

TGW-ERMANCO INC. Engineers Design TURBO Sorter Thanks to Rapid Local Logic Completed by Intelligent Components

DeviceLogix technology enables material-handling OEM to serve larger customers with an off-the-shelf solution

Solution

Off-the-Shelf Components

- Allen-Bradley CompactLogix programmable automation controller (PAC) provides a fully integrated control system for the TURBO sorter
- DeviceNet communication and distributed I/O systems help minimize wiring cost and allow seamless communication between the central controller and I/O points
- Allen-Bradley ArmorBlock MaXum I/O module with embedded Allen-Bradley DeviceLogix technology allows local, autonomous logic execution for rapid loop closure as an extended functionality of the device.

Results

- Helped reduce engineering time by over 400 hours
- Helped reduce wiring costs by over \$200 per divert point
- Off-the-shelf, modular components provide end users with easier access to spare and replacement parts
- Local logic execution allow engineers to design one of the fastest systems of its kind



With DeviceLogix technology, the ArmorBlock MaXum I/O module is able to execute programmable logic functions without relaying information back to a central controller.

Background

In distribution centers around the globe, products that have been ordered by companies and individuals from Australia to Alabama need to be sorted and shipped out. From baseball caps to candy bars to computers, after someone clicks the "submit order" button, conveyor systems start doing their part of the job, making sure that a specific order makes it to a specific destination in the shortest amount of time possible.

The engineers at TGW-ERMANCO INC.™, one of the world's largest suppliers of material-handling solutions, are tasked with making sure that those companies ship out the most cases of products with the highest degree of accuracy possible.

Challenge

About three years ago, the engineering staff at TGW-ERMANCO INC. took on their greatest challenge yet. They wanted to design a cost-effective, pop-up wheel conveyor that would move cases of products in distribution centers as fast as possible. "Our end users are always looking for the lowest-priced solution to quickly move their finished goods through their

LISTEN.
THINK.
SOLVE.



The TURBO Sortation System is one of the fastest pop-up wheel conveyor systems available.

warehouses and out to the people who need them,” said Andy Knaut, director of Engineering, TGW-ERMANCO INC. “Traditional pop-up wheel conveyor systems can move about 100 cases per minute (CPM). We wanted to design our new TURBO™ sortation system to move up to 200 CPM, while still keeping costs down for our customers.”

The TURBO sorter has a unique design that requires less space between cartons, resulting in higher throughput than a traditional pop-up wheel sorter. A series of narrow belts about two inches wide stretch across the width of the conveyor. Between each belt, the TGW-ERMANCO INC. engineers place six rows of wheels designed to pop up when they are told a carton is approaching.

Traditional pop-up wheel sorters follow the theory that the more wheels on the conveyor, the faster the cases of product can move through the system – by raising more rows of wheels under the carton, the system has a better chance of grabbing the product and carrying it off the conveyor to its correct destination. However, by raising multiple rows together, the cases

have to be spaced further apart, which significantly lowers the number of cartons that can be moved.

The TURBO sorter solves this problem by implementing the patent-pending WAVE™ technology, which raises and lowers each row of wheels individually. The row raises as the leading edge of a carton arrives at the divert point, and lowers as the trailing edge is conveyed over the divert wheel row, giving anyone watching the process the impression that they’re witnessing high-speed carton surfing. With just one row of wheels moving at any given time, the cartons can be spaced much closer together, while still moving at a rapid rate to increase CPM throughput significantly.

In order to move each row of wheels as quickly as possible, the TGW-ERMANCO INC. engineers needed a local controller at each divert point. “We found that even a programmable logic controller (PLC) with a 10 millisecond program scan time wasn’t fast enough,” said Knaut. “In order to move the wheels and boxes as fast as our customers demanded, we needed a product that would complete program scans in the one to two millisecond range.”

The engineers also wanted to cut down on wiring costs and provide their customers with the ability to buy replacement parts locally, right off the shelf, without having to send them back to TGW-ERMANCO INC. for customization. It also was important that the new conveyor line be modular and upgradeable to allow for expansion and product changes in the distribution center.

Solutions

TGW-ERMANCO INC. engineers have been using Rockwell Automation products for over 25 years, so when it came time to select the control products for the new TURBO system, they decided to stick with Rockwell Automation. “When we selected the control system for the new TURBO sorter, we didn’t need to look any further than Rockwell Automation,” said Knaut. “They were the only supplier that offered the kind

of control products we needed, at a reasonable price, that all worked together seamlessly. We didn’t need to comparison shop at all.”

To help meet the demanding program scan time requirement of one to two milliseconds, TGW-ERMANCO INC. engineers selected the Allen-Bradley® ArmorBlock® MaXum™ I/O module with Allen Bradley DeviceLogix™ technology for each divert point. DeviceLogix embedded firmware is an extension of basic component functionality that controls outputs and manages status information onboard many Allen-Bradley devices like the ArmorBlock MaXum I/O module. As part of the I/O block, it combines inputs and outputs, and programmable local logic to determine its behavior.

“Each ArmorBlock MaXum I/O module is connected via DeviceNet to a central Allen-Bradley CompactLogix™ programmable automation controller (PAC),” explained Knaut. “When that central controller receives an alert that a box is headed toward a specific divert point, it seamlessly alerts the ArmorBlock MaXum I/O module. Thanks to DeviceLogix technology, which is embedded in the ArmorBlock module’s internal miniprocessor, the programmable logic necessary to move the row of wheels up and down to divert the box can be completed locally by the ArmorBlock module without having to loop back through the central PAC.”

By carrying out logic control at the divert point rather than at the centralized master PLC, the time for an input to be sensed and an output to be actuated decreases significantly. TGW-ERMANCO INC. engineers were able to complete the necessary program scans in fewer than two milliseconds, allowing the TURBO sorter unprecedented speed and accuracy.

An additional benefit of using DeviceLogix technology was the simple and straightforward logic programming of the device. “Our control engineers were able to program the ArmorBlock MaXum I/O module in a familiar development environment,” said Knaut. “As a result,

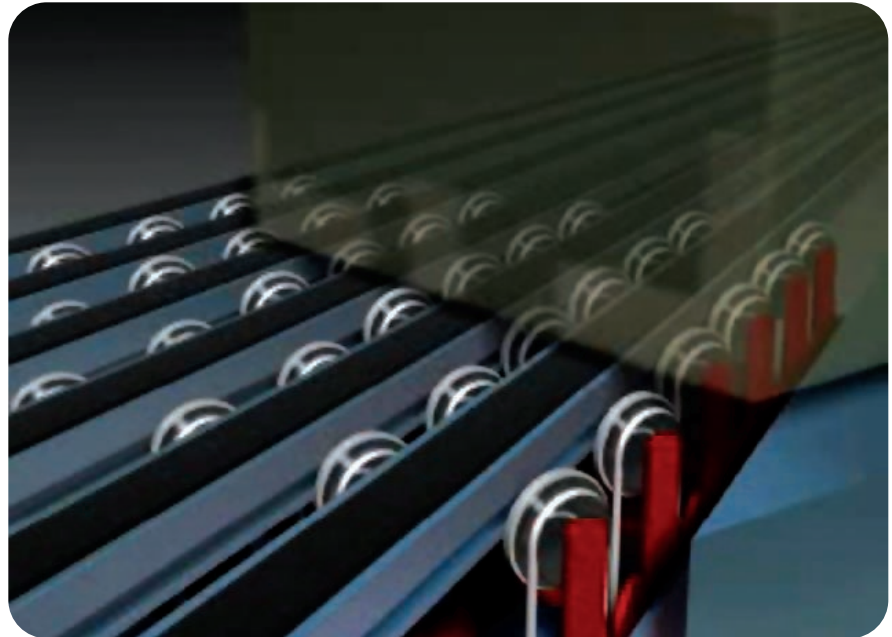
the TURBO sorter features a faster start-up time, and reduced training costs for the system's end users."

The ArmorBlock MaXum I/O module also solved the engineers' wiring cost challenges in a completely off-the-shelf package. "We could link several components to the central PAC via DeviceNet, which saved us hundreds of dollars in wiring costs," said Knaut. "And each component, including the I/O module, came directly from Rockwell Automation with no customization necessary. If our customers need a replacement, they can simply order from a local distributor and plug in the new part, which saves them time and money."

Results

Because the ArmorBlock MaXum I/O module with DeviceLogix firmware can control wheel movement at the divert points independent of the central controller, the TGW-ERMANCO INC. engineers were able to design the TURBO sorter as one of the fastest pop-up wheel conveyor systems available today. "We're now able to supply conveyor systems to much bigger companies with larger warehouses and distribution centers that have a need for faster throughput," said Knaut. "With the TURBO conveyor, companies are able to save thousands of dollars and experience fewer damaging jams over the alternative sliding-shoe sorter."

Using DeviceNet to connect the ArmorBlock I/O module to the central CompactLogix controller also has saved wiring costs. "Because we can connect the ArmorBlock unit and



With just one row of wheels popping up to direct each box at the divert point, TGW-ERMANCO INC.'s patent-pending WAVE Technology looks like high-speed surfing to the naked eye.

surrounding devices to the central PLC through DeviceNet, we save more than \$200 on wiring costs for every divert point on the TURBO sorter," said Knaut.

By employing an off-the-shelf solution that required no customization, TGW-ERMANCO INC. saved more than 400 hours in engineering time. Knaut also pointed out that the off-the-shelf replacement parts keep their customers very happy. "Our customers don't want to have to wait for a customized part if something goes wrong. By using standard, readily available Allen Bradley components in our system, each of our customers have easier, local access to replacements."

Overall, Knaut was very pleased with the Rockwell Automation solution. "Our engineers have succeeded in building one of the fastest pop-up wheel sorters available thanks to the DeviceLogix technology embedded in the ArmorBlock MaXum I/O module. TGW-ERMANCO INC. is on the cutting edge of material-handling technology and Rockwell Automation helped us get there."

The results mentioned above are specific to TGW-ERMANCO INC.'s use of Rockwell Automation products and services in conjunction with other products. Specific results may vary for other customers.

Allen-Bradley, ArmorBlock MaXum, CompactLogix and DeviceLogix are trademarks of Rockwell Automation Inc. TGW-ERMANCO INC., TURBO and WAVE are trademarks of TGW-ERMANCO INC. Trademarks not belonging to Rockwell Automation are property of their respective companies.

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe/Middle East/Africa: Rockwell Automation, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846