Dodge DCS Migration Startup Surprises

Take advantage of some cutover commissioning tips and tricks

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YOU'RE READY. Installation is complete. Your distributed control system (DCS) modernization project nears its end. The control loops of the distillation column have been in manual for the last four hours to allow a hot cutover to the new DCS. The project engineering team said the new controls should work just like the old ones.

The operator puts the control loops in the proper mode. Everything looks good initially. Thirty minutes later, though, the key loops on the column start to cycle. Soon, the top and bottom composition (temperature) loops have hit their respective alarm limits, indicating near out-of-spec products. The operator takes manual control trying to recover. It's too late. The overhead and bottom streams have switched to recycle mode.

Now the team's focus switches to troubleshooting. This, of course, delays the modernization project and cutover. Risks to both costs and schedule rise. Management looks at you and asks: "What just happened?"

After hours of investigation, the control engineer says that many aspects of the proportional-integral-derivative (PID) control conversion weren't considered when moving from the legacy DCS to the modern automation system.

APPRECIATE THE DIFFERENCES

Nightmarish stories of modernizations gone wrong might make some people reach for spare-parts order sheets to keep their vintage DCS on life support. However, modernizations in chemical processing can and will have happy endings when well planned. Today's DCSs bring benefits that old systems can't match: productivity, process availability and enterprise profit increases to name a few. These are lasting differences that create successful operations.

Proper controller tuning paves the way for state-based control algorithms and other high-value functionality. Tools available now for systems provide help with auto tuning and advanced tuning techniques. In addition, knowledgeable control engineers can help with complex problems using the functionality correctly. In fact, controller tuning techniques can be used to minimize impact of any upsets or disturbances in hot cutovers as well as improve control performance after cold cutover startups.

Consider that modernization is not just replacing in kind, one for one. Project teams must focus on forward engineering the settings to attain optimal control and process performance. That means concentrating on improvements that are attainable, such as implementing existing functionality with new features to ease use and maintenance. In addition, look at changes with new relatively simple features (e.g., an easily selectable PID structure to reduce process disturbances) that may not have existed in the legacy DCS; these can improve control and reduce variability. Lastly, explore using new embedded supervisory features such as model predictive control (MPC) that can be designed into the project, turned on shortly after the process is up and running, and bring big value to your process.

By using a forward engineering methodology, planning for new control requirements and optimizing the new system, a distillation process, for example, could see improvements such as these:

- 40–80% reduction in quality variation;
- 5–10% increase in throughput;
- 0–4% drop in operations and maintenance costs;
- 10–20% decrease in safety or environmental incident risk;
- 5–10% cut in energy costs; and
- 5–10% decline in product inventories by reducing rework and off-specification product.

NOT LIKE YESTERDAY'S PID

Today's PID differs significantly from that of legacy systems. The main reason is that current DCSs have much more power and include many useful control features inside the function blocks. Modernization teams must think about the new functionality in addition to translating functionality from the old to the new system. All this must be done on a tight