Go Reconfigure

The Race is On

When the longshoremen at the Port of Los Angeles threatened to strike, many across the U.S. were held in rapt attention at the thought of barges stacking up in South Bay off the coast of California while good food went bad.

Take that same feeling of building pressure and you have a microcosm of what engineers were experiencing at one of the world's largest consumer goods companies. Their iconic food has been on the tables of millions of Americans for decades. However, new requirements for increased flexibility and capacity in the manufacturing line demanded that the old line and control software be changed out.

The problem was people didn't want to do without food that is as much of their daytime ritual as coffee and morning drive-time radio. Down time for the line needed to be minimized so typical start-up times had to be severely compressed. The company was already experiencing some pain by sending manufacturing out to co-packers and paying toll charges that decimated already tight margins.

Requirements for the project included:

- Four banks of baggers with the ability to share common trunk lines
- Any bagger needs to be able to go to any packer (that's 18 routing scenarios)
- Tear out the old lines and control software & put in new lines
- Complete dynamic controls debugging in 2 days (not the standard 2-4 weeks)
- Be back in production 2 weeks from the day the line is shut down

To meet the tight, two-week deadline, the team has three options:

- Build the line off-site (pre-integrate), then disassemble and reinstall
- Send production to outside co-packer for duration of shutdown
- Virtual pre-integration and virtual commissioning of controls

Virtual Operations

The team quickly eliminated the options to build the line off site which would require disassembling it and reinstalling it. The time, complexity and costs made that
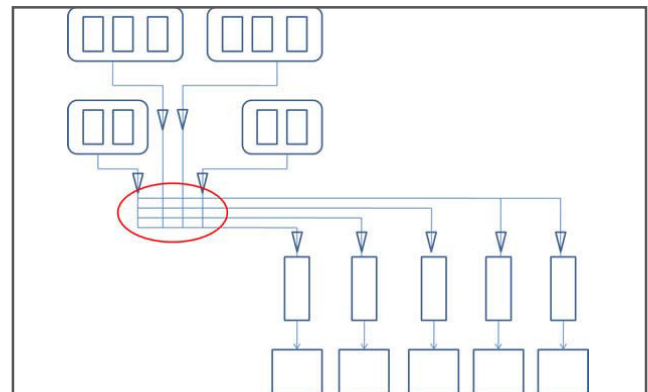
option impractical. Also eliminated from consideration was the option to send production to an outside co-packer for the duration of the shutdown. Tight deadlines and margins, and project costs, made that option untenable, as well. The team quickly shifted to performing a virtual pre-integration and virtual commissioning of controls.

Requirement: *Four banks of baggers with the ability to share common trunk lines. Each bagger needs to be able to go to any packer via any of the 18 routing scenarios.*

Virtual Verification

The virtual verification followed a 4-step process prior to installing equipment and making the new line live: *Audit; Develop Model/Create Process to Test Model; Develop New Program Control Scheme; Test on Model.*

1. **Audit:** Each packaging line was audited prior to the beginning of the relocation to verify the accuracy of the layouts, schematics, programs and the system architecture. Each packaging line's PLC and HMI

programs were then recorded and used as a base point for simulation program development.

2. **Develop Model/Create Process to Test Model:** Next, checklists were developed for each control point to validate and verify the engineering of the relocation. With all those assurances regarding legacy data and performance in place, the simulation program development for the new line could begin. Haskell's proprietary emulation models allow the controls engineers to validate all the custom code for a system using a scaled, 3D simulation of the line.

   The Haskell team set up the HMI & PLC at their lab in Atlanta. New control schemes were created; HMI screens were developed; and custom programming was written. New PLCs were to be integrated into the existing system architecture. The system also used a new HMI distributed application configuration allowing monitoring and servicing from a centralized location with the added benefit of being deployed to existing HMI locations as required.

3. **Develop New Program Control Scheme:** Once the PLC and HMI programs were completed, they could be tested on the new simulation model. Dynamic checklists were developed and used to validate each possible routing scenario for baggers to cartoners. The dynamic checklists included the validation of fault logic, jam logic and routing capabilities with an emphasis of "on-demand" change-overs.

4. **Test on Model:** Complete dynamic controls debugging could begin. Controls engineers executed and debugged the modified PLC and HMI programs prior to onsite commissioning. The team's simulation and systems analytics tools were used to test, debug and confirm the control systems functionality of each routing scenario prior to on-site commissioning.

The customer then verified all systems analytics data, models and simulation during a demonstration of the controls at the Haskell office. The actual installation could start with the full confidence of the entire team.

Conclusion

The application of the simulation and systems analytics tools allowed Haskell to have the line up and running by the deadline. In addition, the client outperformed their planned startup curve. This was made possible because the team made use of Haskell's proprietary emulation modeling tools and startup management best practices.

All requirements were met or exceeded:

▸ The old lines and software were relocated and improved with new equipment
▸ Complete dynamic controls debugging was completed within 2 days (ahead of the standard 2-4 weeks)
▸ The four banks of baggers shared common trunk lines
▸ Each bagger could go to any of the packers via any of the 18 routing scenarios
▸ Most importantly, the company met its business objectives by getting the system back in production only

Contact us to discuss your problem. You can know with certainty that you have not only a **solution**, but the **best solution** for your system.