Control System Monitors Expanded Fertilizer Production

By Nevenka Jevtic, Associate Editor

ARAUCÁRIA, BRAZIL — The Ultrafertil plant, located here, manufactures technical-grade urea, ammonia, methanol and sulfur that are used to produce environmentally friendly fertilizers.

The plant's urea production involves high-temperature (330°C) and high-pressure (150 bar) process equipment such as reactors and compressors. To monitor and control urea production, the company installed a PROVOX distributed control system (DCS) from Fisher-Rosemount Systems, Austin, Texas, in 1986. The system was very reliable and worked well.

Reaching capacity

In early 1998, Ultrafertil assembled a project team to ensure Y2K compliance for all microprocessor-based control systems at the Araucária location. At that time, the team discovered that the single-loop architecture the DCS used to monitor the urea plant had reached its capacity. It was unable to handle any future plant expansions, including a Y2K upgrade. Ultrafertil decided to replace the DCS with a more modern intuitive distributed system.

The project team assembled a long list of requirements for the new control system. First, it had to be reliable and easy to use. Second, migration from the old DCS to the new system had to be accomplished without production downtime. Third, because a plant expansion was in the works, the new system also had to be flexible enough to control the entire Araucária plant. Finally, because of tight budget constraints and currency exchange factors, executive management demanded a quick return on investment (ROI).

A request for quotation, along with the specification, was sent to the major automation system suppliers in the Brazilian market. Ultrafertil received detailed responses from most of the suppliers.

After evaluating the proposals for technical merit, the company made a final decision. The DeltaV system from Fisher-Rosemount Systems fit the bill.

New system implementation

The first step in implementing the control system involved installation of the unit itself. Because the hardware equipment for both the old DCS and the new automation system had to co-exist during the migration phase, availability of rack room space in the facility became a precious commodity. Wall mounting the system hardware immediately reduced cost.

"By wall mounting the new system hardware, we were able to [keep] hardware for both systems and avoid a process shutdown," says Valdir Jose Caobianco, maintenance department manager and the team's leader.

Two monitors located at the same workstation allowed the operator to navigate seamlessly from one screen to the other. This made a larger portion of the process more visible.

"One thing that was highly advantageous to us was the involvement of the operators in our graphic display development and training processes," says Caobianco. "The operators themselves developed most of the graphical interface for the new system. The embedded simulation software included with the new system allowed Ultrafertil to start the operator training effort concurrently with the system configuration effort."

The time needed for configuration of the new system also was reduced significantly. For example, because the DeltaV system is based on the Microsoft Windows NT platform, Ultrafertil was able to import instrument tag lists directly from a Microsoft Excel spreadsheet to the new system database, eliminating the need for data re-entry.

"Based on our experience, the team estimated that the new system provided us with a 75 percent savings in the configuration effort compared to a conventional system," says Caobianco. "The system configuration effort allowed more participation on the part of the unit staff, so that we had the best results in presenting the system to the people who will use it, to the people involved in operations, as well as in maintenance."

Added benefits

The DeltaV system also includes asset management software. "There is virtually no reason, other than replacing a field-mounted device, to send a maintenance technician out in the field," says Caobianco. "We can perform virtually all maintenance functions such as re-ranging transmitters or analyzing valve hysteresis from the new system console. With this, maintenance time is reduced, as [are] the risks involved in the maintenance process."

The Ultrafertil plant manufactures technical-grade urea, as well as ammonia, methanol and sulfur.

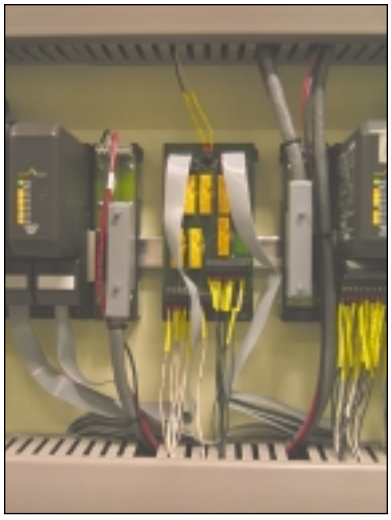
Replacing a failed I/O card is easy too, according to Laertez Ruiz Munhoz, instrumentation supervisor. Cards can be replaced without stopping the system, he explains. A card is removed with a screwdriver and its replacement then is inserted. "After a few seconds, the system will automatically recognize this new card without having to load it," he adds.

Cristiano Azevedo, process engineer, also has benefited from the productivity gains offered by the new system. "In the past, we generated monthly reports which usually took us three or four days to generate," he says. "Now, the new system holds all of the [historical] data and we can automatically calculate averages, deviation, minimum and maximum values, etc. The reports are now generated on demand and in real-time."

Fisher-Rosemount also is pleased with the system implementation and performance at the Ultrafertil fertilizer plant.

"We were very pleased with Ultrafertil's success with this DeltaV installation," says Claudio Makarovsky, director of sales for Fisher-Rosemount Brazil. "What is particularly impressive is the fact that they were able to make the conversion from their old system to the new while remaining on-line.

"This is a testimonial to both their talented engineering staff and the ease-of-use built into our DeltaV system," he continues. "This was the first installation in Latin America using our dual-headed operator interface. This gave the Ultrafertil operators a much better view of what was occurring in this large process manufacturing operation by showing them twice the amount of information that was previously possible. Our involvement with this project was limited to supplying the material, training, and providing limited assistance during startup. The team at Ultrafertil took this project on and achieved a really gratifying success."



A view inside the DeltaV control system is shown.

Future potential

Ultrafertil currently is expanding the use of the DeltaV system to control all the units within the plant. "With the new system purchased to handle 20,000 points (optionally expandable to handle even larger sizes), we are in the planning phases to extend the unused capacity of the new system to the ammonia, methanol and sulfur recovery plants," says Caobianco. "We've also been working on ways to integrate other existing automation systems, including PLCs from several manufacturers. Our goal in integration is to bring this information resident in other systems to the new system."