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DuPont, RoviSys complete the jump to SIMATIC PCS 7

Film manufacturer navigates final stages of migrating from obsolete Bailey and Modicon equipment to Siemens SIMATIC PCS 7 process controls for its split crushing/recycling, HVAC and other utility applications.

By Jim Montague, Executive Editor Control Magazine

Making the big shift from old process controls to a new PLC/DCS platform is no simple task, but doing it without impacting production is even more challenging. However, that's what many process engineers must do because of the ceaseless demands on their applications.

To ease its own transition, DuPont's Tedlar® film plant in Circleville, Ohio, recently collaborated with RoviSys, a Siemens certified solution partner, to finish an upgrade to SIMATIC PCS 7 that had been lingering for a few years. The facility had been repurposed to Tedlar® in 2011, and adopted SIMATIC PCS 7 at that time, but several utility systems weren't upgraded then due to time and budget constraints. These included split crushing/product recycling of waste film, HVAC, and process unit monitoring of air, nitrogen, steam, water and sewer. Tedlar® is often used as the backing sheet in solar panels.

"We've gained a better understanding of the hardware and software in our plantwide systems. We're also experiencing cost reductions for engineering changes, operations and maintenance, and our stakeholders' expectations have been exceeded," said Ellen Fasnaugh, process control engineer at DuPont, about her firm's recent upgrade to Siemens SIMATIC PCS 7 control system.

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The legacy controls consisted of Bailey components connected to SIMATIC PCS 7 via its operating system (OPC90) for visualization of legacy systems and the plantwide DCS. However, there were interface failures between the old ABB controls and the newer Siemens controls, which sometimes made the recycle crushing system for waste film unavailable, halted remote operation open process sewer, and increased required manpower for operations and maintenance. Modicon discrete I/O and some low-level logic devices communicated with Bailey via a Modbus bridge multiplexer, while Bailey handled analog I/O, some discrete points and all supervisory logic. All of this old equip-ment was obsolete, and most of the plant knowledge to support it was lost.

"The new solution had to use SIMATIC PCS 7 to integrate with the plantwide DCS, increase system reliability and performance, be cost effective, not impact the production system, and not significantly change operations and user interfaces," said Ellen Fausnaugh, process control engineer at DuPont. "We couldn't afford downtime, and we had to be within budget."

Fasnaugh and Josh Hilewick, senior systems engineer at RoviSys, presented "Finalizing your legacy DCS/PLC migration" on the opening day of Siemens Automation Summit 2017 on June 27 in Boca Raton, Fla.

Design for migration

To work towards accomplishing their migration, DuPont and RoviSys conducted a front end engineering design (FEED) study, which gathered information on the plant team, drawings and I/O lists, performed plan walkdowns, identified and delineated project scope, set a target schedule, and identified risks. Next, they drafted system requirement specifications (SRS), including control architecture, I/O quantities, hardware selection, control configuration requirements and HMI counts, as well as project responsibilities and project documentation lists.

In the design for the new controls, DuPont and RoviSys also decided to use the new AS410 controller from Siemens, retrofit existing cabinets with new subpanels containing Siemens' ET200M with MTA remote terminal modules, and use a redundant, fiberoptic Profibus backbone. However, it turned out that a phased approach was going to be needed for the migration.

"Initially, all panels and systems were to be migrated the same time, but production demands and shorter maintenance outages caused the project team to switch to a phased approach," said Hilewick. "Split crushing was determined to be the critical path, so we started with those panels, and worked our way out. The key was to define the scope and boundaries of each phase, set a schedule, and identify and update risks."

Fausnaugh and Hilewick also encountered some added complexities when it turned out that panels containing split crushing I/O also contained other systems. This meant some panels couldn't be partially cutover, which increased the scope of the first phase. Plus, there were some conflicts between existing audit drawings and legacy code, which required detailed comparisons between them.

"We found about 10% of the I/O points had been abandoned, but were never documented," said Fasnaugh. "Some other devices, cables and cards were abandoned and went nowhere, so we had to confirm what we had in the field."

Hilewick added, "For the functional specification, an overview and some details were provided from discussions with the plant engineers. We also captured detailed functionality by reverse engineering legacy code, defined all control modules and alarms, and defined all sequences. Collaboration with the plant was critical!"

Taking the plunge

Final preparations for the Phase 1 migration of the Tedlar® plant's controls included staging a development system with spare equipment from the plant, setting up a virtual machine operating system (OS) server and OS client, and using Siemens SIMIT 9.0 Virtual Controller software for process simulation. "We simulated 100% of our I/O in SIMIT, and used existing templates and standards from the site, so we could implement devices like channel drivers in the way that DuPont wanted," added Hilewick. "We also repurposed backgrounds from the Bailey OS graphics as a starting point, added new PCS 7 block icons, and optimized spacing for operator understanding. The full factory acceptance test (FAT) including I/O simulation with SIMIT increased confidence and minimized risk during cutover."

The final cutover plan outlined all work, and some added walkdowns were done with the electrical contractor to review details. Preexisting wiring and labeling mistakes were found and corrected. These preparations allowed the actual Phase 1 cutover and commissioning to take place during the three and a half days originally scheduled. "We ended up with two complete and separate systems," added Fasnaugh. "And we don't have to deal with Bailey and Modicon anymore."

Hilewick and Fasnaugh explained that splitting the migration into a phased approach increased project costs, and that extra engineering effort was needed to research and define the phase boundaries. Also, the project's plant library templates didn't have some features that were added later, so they stressed to the importance of confirming a library is up to date before bulk creating continuous function charts (CFCs).

With Phase 1 complete – and Phase 2 FAT done and awaiting this fall's scheduled plant outage – DuPont's Tedlar® facility has gained several major benefits. Most importantly, startup time for the split crusher has been reduced from more than 30 minutes – or not starting at all – to less than 5 minutes. The HVAC units are operating more reliably, and are improving quality of the manufacturing process.

"We also have a better understanding of the hardware and software in our plantwide systems," said Fasnaugh. "We're also experiencing cost reductions for engineering changes, operations and maintenance. And our stakeholders' expectations have been exceeded."

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