



ven though Repsol YPF's La Plata refinery in Argentina is the country's largest with an annual output of 200 000 bpd, the facility is challenged to meet growing customer demand. It, along with sister refineries in Lujan de Cuyo and Plaza Huincul, are at

near maximum production capacity, responding to one of the fastest growing economies in the Americas. Economic growth for Argentina is over 8%, and is expected to stay that way for the foreseeable future.

Repsol YPF plans to capitalise on this growth by investing nearly US\$ 7 billion in Argentine operations through 2009 for exploration and production activities, as well as logistics and marketing. A portion of that funding will be going to the La Plata refinery located 60 km from Buenos Aires, on the banks of the Rio de la Plata. The operation is massive, with some 35 process units occupying an area of 750 acres.

Located within the La Plata refinery complex is a critical operation. It is the Departamento de Operaciones de Lubricantes

Juan Carlos Bondarenko, ABB, Argentina, discusses the improvements made at Argentina's largest refinery through advanced technology. y Especialidades or DOLE plant, which produces lubricants and specialties such as asphalt, paraffins and derivatives. The La Plata refinery also produces fuel oil, diesel oil and gasoline. The lubricants blending operation faced a multiple marketing challenge regarding a product portfolio extension, reduction of batch sizes, and heavier customer restraints. Additionally, it has a reputation for continuous improvement as its operations manager pursues methods to increase its output.

The situation called for a creative solution that was both timely and cost effective. The best alternative

involved sophisticated process control. That was the route that the company followed.

Application of advanced process control

Repsol YPF decided to replace the existing control system with a plant-wide control system from ABB, its Industrial IT System 800xA Extended Automation. This scalable, extended automation system for process and production control, safety and production monitoring is designed to extend the reach of traditional automation systems beyond control of the process to achieve production gains necessary to meet business targets.

Some of the key decision factors were the system's object technology, which can include aspects such as documentation, production orders, raw material and laboratory analysis. It operates with standards such as Microsoft technologies. There is also enterprise connectivity to existing systems such as SAP, and the fact that ABB provides a local presence and support for its products and systems.

The system is unique as this scope is accessible from a single user interface that is configured to present information and provides interaction in a context appropriate to all user disciplines. Extended automation objects created within the engineering environment provide the foundation for the efficient development, deployment, and continuous improvement of production and safety applications with predictability. The system provides evolution through enhancement capabilities to help ensure that future advances in system technologies enhance rather than comprise the system investment.

System 800xA's operating environment allows users to incorporate products, applications, and services from ABB. Built on an industrial IT aspect object technology platform; ABB's automation portfolio provides a seamless link between process, safety, and business management requirements.

It also offers a complete safety instrument system (SIS) solution complying with IEC 61508 and IEC 61511 standards, and is certified by TUV. It includes the entire safety loop, consisting of SIL rated field instruments, controllers, and I/O modules, as well as value positioners and actuators.

System 800xA controllers and I/O options make them suitable for safety and critical process applications. SIL and non SIL applications are secured by certified firewalls, with advanced diagnostics and built in checks that prevent inadvertent degradation of safety applications. By utilising similar hardware and software, ABB reduces the user's costs in training, engineering and maintenance. Similarly, as an integrally common solution, the operator interfaces and asset management software (AMS) functions are fully integrated and the same.

Using System 800xA, from reception of raw materials, through blending and filling to truck loading, all DOLE plant transactions are controlled according to planned orders and quality requirements through this advanced manufacturing system.

'We chose ABB as a strategic partner in our technological development because ABB is one of the first companies



Figure 1. Overview of lube oil plant.



Figure 2. The 800xA lube oil control room.

in the world in technology,' said Ms. Monica Vasquez, Operations Manager of Lubricants and Specialties for Repsol YPF. 'We know that they look to innovate and create; we know they are always one step ahead of the rest. We think of the provider as a partner who looks at the market with us and that looks to generate new business opportunities, like us, convinced that if businesses are businesses to us, they will be businesses for them, too, because that's what being partners is all about, having mutual benefits.'

'For instance, during the start up period the plant worked with the old system during normal working hours and with the new one during night hours in order to test and calibrate the system, all done on the same I/Os modules and controllers.'

'This was possible due to the integration of a unique teamwork between Repsol YPF and ABB.'

With the 800xA system, real time monitoring enables the lubricants blending plant to respond quickly to market demands, produce products with less manpower than before, and less inventory cost. The system's scheduling function optimises company assets and reduces cross contamination.

The system's historian capabilities allow continuous improvement of the process through advanced analysis tools. The 800xA system encompasses a set of ABB industrial IT software tools used to configure the system's ability to deliver the required process operations. In this way, the system is tailored or customised for each application. For the lubricants blending operation, the first stage of installation included software from different IndustrialIT suites for process control and batch management, as well as operations, maintenance and management information.

The system is equipped with ABB AC800M controllers with about 1400 S800 remote I/O points, process portal and process panel displays, as well as batch application and connectivity for recipes, inventory, and handles production orders from ERP-SAP through an information management system.

20% increase in plant productivity

The goal was to increase the plant's flexibility and the principal indicator is to increase the plant's productivity by 20%. This is not only 'making more lubricants,' the goal is to improve productivity through the improvement of efficiency and efficacy of production, the more the better.

Repsol YPF is aiming for flexibility in a plant that makes 120 different products with 10 changeovers /production unit /d. So, to do that, the objective is to increase productivity, reducing production costs in a highly complex environment. The improvement is based on reducing the Reblend Index from 15 - 5% (efficiency); reducing costs of scrap generated during cleaning lines after a product change by 15% or 20%, which is comparable to 120 m³/yr (efficiency).

Repsol YPF is achieving, and in some cases, exceeding these efficiency improvements because the capabilities of the ABB control system strengthen the process technology changes.

The control system provides Repsol YPF with many benefits including:

- Reducing time to decision and action.
- Engineering for maximum performance.
- Investment enhancement through evolution.

- Integrated information for improved visibility.
- Capacity to implement tailor made process solutions.
- Local knowledge and support.

ABB maintains operations throughout Latin America, and in particular Argentina, that can provide support services for the control system, and other equipment at the refinery.

Daniel Reale, production manager of lubricants and paraffins for Repsol YPE noted, 'the 800xA is a system of utmost reliability. Today we have defined one recipe for each 'process,' so that once you define how you are going to do it, the system will take all the steps necessary.'

'Once we are satisfied with the result, the ABB control system allows me to do it in the same way always. I believe it's the correct platform needed to grow and it's the platform that lets you add lots of technology for optimising.'

'This is vital to our vision of always being competitive and to always be the best option for our clients,' Reale emphasised. 'Frankly, ABB offered what we were looking for, from pumping knowledge into the system and being able to capture vital information for analysing to making decisions that improve the process day to day.'

In addition to System 800xA, ABB has provided the refinery with information management and batch management systems. A high level of running efficiency is critical for the La Plata complex so that it meets the needs of clients, as it reduces operating costs.

Replacing a steam turbine with electric drives system

Another example of applying state of the art technology at the facility is addressing the refinery's large number of drive applications powered by steam turbines. ABB has addressed this with ACS 1000 medium voltage drives for speed and torque control of 315 - 5000 kW motors. Steam turbines were the best technology at the time of installation to obtain the speed and power required for different applications.

However, steam turbines proved to have a number of disadvantages, including the cost of steam being higher than that of electric power, and turbines having higher maintenance costs than electric drives. Additionally, steam turbines have higher operating costs due to large amounts of coolant water circulating through surface condensers.

With this in mind, the refinery decided to study the feasibility of replacing steam turbines with variable speed electric drive systems. The technology that has become available in recent years made variable speed electric drive systems a competitive alternative for applications in the medium power range even with speeds greater than 3000 rpm, the maximum speed of an electric motor driven at a frequency of 50 Hz.

A fluid catalytic cracking unit with three blowers was selected for conversion. The blowers were driven by 2970 kW steam turbines at

4100 rpm. One of the blowers was replaced with an electric drive system consisting of an ABB KTMP 4400 double secondary transformer, an ACS 1000 converter, and a AMB 560 L2L motor.



Figure 3. Another view of Repsol YPF lube oil plant.

A synchronous electric motor and frequency converter assemblies have proven to be a viable alternative for driving process units in which the necessary adjustments can be obtained with variable speed. An ACS 1000 controls the motor torque throughout the speed range. Since there is a smooth output waveform, a torque analysis is not necessary in most applications.

Ell improvement of over 10%

After the change, the energy intensity index (EII) of the FCC unit improved by 10.5% within one year of replacing the steam turbine with an electric drive, explained Marcelo Ruiz, Manager of FCC units at the refinery. It was also noted that after a shutdown, the drive system returned to operating conditions much faster than the steam drive blowers, several minutes versus two hours.

Having blowers supplied by different kinds of energy, steam and electricity, gives operational flexibility. With this feature, unobstructed air lines can be kept during a failure in one of the energy systems, minimising time to be back in operation.

Savings regarding energy, cooling, water maintenance and flow variations projected for the first year covered 33% of the project cost.

Investment in the future

Repsol YPF maintains a huge presence in Argentina as the country's largest company. Headquartered in Spain, it is an international oil and gas company with operations in 25 different countries. Its oil production and refinery capacity surpasses 1.2 million bpd. Its network of operations includes more than 6600 points of sale in Europe and Latin America, selling gasoline under the brands Campsa, Petronor and Repsol.

Repsol YPF launched a plan in 2005 to invest over US\$ 25 billion in its worldwide operations through 2009, of which US\$ 8 billion involves projects in Argentina, Brazil and Bolivia. Under the plan, Argentine operations would receive close to \$7 billion over the four year period. This is more than US\$ 700 million originally planned, and nearly one third increase over a previous plan covering 2000 -2004, indicating the importance of the Argentine market in the Repsol YPF organisation.