Holding Up a Mirror to Success
SIMPLOT'S ERP/MES IMPLEMENTATION IMPROVES PRODUCTION CONTROL

As the development of programmable logic controllers matured in the 1980s, their growing functionality gave birth to an important strategic idea at food giant J.R. Simplot Company (Boise, Idaho): *using information technology to mirror the production environment for more effective operations control.*

"Extrapolating what we observed in the use of PLCs, we came to believe that there would be a time in the near future when we could mirror our production environment through computers," notes William Friend, group vice president, supply chain management and information systems, at J.R. Simplot's Food Group. "If we could mirror our operations in a computer, we could simulate our processes—and then predict outputs and costs before production runs were made."

Since that time, software companies around the world have been developing and promoting software tools to fill this niche; and Simplot has moved quickly toward realizing its goal through the implementation of Wonderware and Protean manufacturing execution systems (MES) and enterprise resource planning (ERP) applications.

Helping Account for the Earth's Bounty

A global agribusiness corporation, Simplot is among the nation's largest and fastest-growing privately held businesses. The company provides a wide variety of products and services to customers around the world, with annual revenues of approximately $2.8 billion, derived principally from food processing, fertilizer manufacturing, agriculture, and related businesses. Simplot is organized into five major groups, of which the Food Group is the largest.

"Being in the food manufacturing business, our raw materials come from the earth," says Friend.

While the earth is amazing in the variety of the bounty it provides, that bounty comes with a significant number of variable factors, which can be problematic for manufacturers.

"The unique issues we face revolve around the traceability of materials," continues Friend. "We have to know where they come from, under what conditions they were grown, and, increasingly, what attributes they have."

According to Friend, the need to trace and account for these variables was one of the drivers in moving the company to implement Wonderware as a means of gaining stronger visibility into the production process.

Putting the Mirror in Place

Friend gives this basic technical overview of the process:

Process information is typically generated from three different but related sources. At the deepest level, real-time information is generated by PLCs. This can be a simple activity count, a measure of throughput, or a process parameter such as pH or temperature. Near real-time information is contained in the MES, where PLC data can be stored and summarized.

"PLC data can be combined with online physical tests and lab analysis to build process run charts and create measures of statistical process control (SPC) on the production line," Friend notes.

The third source of process information is the ERP, which is also near real-time information. Here, information gathered at the MES level is incorporated with information about the material requirements of products being made on the line and also about the process capabilities of the line to generate schedules and bills of materials for production.

Recently developed software technology provides interoperability that allows the above information stream to flow in the opposite direction as well.

"In addition to the PLCs driving the information flow up to the ERP level, the production schedules loaded into ERP systems can drive processing down to the MES layer—which would, based on the product's recipe, set the process parameters on the PLCs," says Friend. Such bi-directional flow dramatically increases the company's ability to tune ongoing production.

Simplot selected Prism from Marcam (now Wonderware) in the early 1990s to operate at the enterprise level, and they upgraded to Protean in December 1995. Since that time, Simplot has proceeded with an incremental implementation of Wonderware at the shop floor level (MES) while extending Protean at the enterprise level.

"We've installed the Wonderware system in eight production plants throughout the United States, providing total MES at these sites," says Friend. "What we've done is execute the plan—collect PLC data, store it in the MES layer, and use it to monitor

process conditions at the enterprise level. We now have our mirror in place to gauge parameters and keep the process within established control points."

The system is set up with monitors along the process control lines so that operators can make adjustments on-the-fly. According to Friend, as many as 2,000 people may view the Wonderware application during the course of a day, although a much smaller number would manipulate the program. The Wonderware MES is integrated with Protean at the ERP level.

A Basketful of Benefits

Simplot has harvested an array of important benefits by tying the Wonderware MES to Protean at the enterprise level. These include:

- The ability to cost products based on usage parameters
- Better understanding of what drives throughput rates at the plant level.
- A more realistic view of the production process— how products really run through the plant.

"One thing we've clearly done," says Friend, "is gain control over inventory of production materials. Once the system was up and running and providing control, inventories were reduced by 15 to 20 percent."

Additionally, he adds, inventories are turned faster and there is significantly better accounting of material costs.

The system has also improved communications across the growing Simplot enterprise.

"Through Wonderware, we've been able to provide much broader exposure to information about what's happening at the plant level by using Internet technology," says Friend. "We broadcast Web pages over the company Intranet to get the causes of action in front of management on a real-time basis. This has dramatically improved the communications and decision-making processes by delivering much-improved plant flow information,"

Knocking Down Barriers

One thing that Simplot learned early on was how powerful Wonderware's graphical user interface (GUI) was as an enabling tool for workers.

"The presentation Wonderware has achieved with their GUI makes it really easy for line workers to use the system," says Friend. "This is significant—getting line workers to work comfortably and confidently in the computer environment."

At Simplot's processing plants, the educational level of workers is relatively low when compared with other industries such as electronics. Most workers have a high school degree or less. Until their work experience, they haven't had a great deal of computer experience.

"We've had really good luck with these interfaces," says Friend, "especially with the feature that allows us to easily customize user screens. Ramping up with this technology has been much less painful than we thought it might be."

Leap into the Future

Friend sees the integration of the Wonderware offering across the MES and ERP levels as having tremendous synergistic potential.

"We picked Wonderware and Protean as best-of-breed solutions," says Friend, "but together, under the Wonderware banner, they can transform the solution to a truly effective and overarching enterprise solution—and that can be a significant advantage to users like Simplot. It's one thing to mirror your production process, but it's a whole leap ahead to be able to make adjustments based on what you know."

With Wonderware and Protean, Friend concludes, Simplot is poised to make that leap as a means of supporting their leadership status deep into the next millennium.

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