Efficiency, Inventory and Accuracy are Key Benefits in Sealed Air Corporation Automation Project

The next time you receive a fragile item by mail or delivery service – a piece of glassware, an electronic component or anything else – take a moment to look at how it is packaged. If the item is encased in or braced by lightweight, rugged, foam packing, it is likely that you have Sealed Air Corporation to thank for facilitating a damage-free delivery.

Sealed Air Corporation is a leading, worldwide manufacturer of protective and specialty packaging products. Among the company’s products is the Instapak® polyurethane foam packaging system produced by the Engineered Products Division in Danbury, Connecticut. The Instapak foam system consists of both a dispenser and a foam applicator. The chemical components are shipped to customers in separate containers, ranging in size from 15 gallons to 275 gallons. When the chemicals are combined, they form a protective foam cushion.

“There are different formulations that involve different combinations of the A and B sides of the chemical," explained Mark Chateauneuf, the plant’s director of manufacturing. "Each foam has a range of applications. It ranges from very light or low-density foam used for simply filling space in a box, to blocking and bracing of equipment, motors, axles, etc."

Demand for Sealed Air’s Instapak foam has been growing steadily, with orders today approximately double that of just 10 years ago, said Chateauneuf. In tandem with the increased demand for its products has been the chemical facility’s plant automation implementation. Ten years ago, plant control was almost all manual, whereas today, Sealed Air has automated its process control and inventory management, resulting in increased productivity. In fact, the company manufactures approximately twice as much product with the same number of workers as 10 years ago. In addition, the plant has improved product quality, reduced inventory costs and has established itself as a model for other sealed air plants around the world.

From Manual Control to Automation

Chateauneuf described the chemical processing plant a decade ago as a “glorified manual filling station” that required extensive manual intervention by eight employees over two shifts to run the processing and packaging of the chemicals used in the polyurethane foam.

"In the early 1990s, our control system was proprietary, based on an Intel RMX processor. It used text-driven screens, and was very cumbersome and prone to crashing," he said. "In addition, it was designed and maintained by a single person. If this person was not able to make it to work, no one else here would have been able to support the system."

Even with this system, most processes were manual, said Mike Westkamper, president of WEI, an integration and engineering firm that has developed process control and inventory tracking systems for Sealed Air.
"We’d download a recipe into the system, but someone would have to manually weigh ingredients. They had forms to complete indicating which ingredient was added to the process, and at what point. Actual control of the process was achieved through manual and pneumatic valves and single-loop controllers," said Westkamper.

"Inventory Control was totally manual," he added. "If a raw material was received, they’d track it by writing it down. The plant had computers, but they were the province of the MIS Department and used strictly for business-level functions."

The situation began to change in 1992, when the company implemented a WEI-developed supervisory control and data acquisition (SCADA) system. Sealed Air selected Intellution’s MS-DOS-based FIX DMACS system. The system functioned well for several years, but by 1997, it was time to make further improvements. As part of an overall plant upgrade, Sealed Air elected to have WEI implement a more modern Microsoft® Windows NT-based SCADA system. Y2K issues further necessitated the switch, as did the desire for greater functionality and a more modern graphical user interface (GUI), said Ira Gelfond, the plant’s engineer.

In addition, Sealed Air wanted to incorporate an inventory control system in an effort to accurately depict raw material inventory and product statuses (work in progress and finished goods.)

"They needed better inventory control for all the classic reasons," said WEI’s Westkamper. "The way they had been doing things was inefficient. Lot code tracking was practically non-existent. Inventory variances often would have a negative impact on their financials, and often they found themselves struggling to meet market demand for chemical orders efficiently and on time."

**Three-Tiered System Yields Business Results**

In response to the company’s needs, WEI designed a three-tiered system. At the control level, the company implemented a plant-floor system based on three Siemens programmable logic controllers. At the SCADA level, Sealed Air chose to build upon the advantages it had gained through Intellution’s software by upgrading to Intellution Dynamics™ iFIX™ software, running WEI’s custom batch management software. Intellution Dynamics is a family of industrial automation software solutions, such as iFIX HMI/SCADA software, based on industry standards such as Microsoft Windows® DNA for Manufacturing and reliable data and security from Intellution.

“iFIX generates and pulls information from the plant’s IBM DB2 database, processes it and creates the batch. It then sets the process into motion by downloading instructions to the PLCs. As the process proceeds, iFIX then draws data on its progress from the PLC and returns the batch record to the DB2 database,” said Westkamper.

Gelfond noted that the plant actually had begun implementing a different SCADA system, but abandoned it because of insurmountable integration problems. The plant was able to make up considerable lost time through use of Intellution Dynamics iFIX.
"We were about six months into the project at the time we made the change. Because of the iFIX-based system's flexibility and scalability, we were able to convert all of the work we had already done and get it up and running on the Intellution system in only two weeks. We were able to take the software out of the box, load it onto our computers and get it communicating with our PLCs in less than an hour," he said.

At the third tier of the system, WEI developed a customized Windows NT-based inventory management system to track lot codes and record all data regarding receipt of raw ingredients and shipping, quality control, batch generation and tracking. In the near future, the plant will be tying the inventory management system into Sealed Air's corporate SAP enterprise resource planning system.

**Holding the Line on Costs**

Since implementing the new control system and adopting world-class manufacturing techniques, Sealed Air has been realizing a number of key benefits, said Gelfond and Chateauneuf.

"First, we have much better control over our inventory. Our accuracy has improved dramatically," said Chateauneuf, who added that inventory variances currently average less than 0.5 percent, a major improvement over variances in the past.

"This is largely a result of the world-class manufacturing philosophies we've adopted, such as just-in-time manufacturing, but the data we get from Intellution's software is a tool that helps us get to that point," he said. "It feeds our inventory control system with accurate data on the fly. It also lets us know the condition of our pumps, valves, transfers, etc., so we have a solid handle on our production capabilities."

The plant's improved infrastructure – including dedicated, rather than shared, lines for chemical transfers – has added to operators' ability to track product lots accurately and provide up-to-the-minute information on production statuses. This ability has gone a long way toward helping the company reduce its inventories to a bare minimum, thus reducing costs.

"Our sales have increased considerably, yet we've been able to keep our inventory levels at essentially what they were eight or nine years ago," said Chateauneuf. "We average about 36 turns per month on inventory versus a much lower number in the late 1980s. As a result, we're able to operate much more cost-effectively."

Intellution Dynamics iFIX and the improved plant facilities have also enabled the Sealed Air plant to hold the line on labor costs through more efficient operations. Despite the increased volume of product, the plant still operates with a staff of eight.

"On our filling lines, operators can queue up to six products. That's all done through the SCADA communicating with our database," said Gelfond.
He also said iFIX’s outstanding graphics enable plant visualization for operators, as well as providing production equipment and alarms statuses. Because Intellution’s architecture is largely based on a unique implementation of standard Microsoft technologies, it is relatively easy to integrate process information with other plant and business systems.

“For example, we have a maintenance software package online that uses a Microsoft database engine. So, if we want to take the run-time hours off of a pump and send that data from the SCADA system to the maintenance software, it’s easy to accomplish,” he said.

WEI’s Westkamper added that Intellution’s use of Microsoft Component Object Model (COM) architecture has increased his ability to build displays and routines.

“Before, it wasn’t practical to do a lot of the error-checking you can do now,” he said. “You’d have to check every screen for errors. But now, you can build reusable objects that you only have to check once. Microsoft’s technologies allow us to establish more reliable data exchange between the DB2 database and iFIX than we could have in the past.”

The Engineered Products Division’s use of iFIX also has helped the plant’s prestige within the corporation.

“The system has given the plant a lot of visibility within the corporation,” said Westkamper. “They place a high value on the system’s graphical capabilities, and that’s an area in which Intellution has a real edge. Consequently, the SCADA system serves as a showpiece for customers and the company’s internal people.”