever it is needed to fit the size and distribution of all safety applications.

Pressure transmitter to IEC 61508

For the first time, a field-proven, highly reliable device for basic process control can be converted easily to a TÜV-certified pressure transmitter for use in a SIL2 or SIL3 safety instrumented system. Made possible by the scalable architecture of the Rosemount 3051S, supervisory electronics are simply added to the transmitter either at the time of ordering or after purchase as a “plug and play” upgrade in the field. Utilising certified devices for safety applications eases user compliance with the new IEC 61511/ANSI ISA 84.00.01 (2004) safety standards for the process industry sector and minimises the costly documentation and analysis efforts associated with the alternative prior-use methodology. Customer costs are further reduced by eliminating duplicate training, maintenance and inventory costs, because the same pressure in-



The DeltaV safety system forms the heart of Emerson safety loops

strument can be used in both basic process control and safety instrumented systems. The flexible 3051S SuperModule design platform also offers a complete family of primary elements, diaphragm seal assemblies and instrument manifolds, which enable highly integrated and compact measurement solutions to serve all the flow, level and pressure applications in a process plant.

The mandatory proof test intervals can be extended to 5 years, eliminating unnecessary process interruptions and risks to personnel. The robust, hermetically sealed 316L stainless steel SuperModule housing is designed to withstand the harshest field environments. The 3051S integrated solutions allow the transmitter to be direct-mounted close to the process, providing safer and more reliable measurements and reducing potential leak points by 90%. Unparalleled performance and advanced diagnostics ensure that the most accurate

and timely process information is available for making critical decisions.

Temperature measurement

The Rosemount 3144P temperature transmitter is also available with a safety certification as per IEC 61508. Existing 3144P users can now upgrade to a safety-certified transmitter simply by replacing the standard electronics assembly with a safety-certified assembly.

The Rosemount 3144P comes with both single and dual sensor input capabilities, which are factory or field-configurable. The addition of device and process diagnostics increases the reliability of the temperature measurement and generates operational savings.

The hot backup feature in a dual sensor configuration protects the user’s investment by automatically switching to the backup sensor if the primary sensor fails, providing affordable sensor redundancy. The sensor drift alert feature notifies the user if an unreliable measurement is detected, allowing time for the degrading sensor to be replaced before failure.

Components of Smart SIS

- DeltaV SIS Safety System that communicates with safety-certified sensors and final control elements. This Safety System uses the same engineering tools and interfaces as Emerson’s DeltaV digital automation system for process control, enabling Safety System data to be viewed from any control system interface.
- Sensors such as the certified Rosemount 3051S pressure and 3144P temperature transmitters, plus other flow and level measurement devices and analysers. Other sensors will be certified soon and are currently available for SIL 3 safety applications based on “proven in use” experience.
- Final control elements with partial stroke testing, including SIL-PAC emergency shutdown valves (ESD) comprised of Bettis, Hytork or El-O-Matic actuators and a certified Fisher DVC6000 digital valve controller, combined with any manufacturer’s valve to offer an integrated and tested unit.
- DeltaV Safety System software that includes an exclusive palette of TÜV-certified smart function blocks, enabling users to employ simple drag-and-drop techniques to accomplish tasks that required pages of coding in traditional safety systems.
- AMS Suite: Intelligent Device Manager software that documents and archives the system configuration and all changes, as well as system health information and alarms.



The Rosemount 3051S transmitter can be used simply by exchanging the electronics in safety-related applications