Retailer Journeys sets course for dynamic growth in e-commerce

To keep up with the continuing rise in online sales, retailers must design better websites, expand their shipping capacities and optimize their logistics processes. This challenge is very familiar to U.S.-based retailer Journeys, which specializes in footwear from brands that are popular with young adults, such as Adidas, Fila, Converse and Vans. Together with its partner Fortna, Journeys recently upgraded its distribution center with PC-based control technology.
Small picture: The Journeys distribution center in Lebanon, Tenn., supports order fulfillment for hundreds of stores and the footwear retailer’s growing e-commerce sales.

Large picture: Each line features a pole-mounted CP3919 multi-touch Control Panel that is connected to the control cabinet via the CP-Link 4 One Cable Display Link.
Journeys first partnered with software specialist Fortna in 2000 to design and implement its warehousing and logistics center in Lebanon, Tennessee. The facility originally extended over 320,000 square feet to support 800 brick-and-mortar stores with 17 million SKUs (stock-keeping units) per year.

In 2015, the boom in online shopping prompted Journeys to begin planning a major warehouse upgrade, which was completed in 2017. Besides increasing its capacities, Journeys wanted to raise its throughput and optimize its order fulfillment processes to best serve its successful store business while boosting online sales and satisfying new consumer demands such as same-day or next-day delivery. William King, group vice president of integrated technology solutions for contractor Fortna, explains: “As part of the expansion project, we increased the distribution center’s capacity by adding a new conveyor and picking system. We also upgraded the warehouse control system with our FortnaWES™ Warehouse Execution System (WES) software and the supporting hardware.”

Fortna Inc., which is headquartered in West Reading, Pennsylvania, and has locations in several other countries, designs and implements logistics solutions including its industry-specific FortnaWES™ software for companies across the globe. The company helps customers implement innovative control technology while leveraging legacy systems for better results. To integrate the controllers and field devices in the Journeys warehouse and optimize its logistics processes, Fortna made full use of the openness and flexibility of PC-based control technology and EtherCAT.

Mandatory in logistics: maximized throughput and minimized downtime

The specifications for the upgrade were dictated by the distribution center’s high throughput requirements. For example, high-speed sorters and merges had to be capable of handling more than 130 boxes per minute with incredible accuracy, because a single mistimed box can jam the conveyor and bring the entire operation to a halt. Since unplanned downtime is something that a company like Journeys simply cannot tolerate, the order fulfillment operations even had to continue during the warehouse expansion, says Jeremy Davidson, director at Fortna. To solve this problem, the migration was carried out in phases. First, Beckhoff controllers were added to execute the legacy software. Next, the fieldbus communication was upgraded to EtherCAT, and finally complete automation solutions were implemented based on TwinCAT and CX2030 Embedded PCs.

To minimize downtime during the migration, Fortna installed an extra CX2030 Embedded PC near the main line controller. This enabled the operator to simply move the Ethernet cable and CFast flash memory card to the new unit as needed.

Since any unapproved access to the distribution system over the internet can slow down or even stop its operation, protection of the network infrastructure was another requirement: “Security has rightly become a critical area of focus,” says William King.
Real-time automation raises transactions to a new level
Fortna based an upgrade of the control application layer for its FortnaWES™ warehouse execution system software on the TwinCAT 3 automation platform. The resulting Fortna Real-Time Controls (FRC) replaced the company’s 25-year-old FortnaPlus™ software. According to William King, TwinCAT’s TCP/IP-based communication is particularly important: “Ethernet TCP/IP is the protocol that allows our FRC controls layer to talk to our business layer in real-time and process thousands of transactions per hour. Anytime we scan a carton at a sorter, for instance, the controls layer asks the business layer ‘Where should this go?’ The business layer, which contains the logic, may respond ‘Take it to Lane 6’. All of this happens in hundred-millisecond cycles, and direct TCP/IP communication from the PLC makes it possible.”

On the hardware side, operators interface with the WES through a CP3919 multi-touch Control Panel on each line. A CX2030 Embedded PC equipped with a dual-core processor handles the control functions. The PC’s form factor makes it more accessible to engineers in the industry, according to William King: “Many in the material handling and distribution industries are still locked in the PLC mindset. A PC-based industrial system that mounts on a DIN rail inside an electrical cabinet like a PLC looks familiar to them and is accepted more easily.”

Using EtherCAT as the industrial Ethernet fieldbus, Fortna is able to leverage distributed I/O concepts. “EtherCAT was a compelling technology for Fortna from the beginning due to its wide acceptance in the logistics industry,” says Doug Schuchart of Beckhoff USA. “It possesses the unique ability to support the data exchange of more than 65,000 devices over networks with a wide range of topologies and speeds in the realm of microseconds.”

Successful logistics upgrade for e-commerce
When the Journeys distribution center went live in April 2018 after successful completion of the upgrade, the results were impressive: expanded storage capacity, an overall increase in carton throughput and the ability to fulfill e-commerce orders more efficiently.

Together, Fortna and Beckhoff have demonstrated how automation technology and modern logistics solutions can be used not just to manage the risks caused by growing e-commerce sales, but also to take advantage of their inherent growth opportunities.