Replacing Obsolescent Safety Trip System with DeltaV SIS™

RESULTS

- Compliance with latest safety standards including IEC61511
- Integrated smart device configuration with safety system
- Simplified smart device check out
- Smart device diagnostics reduce number of trips
- Local, reliable support for integrated control and safety system

"Access to smart diagnostics enables devices to be worked on before trips occur."

I&E Supervisor

APPLICATION

The plant includes production of ammonia, urea, nitric acid as well as a urea/ammonia nitrate solution. The safety system is to provide an emergency shutdown system for the entire facility.

CUSTOMER

The customer is a major producer of fertilizer in North America.

CHALLENGE

Since 1995, the main safety trip function for the complex had been provided by a 700-point standalone Triconex Triple-Modular Redundant (TMR) system, but by 2006 it was nearing the end of its useful life. Replacement parts would soon be unavailable, and the only maintenance interface to the system was an old PC that ran MS-DOS. Not only would a failure of that computer shut down the safety system (and the entire facility), but very few people at the plant were sufficiently familiar with DOS to use it. The supplier of the safety trip system provided very little engineering support; when maintenance was required the company had to call in a third party. On top of that, the existing safety system was unable to make use of the diagnostic information from the plant's many intelligent field instruments.

The goal of the company (and the company's insurers) was also to get the plants aligned with current safety standard IEC 61511, have access to smart device instrument diagnostics and have local, reliable system support.

DeltaV SIS

For more information:
www.Emerson.com/QBR
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SOLUTION

With Emerson's help, plant engineers began by evaluating the facility to come up with a safety requirements specification (SRS) document. The previous system had no proper documentation as to safety integrity levels (SILs). For the new installation, the team evaluated the required SIL rating for each trip and determined the appropriate SIL for all safety instrumented functions (SIFs). The system was then designed around that documentation. The previous system had lacked documentation, and there had been some concern that some of the trips might have to be as high as SIL 3. However, the team found that most loops needed were SIL 1, and a few loops were SIL 2. Not having SIL 3 loops significantly reduced the hardware cost of the system.

Three SIS systems were installed, with 354 I/O points: 84 analog inputs, 22 analog outputs, 170 discrete inputs and 78 discrete outputs. One critical choice was the degree of redundancy to use in the logic solvers. For most of the plant the choice was to use simplex logic solvers, but for the ammonia plant, which is critical to all other operations, duplex logic solvers were chosen.

One challenge that the project team had was completing everything —from PO to installation—in 16 weeks to be ready for a plant changeover. However, the project team, including both Emerson and the customer engineers, was able to meet the deadline. The DeltaV SIS hardware and connection to HART safety devices helped move the project along because of easy installation.

The DeltaV SIS made it possible to access the safety device information from the plant's Emerson AMS Suite asset management system. Access to the smart device diagnostics enables the customer to repair faulty devices while the plants are running, before the shutdown is tripped. Furthermore, the integration of the DeltaV™ system as the BPCS and DeltaV SIS system offered a tremendous amount of flexibility in managing trips that was not available before.

DeltaV SIS

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