PMT PACKAGING MACHINERY TECHNOLOGY

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COMMUNICATION THROUGHOUT THE PACKAGING PROCESS PROVIDES CONSTANT SUPERVISION AND FEWER UNWANTED SURPRISES.

BY JIM PARSONS

Is your packaging system keeping you awake at night?

Unless you're bedding down on the production floor, system performance shouldn't be a recurring source of insomnia. Ever-evolving automation control technologies and manufacturing execution systems (MESs) give users the power to continually monitor and optimize every function of every line for every product.

And because the system can be set to sound the alarm at even the slightest hint of a discrepancy, you can rest easy with the assumption that no news must be good news.

Better heat up another pot of coffee, though, as you may be in for some long nights.

What you don't know about what's going on inside your packaging system can hurt you and, more importantly, your customers.

Joseph Ringwood, vice president of sales and operations for Systech International, Cranbury, N.J., says that the nature of packaging can outstrip the capabilities of an MES.

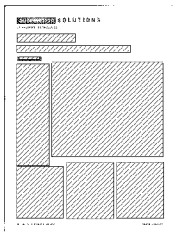
"The big issue is speed," he says. "You're doing things at the millisecond level with immediate response requirements, which is far faster than what an MES can handle. There's also the matter of customizing every component of a packaging line, which may not be feasible in a highly intricate system. That requires a SCADA [Supervisory Control and Data Acquisition system] to handle the control functions, adding another layer of integration complexity to a diverse control network."

Chad Collins, vice president of global strategy for HighJump Software, Eden Prairie, Minn., adds that the federal government's increasing emphasis for product traceability means that food, beverage, medical and pharmaceutical companies can't afford to let any data fall through cyber-cracks.

"They need to have complete information about the product throughout the process," he says, "from receipt of their suppliers' ingredient and component lots to its location on the store shelf."

Several software solutions have been developed that allow users to shed light on their packaging system's performance, permitting them to get a little more shut-eye in return. For example, Systech has enhanced ▶ Guardian™, its plant-level server application, with new features that provide pharmaceutical manufacturers with metrics to help identify and optmize packaging line efficiency.

"Integrated with our Sentri™ machine vision inspection and Advisor™ line management and control solutions, Guardian represents a comprehensive, scalable product-specific Packaging Execution System (PES)



that can be optimized at the line level within the same plant or across multiple facilities," Ringwood explains, adding that Guardian is capable of supporting multiple Advisor line solutions. It also seamlessly communicates with Enterprise Resource Planning (ERP) and MES systems.

"This allows pharmaceutical companies to collect and use this valuable data to continuously improve operational performance and overall profitability," he says.

Guardian also features Serialized Product Tracking (SPT) functionality that assigns, encodes and records EPC serial numbers at the item-, case- and pallet-level for both RFID and 2-D barcode supply chain track and trace initiatives.

Those features were of particular interest to Cephalon, Inc., a Frazer, Pa.-based biopharmaceutical company currently working on an RFID pilot project at its Salt Lake City, Utah facility.

"The project gives us the opportunity to familiarize ourselves with RFID technology to meet current and impending e-pedigree requirements for our supply chain," says Gerry Frank, Cephalon's senior director of packaging technology. "We wanted to move in phases to make sure we could fully evaluate and test the tracking process before automating the line."

Cephalon worked with Systech to map out the steps for tracking pallets and interpacks through the warehouse. Using an interim strategy of manually applied RFID labels, the project team tested how well Guardian and Advisor matched and tracked cases and pallets while also updating the electronic product code data on the plant's existing ERP infrastructure.

"Everything worked just as we'd planned," says Cephalon Senior ▶ Logistics and Analysis Manager Brian Brown, adding that the pilot program is nearly complete. "That puts us on schedule to be in compliance with California's e-pedigree requirements by the middle of 2008. From there, we'll implement serialization into our other product lines."

CHAIN REACTIONS

The need for precise traceability compounds what is already a formidable challenge for food and beverage manufacturers to maintain consistent packaging system profitability.

"Product lines that were once standard now change quite frequently as companies come up with new items," says Collins. "That creates unique packaging configurations that can affect the entire supply chain."

While adjusting to rapid product changeovers may now be second nature to packaging system managers, he adds that their information systems may be a few steps behind.

"The companies may have automated only parts of their system," he says. "They may have data on manufacturing or distribution, but nothing that provides a full trace of the products from source to consumption."

One option for bridging these information gaps is HighJump's Supply Chain Advantage™ , a suite of production tracking and inventory management tools that help food and beverage packagers get a complete picture of their operations.

Designed to support a variety of supply chain models, Supply Chain Advantage can be easily integrated

into a company's production ERP system to capture everything a company needs to know about its products. This can include configurable lot/batch/expiration date management, data for changing compliance requirements and integrated RFID capabilities.

Users can tap the software's web-based visibility tools and data summaries to get real-time and scheduled updates for quality assurance, as well as traceability and recall management.

"Users can trace every item back through the system, including capturing the machine settings during production and location in the distribution channel," Collins says. "The system is also designed to promote full collaboration with suppliers, co-packers and distributors."

COMMUNICATION WITHOUT BORDERS

Packaging lines aren't the only places where throughput is a priority. The communications networks used to control, coordinate and monitor the performance of these complex systems are now expected to carry huge amounts of data at speeds that make the proverbial wink of an eye seem tortoise-like.

So, when the conversation turns to finding the most efficient way to move this massive amount of information, it usually starts with EtherNet/IP. The technology's cost-effective cabling, versatility to support different protocols and compatibility across multiple devices from multiple manufacturers that are using IEC 61131-3 compliant software has helped foster improved horizontal integration across machines.

"You can continually integrate new technologies into your system without adding hardware or excessive cabling that can compromise its efficiency," says Corey McAtee, TwinCAT product manager for Beckhoff Automation, Burnsville, Minn.

He further notes that the recent integration of full EtherNet/IP compatibility to Beckhoff's TwinCAT control software now allows users to use a single low-cost, intelligent gateway package to maintain seamless communication between master and Beckhoff slave devices, regardless of the master controller's manufacturer. ▶

Because TwinCAT already supports most other major fieldbus networks (e.g., DeviceNet, PROFIBUS, SERCOS, EtherCAT CANopen, etc.), the software can connect an immense range of PLCs, PCs, servo drives and other devices.

"Machine builders now have greater flexibility in selecting small, high-speed PC-based controllers," McAtee says. "By making it simpler and less expensive for small, yet high-speed devices to connect into the larger control architecture, they can build Windows functionality into the system, adding features such as database communication and remote diagnostics."

McAtee cites how TwinCAT's enhanced EtherNet/IP features enabled Control Systems Innovators, Elgin, Ill., to retrofit a 20-servo corrugated board slitting/scoring machine for one of its customers.

The system uses a Beckhoff CX1020 embedded PC as the motion controller interfacing to 20 high-performance, EtherCAT-enabled servo drives. In addition to EtherCAT communication, the CX1020 in the ▶ application runs TwinCAT EtherNet/IP Slave software to communicate with a third-party EtherNet/IP master PLC. This in turn interfaces to EtherNet/IP variable frequency drives

(VFDs) and other machine lines.

"Without the EtherNet/IP compatible PC-based controls, the customer would have been looking at a very convoluted, expensive solution that would have delivered slower processing speeds," McAtee says. "The EtherCAT-enabled servo drives bring high-speed, deterministic control to the application, and communication to the servo drives in the low microsecond range.

"Using TwinCAT EtherNet/IP Slave software, Control Systems improved the connectivity between the retrofit's main controller, EtherNet/IP PLC and the CX1020 embedded PC handling the motion."

ALTERNATE ROUTES

While EtherNet/IP may be the eight-lane freeway of automation control communications, linking master and slave devices with less intense data volumes usually requires an I/O network equivalent to say, an arterial road or side street.

Other networks that share the Common Industrial Protocol (CIP) network library—e.g., DeviceNet and ControlNet—have emerged to complement EtherNet's data handling capabilities.

But as Omron Networks Marketing Manager David Kaley notes, "there was still a hole when it came to having a viable low-cost, high-speed solution for the packaging and material handling industry.

"Ethernet lacks the speed and determinism necessary at the word or bit transfer level, and DeviceNet tends to be costly for anything other than small networks."

These needs are what led the Schaumburg, Ill.-based company to introduce a new line of fieldbus products based on the CompoNet Specification developed by the Open DeviceNet Vendor Association (ODVA).

Omron's CompoNet products update 1024 I/O points in one millisecond, with each network capable of controlling up to 384 nodes. Four ▶ baud rates, ranging from 93.75 Kbps to four Mbps are ideally suited to support high-speed packaging and bottling applications.

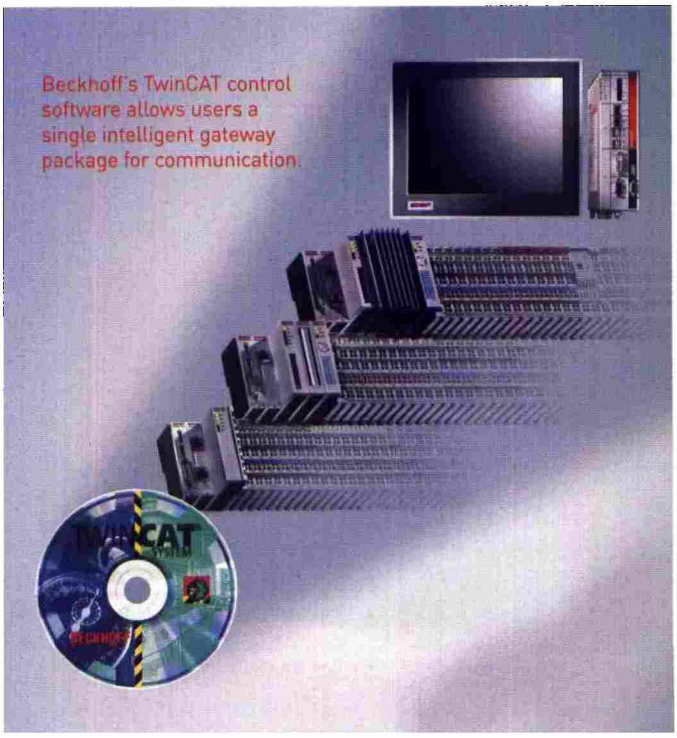
"CompoNet's speed is tremendous," Kaley says. "It's a fast, yet flexible way to simplify system configuration, diagnostics and maintenance using a single tool such as a PC, and with a lower cost per foot."

Indeed, even the most expansive packaging operation can take advantage of CompoNet's versatility. Master and slave units can be separated by nearly 5,000 feet (1,500 meters) using standard trunk line cables. Up to three repeaters can be incorporated between a master and slave to reach more distant units or increase the number of nodes with almost no degradation of transmission speed.

CompoNet is also easy to implement, with an automatic transmission speed setup function that allows slaves to match the rate set by the master. As new slaves are added to the network, existing CompoNet units automatically reconfigure their transmission speeds.

"CompoNet is the perfect complement to other CIP networks," Kaley says. "EtherNet handles the large data blocks while CompoNet collects bits at high-speed. With each network doing what it does best, packaging users get the highest performance from their systems." PMT

Jim Parsons has written about business and technology issues for more than 10 years.



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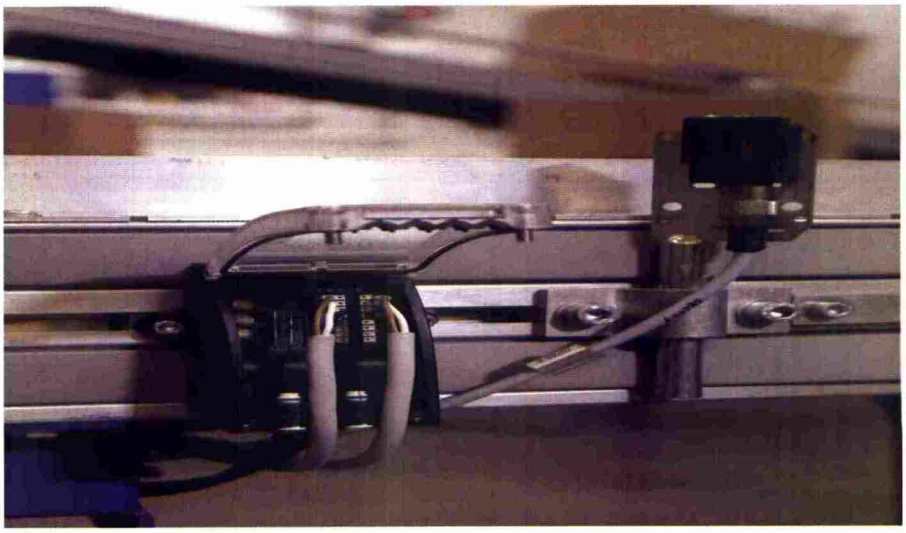

Omron's CompoNet, like this unit on a conveyor, update 1024 I/O points in one millisecond, with each network capable of controlling up to 384 nodes.