

Case Study: La Pastora Sugar Mill

Integrator IAC Implements Opto 22-based Automation System at Venezuelan Sugar Mill—Facility Realizes Big Cost Savings via Water Recirculation and Power Generation

Lara, in the central west coast region of Venezuela, is one of 23 states into which the country is divided. Famous for its abundant grazing land and fertile soil, Lara is a commercial center that ships cattle and grows and exports sisal, coffee, cocoa, and sugar.

In sugar processing, the natural sugar stored in cane stalk or beet root is separated from the rest of the plant material. For sugar cane, this is accomplished by pressing the cane to extract the juice, boiling the juice until it begins to thicken and sugar begins to crystallize, and then spinning the crystals in a centrifuge to remove the syrup. The resulting raw sugar is then shipped to a refinery where it is washed and filtered to remove any remaining non-sugar ingredients, and then dried and packaged as refined sugar.

Of the many sugar mills in Lara, La Pastora sets itself apart not only by its superior sugar processing operations, but also because it uses the by-products of this processing for power generation, thus helping to keep the mill itself up and running.

For example, to power the facility, La Pastora is equipped with a combination of diesel-based and steam-based generators. As the name implies, diesel-based generators are powered by diesel fuel. But at La Pastora, the diesel fuel used in the steam generators is being supplemented with sugar pulp.

"After the sugar cane is pressed and the juice extracted, you're left with a great deal of pulp," explains Antonio Hernández, of Ingiería Automatización y Control (Engineering Automation and Control), the systems integrator for the La Pastora project. "This pulp would normally be discarded. But what they're doing at La Pastora is using it as an alternative fuel source and burning it to help power the generators."

In a similar fashion, La Pastora is also reusing the water by-product created by its steam generators. Steam-based generators work by using boilers to heat water and create high-pressure steam that is then piped to a series of mechanical turbines that spin and rotate,



La Pastora sugar mill in Lara, Venezuela

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thereby making electricity. Ingiería Automatización y Control (IAC) has designed and implemented a system at La Pastora that reuses the condensed water that's created when the steam from the boilers begins to cool.

Critical Requirements and Criteria

"In the steam-generating process of La Pastora's boilers, it's very important that the water used for boiling have certain attributes," says Hernández. "For example, it needs to be free of solids and residue that might cause clogs. It also needs to be free of oxygen, which can cause rust and corrosion and shorten the lifespan of the boilers' internal pipes and plumbing." To ensure that these criteria are met, the condensed water produced during the steam generation process is stored in tanks where it's chemically treated and then transported to a de-aerating machine before being sent back to the steam generator's boilers. La Pastora has a total of five tanks for the storing of processed "good" water plus an additional tank for crude water.

All recycling and dispersal of the condensed water is controlled and regulated by an Opto 22 SNAP Ultimate I/O system, which consists of a SNAP Ultimate brain and rack, two analog input modules, one serial module, eight digital input modules, and eight digital output modules. This specific configuration gives La Pastora the ability to collect all the data from its water recovery system's processes so supervisors can be sure that the water is free of debris and otherwise qualified to be recirculated. For example, pH and ORP (oxygen reduction potential) sensors connected to analog input modules provide data on the concentration of undissolved, suspended particles present in the water. This data is aggregated and evaluated by the intelligent SNAP Ultimate controller, which begins or delays the delivery of the water to the de-aerator accordingly.

The SNAP system also controls the chemical dosers that treat the water and a series of pumps and valves that bring well water (also used for the boilers) from its source to the mill.

IAC was responsible for implementing La Pastora's new system. In addition to designing the control architecture, the company procured all the hardware, completed the installation, and developed the control strategies with ioControl, the programming software included with the SNAP Ultimate I/O system.



La Pastora is one of several agricultural processing customers served by systems integrator IAC.

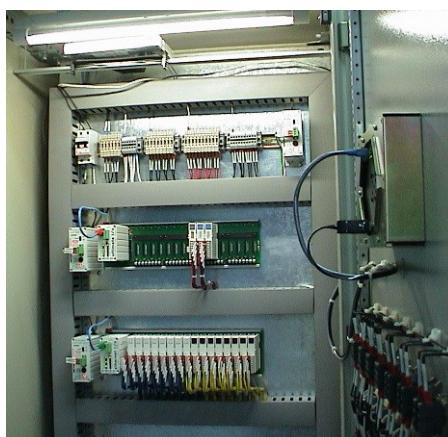
"La Pastora's water recovery system used to recirculate condensed water directly to the boilers," states Giovanni Montes, Business Director at IAC. "But this was proving to be hazardous to the health of the entire system, partly because debris from the sugar cane processing was getting through. The system we designed, among other things, gives La Pastora supervisors an easy way to determine if there are solids in the water and to start and stop processes automatically."

Ease-of-Use, Flexibility and Cost Savings

La Pastora uses Opto 22's ioDisplay software to design human-machine interface (HMI) screens that visualize the described processes and present the data in easy-to-understand graphical representations. Also part of La Pastora's automation system architecture is the OptoTerminal-G75 operator interface terminal, which provides an

interface that allows La Pastora personnel to view data, modify process parameters, adjust setpoints, and start and stop processes locally.

All of the Opto 22 components were sourced from Grupo Telebaud C.A., a systems distributor that serves integrators throughout Venezuela and the rest of South America. According to Germinal Puigbertrand, Technical Director at Grupo Telebaud, "IAC is one of many integrators in South America that understands and leverages the power of our Opto 22 line of products for the benefit of customers in agricultural processing. IAC's expertise in system design and deployment and their training of La Pastora operators and



La Pastora's SNAP Ultimate I/O system controls a number of the mill's water recirculation processes.

maintenance personnel made this project a complete success and resulted in the customer not only significantly improving its mill operations, but also realizing tremendous cost savings."

The Competitive Edge

Indeed, the ingenuity displayed by La Pastora in choosing to implement a new automation system solely to help the mill use water by-product and sugar waste to its advantage, has placed La Pastora far ahead of its competition and resulted in tremendous ROI for the company. By itself, the energy savings from using 80% recycled condensed water in the boilers allowed La Pastora to pay for its new system in a mere two months time.



La Pastora management estimates that the savings from the burning of sugar pulp has been even greater.

"The Opto 22-based system IAC implemented at La Pastora has been up and running perfectly for two years," says Hernández. "After paying for itself in just sixty days, it's been allowing La Pastora to put money in the bank ever since."

About Opto 22

Opto 22 develops and manufactures hardware and software products for applications in industrial automation, remote monitoring, and data acquisition. Using standard, commercially available Internet, networking, and computer technologies, Opto 22's input/output and control systems allow customers to monitor, control, and acquire data from all of the mechanical, electrical, and electronic assets that are key to their business operations. Opto 22's products and services support automation end users, OEMs, and information technology and operations personnel. Founded in 1974 and with over 85 million Opto 22-connected devices deployed worldwide, the company has an established reputation for innovation, quality, and reliability.

Opto 22 products are sold through a worldwide network of distributors, partners, and system integrators. For more information, contact Opto 22 headquarters at 800-321-6786 (951-695-3000) or visit the website at www.opto22.com.