A study into the abandoned production plant using the technological advancements

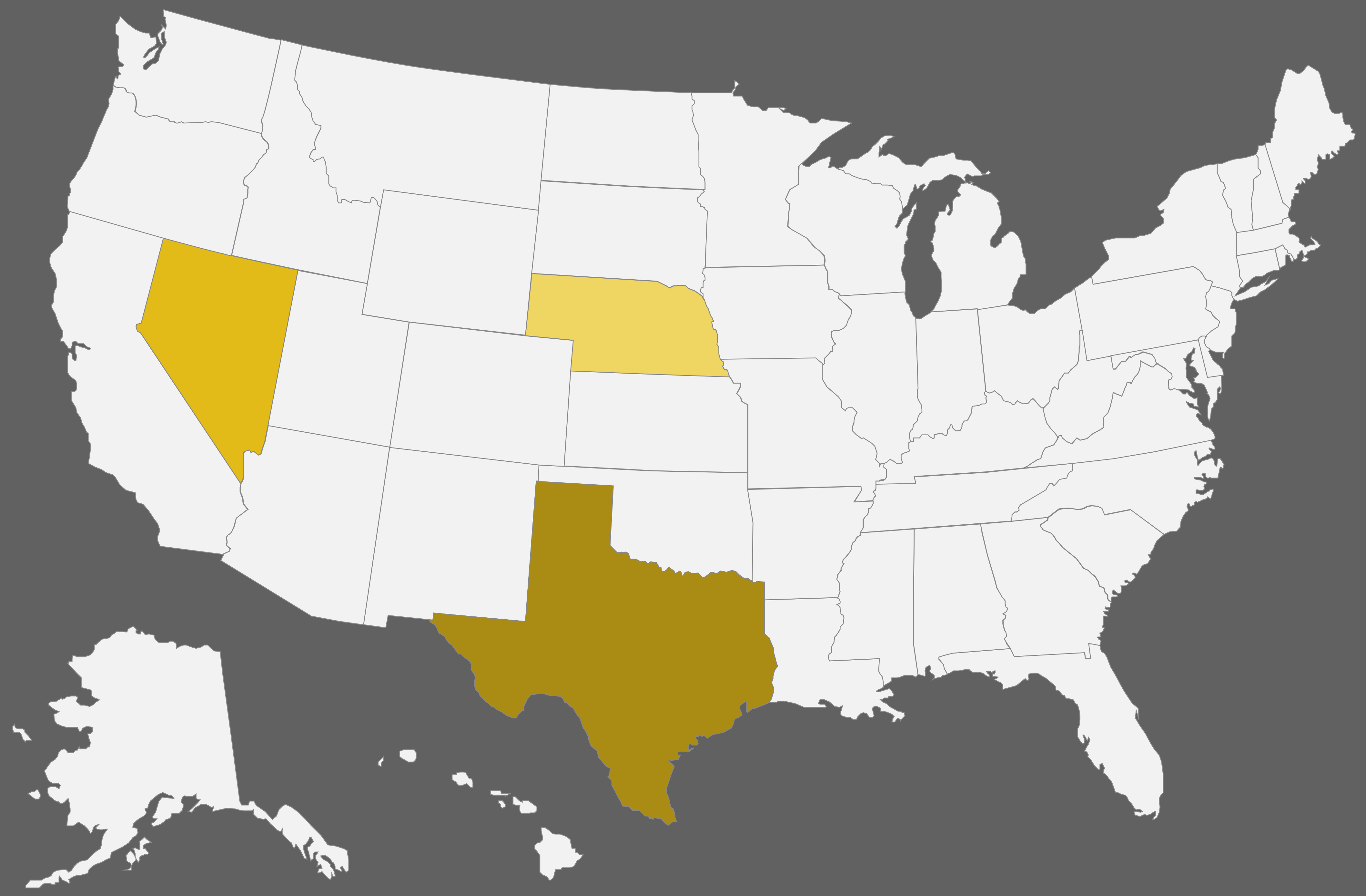
A study into the abandoned production plant using the technological advancements

- The all newly acquired Ohio plant, however, Hardy wanted to do things differently. Specifically, the business wanted to abandon the dependency on just a few raw materials and instead use other non-traditional materials that were untapped in the marketplace, including fats, oils and greases generated as co-products of the edible oils process.
- To do this, Hardy needed to overhaul the outdated controllers and distributed control system (DCS) that existed in the plant.The oleochemical plant that Magnus acquired had been owned and used by several different companies dating back to the 1940s. When Magnus took ownership of the plant, it had been out of commission for two years.
- “It was mothballed and needed to be brought back to an operational state, which came with no shortage of challenges,” said Eric Lofquist, president and CEO of Magnus International Group. “Most significantly, the plant over a period of decades had accumulated a number of different control systems.”

- Hardy wanted to replace the obsolete and disparate control systems, some of which no longer had spare parts, with a new, homogenous control system. Because the plant lacked comprehensive process documentation, Hardy also wanted to develop new control standards for the plant. Doing all of this at once across the entire plant, however, would have been too much for the newly formed company. At the time, Magnus had limited human and financial resources.
- “We developed a long-term plan that took a phased approach to upgrading the plant,” Lofquist said. “The plant has a total of 13 process areas. Our plan was to bring one process online at a time, with each new project funding the next.” Hardy’s phased approach required that operator control for each newly upgraded process area be established in individual control rooms. Once multiple processes were brought online, production would be centralized, with operators monitoring and controlling multiple processes from a single control room.
- To support this modular rollout, Rovisys, a Solution Partner in the Rockwell Automation PartnerNetwork program and Hardy’s implementation partner for the project, recommended using the PlantPAx distributed control system (DCS) from Rockwell Automation. The DCS uses a range of architecture options that allow it to scale from standalone station control to plant-wide distributed control. The PlantPAx DCS also gave Hardy access to a library of process objects, including predefined controller code, display elements and faceplates. This would help ease implementation for Hardy’s staff by eliminating the need to write code for each device, while also helping establish new plant standards.

Swapping out the unit's legacy SLC controller for the PlantPAx DCS not only provided modernized control for the glycerine-refining process, but also laid the foundation of a standardized control system that could be expanded across the rest of the plant. Hardy also deployed a high-level network architecture with a human machine interface (HMI) server and an Allen-Bradley Stratix 5700 industrial managed Ethernet switch. Similar to the control system, this provided basic network-management functionality and set the groundwork for a future, plant-wide network architecture.

Once the glycerine refinery was operational, Hardy and Rovisys moved on to bring the plant's fractional distillation system online. This area included a distillation column, 13 storage tanks and a thermal-fluid system, and would be used to support a new line of high-purity products. The PlantPAx system expansion into this department included an additional controller, Stratix 5700 managed switch, and HMI server.



Next, Hardy and Rovisys brought up another distillation column that would be used to process fatty acids in tandem with the fractional distillation system. The column was located next to the fractional distillation system and shared equipment with it, so Hardy and Rovisys paired their processes together in the existing fractional distillation system controls.

"The flexibility of the PlantPAx DCS combined with good communication among our implementation team made this project a breeze," Lofquist said. "Once the new column was up, we were distilling by the end of the day. Our team said it was as close to a push-button start as they've seen."

With these first three processes up and running, Hardy wanted to tie them all together into a Connected Enterprise. The standalone networks for each of the process areas were married to create a plant-wide, industrial Ethernet network, and the two HMI servers were configured for redundancy. A historian was also added to allow Hardy to collect and monitor process data from all the existing processes.

This eliminated the islands of networks that existed, enabled plant-wide accessibility and created an uplink to the corporate network, all while meeting security standards as defined in the reference architectures. It also allowed Hardy to transition operator control from individual control stations to a single, centralized control room.

Hardy's approach of upgrading one process unit at a time has slowly helped grow the plant's production output from 2 million to 100 million pounds of distilled product per year. That number will only grow as the DCS rollout continues to bring other process areas online.

Control-system uptime is averaging around 99 percent, allowing workers to focus on production instead of dealing with the many production and maintenance challenges that come with using legacy control systems. Controls also are being standardized throughout the plant. This has helped streamline maintenance and spare-parts inventories, and reduced the number of systems and interfaces with which workers must be familiar.

“The flexibility and scalability of the PlantPAx DCS has been instrumental to the success of our phased implementation,” Lofquist said. “The DCS was easy to implement at the onset, and it hasn’t grown in complexity as we’ve expanded it into new areas of the plant.”

For each implementation phase, Hardy has leveraged the Rockwell Automation Library of Process Objects. The proven and tested objects and add-on instructions can be dropped into the coding of each device. Maintenance workers can then configure set points and valve limits right from the faceplates during startup. This has helped Hardy save months of programming and configuration time to date.

Hardy also has used the DCS to get the most from its production processes. The implementation team, for example, built control loops into the DCS that allow operators to switch between controls on the fly without having to go into the DCS to make programming changes. This has helped the company improve yield by 20 percent in its fractional distillation system.

Meanwhile, operators and maintenance technicians at the plant have only recently gained access to historian data, but it’s already proving its worth. Workers now have insights into real-time process variables and KPIs that the legacy systems could not provide, and automated reporting available from the historian has replaced time-consuming manual reports.

“Previously, if something went wrong, workers would gather together and discuss what happened, and there inevitably would be some level of speculation,” Lofquist said. “Now they can specifically see what happened, like if steam pressure drops or if a valve fails. That helps us get back up and running faster. And it can help us prevent similar issues from recurring in the future.”