Open interfaces provide basis for seamless traceability

PC-based control optimizes potato packaging

At Norwegian packaging specialist, Hvebergsmoen Potetpakkeri, the potatoes are no longer sorted, weighed, bagged and stacked on pallets by hand. Instead, a fully automated packaging system made by Norwegian machine building company, Intek now performs this strenuous job. The new system increased throughput by 35 percent, says Hvebergsmoen Potetpakkeri, where a large portion of Norway’s potato crop is packaged. The entire process is automated via EtherCAT on a PC-based control platform from Beckhoff. The interaction of EtherCAT and TwinCAT as a multifunctional interface also makes it possible to exchange data with the MES/ERP system for a flexible and demand-oriented workflow.

According to general manager Elling Ødegaard, Hvebergsmoen Potetpakkeri’s fully automated potato bagging system is among the most modern in Europe. With a capacity of 40,000 tons per year, the large installation covers an area of 12,000 square meters (about 129,000 square feet). End customers include European grocery store chains, Bama and Coop. “Since we package Norwegian as well as imported potatoes, our ‘season’ covers 365 days a year. We process roughly 120 different item numbers per year,” adds the general manager.

The packaging workflows were revolutionized predominantly by two innovations: robots and logistics applications. In the past, the potatoes were packaged by hand – a particularly hard and labor-intensive job. Now ten Kuka robots do this work spread over seven packaging systems and three palletizing centers at Hvebergsmoen Potetpakkeri. “The robots provide more flexibility,” explains Elling Ødegaard, “because a single operator can now control several machines simultaneously.”

PC Control makes customized production possible
The robots take pallets and fill them with bags of potatoes. A standard pallet holds roughly 40 bags, but the system is also able to handle other types like the flatter pallets used by end user Coop, which are automatically double-stacked. While the robots provide the mechanical parts of the plant with a totally new level of “strength”, large portions of the logistics were also replaced – with an integrated order management and production system. “This system handles the automated marking of the packaging and the pallets. It also checks the weight and tracks the products electronically while the potatoes move through the packaging machine,” explains Ødegaard. To perform this job, two label printers have been integrated into the control system that can label two pallets simultaneously.

All customer orders are entered via the ERP system. It is linked to the production system, which assigns the orders to the respective packaging line. The system that checks the weight receives its instructions from the controller via a PROFIBUS interface. The package weight varies depending on the type of potato. The settings are entered automatically with the product selection. Based on this information, the controller transmits the program code to the KUKA robots. All the operator
has to do is select the automatic start of the production cells and press the Start button on the control panel. All machines are configured automatically in response.

Based on the serial shipping container code, the Beckhoff C6930 Industrial PC (IPC) sends all the required information about the ready-to-ship pallet from the TwinCAT PLC directly to the ERP system. “With this system we can track and trace all production data, the location of the respective pallet, the waybill, the invoice and the label data – down to the bag level – for each product type and customer in real time or years later,” explains Elling Ødegaard. As a result, the company now has a system that meets the strict track-and-trace requirements for the food industry perfectly.

An investment that pays for itself

The spread-out packaging system is controlled via three C6930 IPCs. The separate control stations use 15-inch panels from the CP79xx series with stainless-steel housings. They display, among other things, the current status of the orders as well as the daily production. The communication between the controller and the local I/O units as well as the frequency converters of the robots with the palletizing units runs over EtherCAT, with each production cell having its own control cabinet. To provide reliability, the control cabinets are equipped with uninterruptible power supply units, electrical protection systems and fast-acting fuses. Robust Beckhoff Fieldbus Box modules with IP 67 protection rating are distributed throughout the system outside of electrical cabinets.

To make the system even more effective, general manager Elling Ødegaard plans to install automatic sensors to measure the overall equipment effectiveness (OEE) in real time. All trouble messages generated in TwinCAT will be forwarded directly to a database. “This will provide us with entirely new options to improve the production flows,” he says.