WWW.CHEMICALPROCESSING.COM

CHEMICAL PROCESSING

LEADERSHIP | EXPERTISE | INNOVATION

MAKING IT WORK

Plant Gains Extra Output and More

Automation upgrade to polystyrene unit also extends asset life and boosts reliability

By Adolfo Suiffet and Roberto Gorbaran, Petrobras Zarate, and Mario Blanco, Emerson Process Management Argentina

PETROBRAS ZARATE, in Zarate, 80 km. north of Buenos Aires, Argentina, produces high impact and general purpose (crystal) polystyrene. The firm, a part of Petrobras Energia, an integrated energy company based in Buenos Aires, sells 90% of the polystyrene to customers in Argentina, with the remainder exported to other South American countries, including Peru, Chile, Bolivia and Brazil. The company also makes bi-oriented polystyrene, which is exported to North and South America and Europe. However, its plant, which operates 24/7, couldn't expand output to take advantage of a strong polystyrene market.

The plant, which started production in 1986, was limited by its 1980s-era distributed control system (DCS). That system lacked modern tools to facilitate a predictive maintenance strategy that would help reduce emergency maintenance and downtime, better optimize aging assets and boost production. The company also wanted a system that would produce reliable data that could be shared by decision-makers at all levels of the organization, including upper management interested in the facility's key performance indicators.

So, management decided that modernization of the automation system was necessary — and that it must be accomplished in stages and without stoppages to stay within budget and minimize risk. Re-instrumentation was needed but the new digital network also would have to seamlessly connect to some existing assets. Along with the technological migration, the company would have to bring operators and maintenance staff on-board quickly and realign work practices to follow a predictive, intelligence-based maintenance philosophy. Training would be needed to ensure that staff knew how to use the new tools as well as could analyze and properly employ the new, rich data provided to make better maintenance and operations decisions.

Petrobras Zarate selected Emerson Process Management as its automation supply partner based on the company's strong performance record in the field of digital control technology and its global support network. Plant managers sought greater plant availability, improved asset reliability and advanced control tools with the ability to integrate several fieldbuses. They chose a PlantWeb digital plant architecture, which utilizes a DeltaV automation system and AMS Suite asset-management software.

PHASED IMPLEMENTATION

The modernization was accomplished in phases, beginning with the least complicated migration. In 2002, Provox DeltaV Integrators bridged the obsolete Provox interface controlling the plant's air and water utilities to the DeltaV system. This provided valuable experience for the later, more complicated phases. In 2004, the company migrated the reactor operations of its high-impact and crystal polystyrene units to digital control. Then, in 2005, without stopping operations, the remaining variables under Provox control were transferred to the DeltaV controllers. This "hot cutover" saved Petrobras $1.13 million by avoiding a shutdown. The entire migration was performed in-house by facility employees, saving the company $150,000.

The new digital network fully supports Foundation Fieldbus and other bus technologies. The PlantWeb architecture also taps data from existing devices, including the plant's HART transmitters and its Liebert uninterruptible power supply. The wealth of new information now delivered has empowered operators and maintenance personnel to make more reliable decisions about process quality and asset health.

A multi-discipline team, of Petrobras Zarate's mainte-

nance and operations staff, Petrobras Energia's engineering processes personnel and Emerson's technical experts, worked closely through each phase of the modernization project to solve problems as they arose. Company managers credit this close-knit team as largely responsible for the project's success.

Information about the new technology and changes coming to the facility was delivered plantwide very early in the project, before the initial migration began. The advantages of modernizing to a digital plant architecture and switching to predictive maintenance techniques were explained to plant operators, maintenance staff and supervisors. During training, staff easily adapted to using the new tools and found PlantWeb to be user friendly. The new interfaces provide more plant data on each screen than were available through the prior DCS, allowing staff, who have learned how to assess this increased information, to improve the quality and speed of their decision-making about maintenance and operations (Figure 1). They've also gained mobility — a wireless network enables them to perform asset maintenance in the field, using their laptops to access operational and diagnostic data through remote DeltaV desktop and AMS Suite applications.

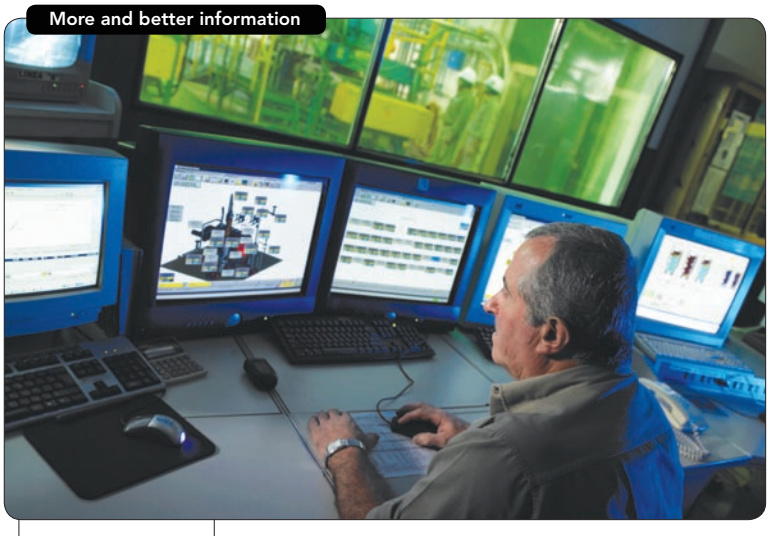

Figure 1. Operators now see more plant data on each screen, speeding and improving their decision-making.

IMPRESSIVE RESULTS

Proactive maintenance techniques available through this smart digital platform have increased plant reliability by 2% to 3% and have reduced maintenance costs by 10% to 12%. Production is more predictable and better controlled now because operators can confidently increase rates for certain products. The plant's availability is 99% and annual production has risen by 3% to 5% — to 66,000 tons of high impact and crystal polystyrene — since the modernization.

Maintenance staff now can predict incorrect functioning in valves, transmitters and other assets, and address problems before they cause production to be scaled back or shut down. Staff use their experience and AMS Suite software to analyze the new, more reliable plant information collected to optimize production without the help of consultants. Predictive intelligence from plant assets allows staff to better utilize raw materials, more quickly correct flow deviations, anticipate product changes to avoid second-rate quality, and produce less scrap.

The plant also has reduced variability through advanced control tools. Neural network software provides more effective quality prediction for the reactors, enabling increased rates for certain products. Operators can rapidly determine the melt flow index of a product and adjust production accordingly through data collected by their "neuron web" of intelligent devices. In the past, they would have to wait for lab test results before making changes in production.

After the switch to digital, staff members were able to quickly detect and diagnose a faulty seal on a pump, correcting a problem that in the past would have caused a plant shutdown. Plant stoppages have been reduced from once per year to once every two years through predictive maintenance. The decision-making power of maintenance staff has grown by switching to these new tools, plus other personnel — especially process engineers — now are more involved in maintenance diagnoses.

FURTHER PROGRESS

Management anticipates continued and growing benefits for high-impact and crystal polystyrene operations from the scalable automation technology platform. The plant is installing wireless field devices to extend the modernization. Training continues to further develop the analytic skills of staff so they can make the most of the predictive intelligence data provided. Managers also are considering bringing the bi-oriented polystyrene manufacturing operations into the fold. And Petrobras Zarate personnel and their peers at other Petrobras manufacturing plants across Argentina have established an integration forum to share experiences and discuss the advantages of choosing a smart digital network.

ADOLFO SUIFFET is maintenance manager at Petrobras Zarate, Zarate, Argentina. **ROBERTO GORBARAN** is supervisor, electrical and instrumentation, for Petrobras Zarate. **MARIO BLANCO** is a key account manager for Emerson Process Management Argentina, Buenos Aires. Reach them by e-mail at: adolfo.suiffet@petrobras.com, roberto.gorbaran@petrobras.com and mario.blanco@emerson.com.