

INSTRUMENTATION AND CONTROL

A SMART APPROACH TO SAFETY

Safety is always at the forefront of consideration when designing and operating a plant. To ensure safe plant operation, safety instrumented systems (SIS) are installed that go into action when a dangerous condition is detected. Furthermore, stringent standards are continually being developed and refined to ensure the safe operation of SIS. One recently released standard making an impact on the chemical process industries (CPI) is IEC 61511, which is essentially a collection of the best practices accumulated by SIS users. Going hand-in-hand with this standard is IEC 61508, which targets manufacturers of safety-related equipment.

One key area defined in IEC 61511 is the selection of devices in SIS applications. According to the standard, there are only two ways for selecting such devices — proven in-use or compliance with IEC 61508. Proven in-use is based on prior use of the device, and requires an extensive verification check list, including the history of successful use, demonstration of performance, and specification of components. For a device to be IEC 61508-compliant, it must be certified by a third party, such as FM Global (Norwood, MA; www.fmglobal.com) or TÜV Rheinland Group (Cologne, Germany; www.tuv.com).

Coinciding with the recent release of IEC 61511, Emerson Process Management (Austin, TX; www.emerson-process.com) made its first foray into the field of safety with the launch of the PlantWeb Smart SIS safety management architecture. Taking a three-pronged approach, Emerson divided SIS into three key components — the final control element (e.g., valve), the sensor (e.g., pressure transmitter) and the logic solver (e.g., control system). According to the Offshore Reliability Database, “50% of SIS failure is caused by the final control element, 42% by the sensor, and only 8% by the logic solver,” says Duncan Schleiss, vice president of marketing at Emerson. “The focus, which has traditionally been on improving the logic solver, is only part of the solution,” he continues.

A long-time manufacturer of sensors, Emerson has developed supervisory electronics that can easily plug into an existing Emerson transmitter, effectively converting it into a TÜV-certified transmitter for applications that require safety integrity levels (SIL) of 2 or 3. SIL are defined and established in IEC 61508, with SIL 1 being the lowest level of safety integrity and SIL 4, the highest. This plug-in module is currently available for the Rosemount 3051S pressure and 3144P temperature transmitters, among other sensors.

Since the final control elements are the most common points of failure in an SIS, it is important to make sure that they will be operational when needed. Typically, these elements are manually checked while the process is offline during a plant shutdown or while the process is still running using a bypass valve. The key problem here is not only the expense to perform this task, but also the potential of exposing employees to hazardous situations.

To address these problems, Emerson has developed the FIELDVUE DVC6000 digital valve controller, which can remotely check the valve’s ability to operate by performing partial-stroking testing. For emergency shutdown solutions, the controller is TÜV-certified for use in SIL 3 applications.

Finally, at the heart of PlantWeb Smart SIS, is the DeltaV Safety System — the logic solver component that ties the sensor and final control element together.

Comprised of 16-channel modular logic solvers (DeltaV SLS 1508, see figure), the scalable safety system can be deployed in distributed fashion to carry out programmable electronic system functions for virtually any safety need. The system is rated for SIL 1–3 safety applications, in compliance with IEC 61508, and has been designed to integrate all the tools needed to fulfill customer design requirements of IEC 61511.

To help simplify process manufacturers’ compliance efforts with IEC 61511, the system delivers version control and audit trail (VCAT) within the DeltaV Safety System software and AMS Intelligent Device Manager. Changes to the system are recorded, including date, time, author or respective alarm level. Plant

Messenger directs the events with corrective actions to the relevant department via e-mail, text message SMS or pager. Plant Historian automatically documents all the events.

“The DeltaV Safety System provides easy implementation with its exclusive palette of certified smart function blocks,” states Schleiss. “These smart functions enable users to employ simple drag-and-drop techniques to accomplish tasks that require pages of coding in traditional safety systems.”

The benefits of such a system are significant, touts the company. “Using certified devices for safety applications eases user compliance to the new IEC 61511 safety standard for the process industry sector and minimizes the costly documentation and analysis efforts associated with the alternative prior-use methodology,” says Schleiss. Additionally, “customer costs are further reduced by eliminating duplicate training, maintenance, and inventory costs, because the same pressure instrument can be used in SIS and basic process control systems.”

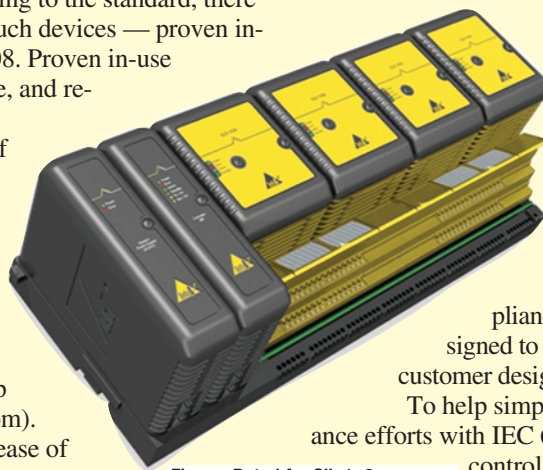


Figure. Rated for SIL 1–3 applications, the DeltaV SLS 1508 logic solvers features HART communications with safety sensors and final control elements.