Lifecycle Management Enables Seamless Control System Migration

White Paper

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Introduction

PRALCA Productora de Alcoholes Hidratados, C.A., located in Santa Rita, State of Zulia, Venezuela, produces Ethylene Oxide and Ethylene Glycol for sale to Venezuelan industry and international markets. The plant is situated on the eastern shore of Lake Maracaibo (See Fig. 1).

Figure 1. PRALCA's petrochemical production facility, located on the eastern shore of Lake Maracaibo in Venezuela.

A legacy Honeywell TDC3000 Distributed Control System (DCS) originally controlled the PRALCA operation. However, the need to implement advanced control strategies to improve plant efficiency, as well as spare parts considerations with the aging DCS, prompted the plant's migration to the Experion Process Knowledge System (PKS).

PRALCA's control system migration was made possible by Honeywell's Lifecycle Management (LCM) program. A multi-year LCM agreement and upgrade kits will extend the life of plant equipment and provide a cost-effective path forward to the latest automation technology. Along with a Parts Management contract, the LCM agreement reduces costs with locked-in spare parts availability and pricing.

Background

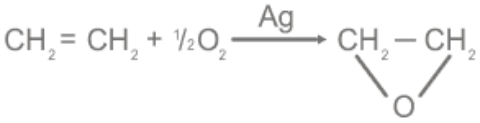
Commissioned in February 1993, the PRALCA petrochemical facility employs a catalytic production process. The oxidation phase of the ethylene steam, with oxygen, produces Ethylene Oxide (EO). Following non-catalytic hydration, EO is converted into a mixture of glycols highly rich in ethylene glycol (See Fig. 2).

Production capacity at the PRALCA facility includes:

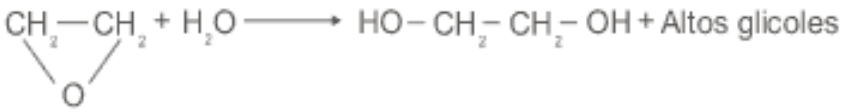
- Ethylene oxide (EO): 22.000 MT/yr
- Ethylene glycol (MEG): 84.000 MT/yr
- Diethylene glycol (DEG): 8.000 MT/yr
- Triethylene glycol (TEG): 1.300 MT/yr

Figure 2. PRALCA produces Ethylene Oxide and Ethylene Glycol for sale to Venezuelan industry and international markets.

Ethylene oxide is produced by direct oxidation of ethylene in the presence of a silver-based catalyst. At room temperature, EO appears as a colorless gas and is found in liquid phase to 12º C. Ethylene oxide's reactivity is extremely high, and for this reason, it is used as an intermediate product in a number of different reactions to produce ethylene glycols, ethanolamine, glycol ethers, surface-active agents, solvents, polyols, sterilization agents, emulsifiers and nonionic surfactants.

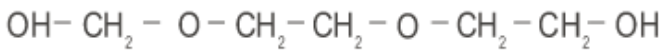


Ethylene glycol is produced by non-catalyst hydration in liquid phase of ethylene oxide. The same reaction produces diethylene glycol, triethylene glycol and other high glycols, which are separated by distillation. At room temperature, ethylene glycol is a colorless, highly transparent liquid. Its primary uses include production of polyethylene terephthalate for fibers, antifreeze formulations for engines and other machinery, processing aid agents for the natural gas industry, as well as polyester resins, adhesives, etc.



Diethylene glycol is obtained through distilling the product of the main non-catalyst reaction, and is used as an intermediate agent in the reaction of unsaturated polyester resins and polyurethane resins. DEG is also employed in elaboration of brake fluids, and as a dehydrating agent in paper and cellophane production. In addition, it can be used as a dehydrating agent for natural and industrial gas, and as a solvent in functional fluids, printing inks and textile dyes. Other uses include the production of plasticizers, emulsifiers, surfactant agents and lubricants.

The primary application for triethylene glycol is as a drying agent in natural gas processing. Other uses include production of plasticizers, polyurethane and polyester unsaturated resins; as a humidifier for cork, paper and synthetic sponges; and as a moisturizing agent in tobacco industry.



Situation

Today's competitive marketplace demands automation solutions that increase plant efficiency and profitability. Control system performance can significantly impact a manufacturer's bottom line. Leveraging automation capabilities through simplified, cost-effective migration to new technology while optimizing current investments is critical to business success.

In some cases, legacy control systems can no longer meet corporate objectives for enterprise-wide sharing of business information. Nor can they enlist advanced control capabilities enabling increased production throughput, lower operating costs and improved regulatory compliance, while responding to customer demands for better product quality and faster delivery.

At many industrial sites, management has to balance the need to improve productivity against the ever-increasing cost of supporting an aging automation system infrastructure. Plants are often forced into making migration decisions when a supplier changes product-support policies or abandons legacy systems.

Rather than opt for the "low-cost" supplier, a growing number of industrial end users are partnering with automation vendors offering comprehensive asset lifecycle services and advanced application solutions. This approach enables operations that are safer, less costly, and more efficient than ever before.

By employing an integrated strategy to reduce overall asset lifecycle costs, and maintaining state-of-the-art plant automation technology, manufacturers can gain a competitive advantage that will allow them to meet critical business challenges.

New Technology

Like other process industry companies, PRALCA Productora de Alcoholes Hidratados, C.A. needed to implement advanced control strategies in order to optimize production efficiency. Spare parts issues with its older TDC3000 control system were also an important economic consideration in control system modernization.

PRALCA sought to improve operator effectiveness by upgrading its legacy DCS operator stations to the latest HMI technology. However, the Santa Rita plant wanted to reduce training and maintenance requirements by keeping existing graphics, networks, controllers and I/O in place.

In 2005, PRALCA partnered with Honeywell Process Solutions to migrate its legacy TDC3000 system to the new generation Experion Process Knowledge System (PKS). The company also upgraded its Advanced Process Manager (APM) controllers to High-performance Process Managers (HPMs). This project represented a major step forward in establishing a world-class petrochemical production operation (See Fig. 3).

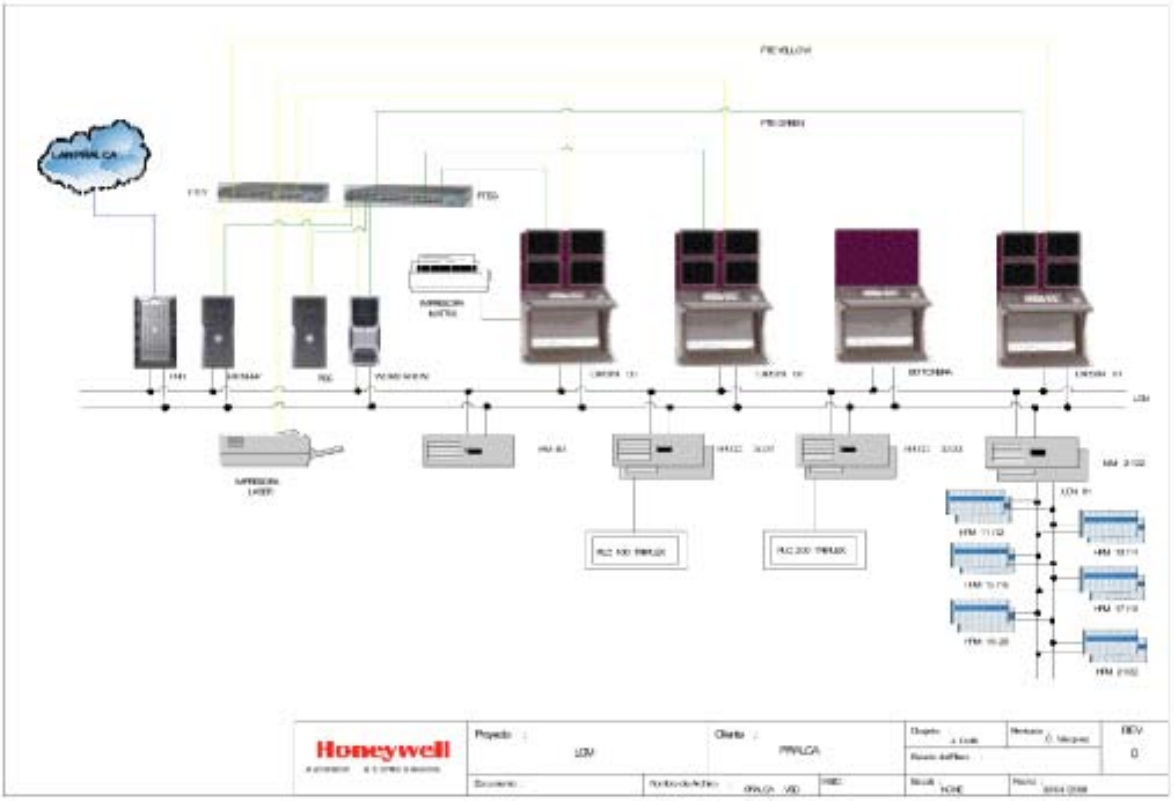


Figure 3. New automation architecture at the Santa Rita plant.

Experion PKS transforms process control beyond traditional DCS functionality by unifying people with process variables, business objectives and asset management strategies. It is the only automation system focused on plant personnel and making the most of their knowledge.

The Experion solution improved operator effectiveness at the Santa Rita site by upgrading legacy DCS operator stations to the latest HMI without additional training and maintenance requirements. With the new system, advanced operator effectiveness solutions designed for asset management and abnormal situation management reduce unplanned outages and increase process uptime. The system is built upon a standard, distributed control architecture utilizing technology from the Abnormal Situation Management (ASM®) Consortium and integrates enterprise-wide physical plant and computer system security features.

Experion PKS incorporates Honeywell's advanced HMIWeb operator interface employing standard Internet technologies. This web-based HMI architecture uses

HTML as the native display format, allowing open and direct integration of process, application and business information. It includes standard console displays supporting navigation and operation of the entire system.

Experion PKS provides PRALCA's plant personnel with online access to a wide range of documentation on the production process. New operator stations enable better utilization of process trending with a single keyboard. Operators and engineers now have an expanded window into plant operations (See Fig. 4).

Figure 4. Experion PKS utilizes advanced HMIWeb technology, which provides an operator interface employing standard Internet technologies.

Thanks to new control system technology, PRALCA gained increased storage capacity allowing flexible management of data history; critical process information can be stored in external units (i.e., Word and Excel). Additionally, the control system upgrade provided improved alarms/events; popup video in line; displays of configuration, loops and diagnoses; and support for an OPC data client.

Migration Solution

Leading control system suppliers have responded to current business demands by offering a variety of options to keep plants updated on the latest technology while safeguarding existing investments. The goal is to enable automation upgrades without replacement of the entire control system platform. This extends the life expectancy of installed assets and positions the facility for future growth.

PRALCA's control system modernization was made possible by Honeywell's Lifecycle Management (LCM) program. LCM is a multi-year service agreement that guarantees asset support for Honeywell hardware and software products until they are modernized or retired. The basis for these activities is the customer's site strategy—not Honeywell's product introduction and withdrawal timetable. LCM

bundles site support services into a single, cost-effective solution that ensures users achieve their asset management goals without having to renegotiate multiple service contracts every year.

An LCM agreement establishes a committed automation “roadmap” leading to either electronic refresh or a complete migration during the term of the contract. It allows plant owners to start down the path to modernization today, and get there incrementally as their needs and schedule dictate. The LCM solution also offers flexibility in how to manage plant assets and predictability in how technology investment choices are financed. Plant owners choose when to modernize, what components of the control solution to invest in, how to fund the transition, and how much longer they want to maintain their current capabilities.

Started in 2005, PRALCA’s five-year LCM agreement responds to the changing needs of the Santa Rita operation by combining a variety of comprehensive Honeywell site support services, including: Parts Management, Solution Enhancement Support Program (SESP), Migration/Upgrade Kits, and Maintenance Services.

Thanks to the Parts Management program, PRALCA no longer has to balance the cost of maintaining a spare parts inventory against the risk of process downtime. Honeywell owns the spare parts inventory and PRALCA makes no capital outlay for needed replacement equipment. Parts Management provides the advantage of greater uptime for control systems and the plant.

The SESP solution allows PRALCA to choose from service program alternatives and value-added options best suited for its site. From sustaining existing field equipment to migrating the entire automation platform, SESP maximizes the results realized from investments in process control and information technology.

Honeywell’s migration kits and enhancements will also make it easy to keep PRALCA’s control system running at peak efficiency without the need for a complete system change-out. Going forward, they will enable its petrochemical plant take advantage of new advancements in plant automation and enterprise information management.

Finally, PRALCA has access to Honeywell’s comprehensive maintenance and support services, which are designed to leverage physical and intellectual assets and help sustain and increase their value and performance over time.

Conclusion

Effective control system migration does not end with a single modernization project. As demonstrated at PRALCA’s Santa Rita, Venezuela, petrochemical production facility, plants need a safe, manageable and affordable lifecycle management solution for maintaining up-to-date process automation functionality and minimizing risks associated with system upgrades.