



Honeywell Intelligrated boosts device connectivity and networking capabilities with PC Control and EtherCAT while cutting controller hardware costs by 50%

## The Connected Distribution Center takes control of intralogistics challenges





GTO workstations support picking, replenishment or quality control operations with flexible PC-based control and EtherCAT technologies.



E-commerce continues to grow rapidly at a 25% annual rate, according to Honeywell Intelligrated. For every six jobs created, however, there is only one worker available, and only 20% of candidates possess the necessary skills. These statistics underscore the labor challenges facing retailers and distribution centers (DCs) in a hyper-competitive market. For these reasons, many intralogistics operations are leveraging technological advances to accelerate their digital transformations and maximize DC efficiency and productivity. Honeywell Intelligrated's solution for these and other challenges is The Connected Distribution Center platform – a suite of offerings that combines asset monitoring, warehouse execution and labor management software with advanced automation and robotic solutions. "The purpose of our connected suite is to aggregate data in real time to optimize worker productivity, improve operational reliability and streamline performance through automation. In doing so, we're connecting people, equipment and automation systems to key performance indicators (KPIs) such as uptime, throughput and profitability," explains Joe Joice, VP of Business Development.

Serving customers in e-commerce, supply chain logistics and end-of-line manufacturing, Honeywell Intelligrated offers accessible connectivity to operational

assets that drive warehouse productivity and effectiveness. The Connected Distribution Center concept is the driving force behind the development of all automation and material handling solutions – from software to conveying and sortation equipment. Recent examples include the modular goods-to-robot (GTR) and goods-to-operator (GTO) workstations as well as MC4, the company's fourth-generation PC-based machine control platform. "Compared to legacy platforms, MC4 allows us to design in functionality that customers want, including focused and intentional data acquisition," says Jason Johnson, Senior Manager of Machine Control Development.

Both systems' capabilities draw on the advances of Honeywell Robotics and a broad range of shuttle, palletizing and gapping solutions from Honeywell Intelligrated. Implementing a connected infrastructure across a conglomerate with multiple product families was no small task. To strengthen DCs facing labor shortages and increasing e-commerce technology demands, Honeywell Intelligrated needed to leverage powerful, flexible EtherCAT- and PC-based automation from the robust Beckhoff portfolio.



### Robots lend a hand in fulfillment centers

GTR workstations improve fulfillment operations for companies across multiple industries, where applications range from DCs for third-party logistics (3PL) providers, e-commerce fulfillment centers for large clothing retailers or manufacturing for food and beverage companies. “The flexible workstations support picking, replenishment or quality control operations, as well as other value-added services, while maintaining a compact footprint,” says Joice, who oversaw GTR development. “Traditionally, an associate would handle the products arriving in totes, but as robotics become more common in the workplace to increase efficiency and offset the shortage of workers, workstations need the flexibility for robots to complete these tasks. Our system transcends those two different inputs.”

The current workstation iteration uses a cell provided by Soft Robotics that features an articulated robot equipped with grippers designed for efficient and precise material handling. Shuttles in the automated storage and retrieval system (AS/RS) deliver items either to the robot or operator. To ensure robots can complete all actions, the workstations require flexible, scalable automation technologies that easily integrate with legacy technologies in the warehouse. At the same time, they need to support the Industrial Internet of Things (IIoT) technologies and increased data acquisition – all underpinnings of a connected infrastructure. Implementing highly automated processes, such as the GTR, can help customers increase reliability, improve equipment utilization and maximize productivity.

### Taking control of the distribution center

To support today’s intralogistics applications and build a foundation for the future, the MC4 control platform required flexible software, hardware and networking technologies. This PC-based solution includes everything from machine control to IIoT-enabled data acquisition to provide key insights for the many offerings that comprise The Connected Distribution Center platform. However, most fieldbus and industrial Ethernet technologies experience performance issues when sending large quantities of data and do not work effectively in mixed-architecture environments. “Retrofits comprise a large portion of our business,” Johnson says. “Whether we installed the system or another company did, we have to support a wide range of protocols with open communication.”

Despite already using PC-based solutions from a previous vendor for legacy control platforms, hardware limitations prevented broader implementation of MC4. These hardware offerings did not support distributed control architectures, and they were also cost prohibitive. One server-class solution used by Honeywell Intelligrated could not be installed on the warehouse floor and was thus managed by customers’ IT departments, adding significant maintenance expenses. Another PC could be installed near the equipment but required expensive, air-conditioned cabinets, entirely isolated from the other components.

### Optimizing intralogistics communication with EtherCAT

While searching for hardware solutions for MC4, Johnson and his team began evaluation of the EtherCAT industrial Ethernet system, which led them to automation technologies from Beckhoff. “Beyond enabling more powerful distributed controls architectures, EtherCAT offers the highest speed and determinism available with the most configurations and practically no limit in the number of devices on a network,” he says. Exemplifying system openness, EtherCAT allows systems based on MC4 to connect easily to DC equipment built on a legacy network, including EtherNet/IP, PROFINET, PROFIBUS, DeviceNet and others – with



Using scalable Beckhoff Embedded PCs and EtherCAT I/O for the MC4 controls platform provided performance advantages and cost savings.

the simple addition of appropriate EtherCAT Couplers and gateways. Johnson adds that EtherCAT also offers unrivaled data throughput for drives and other components in the field: “We can get significantly more information from field devices without impacting network performance, which helps us achieve the goals of a connected distribution center.”

Through its speed and flexibility, EtherCAT enables more modular designs of the GTR workstations as well. “EtherCAT helps us keep the cost down per station and also implement future expansion capabilities at a lower cost to the end user,” Joice says. In addition to standard EtherCAT I/O modules, distributed EtherCAT Box modules offer the same high-speed communication in an IP67 form factor, perfectly suited to the GTR and more broadly to conveying systems that span across warehouses. The workstations also feature TwinSAFE integrated functional safety, which provides certified Safety over EtherCAT (FSoE) communication via the standard network. “Honeywell highly prioritizes safety – employee safety, equipment safety and environmental safety. The ability to add safety features within the same network that’s already in the field will become more critical, and TwinSAFE and EtherCAT are perfectly suited for this,” Joice explains.

### Upgrading PC-based hardware and software

Honeywell Intelligrated benefits from scalable, flexible Beckhoff Industrial PCs (IPCs). While several Beckhoff options were available for MC4, the engineering team has largely standardized on CX2040 Embedded PCs, which feature quad-core Intel® Core™ i7 processors. “The performance capability per dollar spent is optimal, and we don’t have to worry about running out of bandwidth,” Johnson explains. “The DIN rail-mounted IPCs are capable in harsh warehouse environments and sit in the same control cabinet as the I/O, drives and other components. As a result, we no longer have to install PC-based controllers in the IT space and also don’t have the added expense of separate cabinets.”

The GTR workstations feature CX5120 Embedded PCs, and the GTO versions for human workers also includes CP2907 multi-touch Control Panels for the opera-



The U.S. headquarters for Honeywell Intelligrated is located in Mason, Ohio, with branches in Owings Mills, Maryland, and elsewhere.

tor interface. According to Joice, the inherently open connectivity of the IPCs and EtherCAT can boost intralogistics solutions' capabilities to send feedback from sensors to the cloud or other higher-level systems and visualize performance and production figures in real time: "We leverage many IoT components on the marketplace to gather actionable information about our solutions and offer our customers better visibility into those assets."

This flexibility extends to TwinCAT 3 automation software from Beckhoff. The engineering and runtime software packages in TwinCAT empower engineers to create applications that handle big data, pattern recognition and condition or power monitoring, as well as standard PLC and motion control tasks. It offers a free selection of IEC 61131-3 programming languages and their object-oriented extensions, computer science languages found in Microsoft Visual Studio®, a variety of built-in function blocks and other options in the graphical editors. The GTR workstations fully rely on TwinCAT for real-time control. Both the GTR and MC4 systems benefit during system configuration through Automation Device Specification (ADS), a device and fieldbus-neutral interface in TwinCAT that enables automatic detection and addressing of devices, saving significant engineering effort. "All of these features highlight the flexibility of Beckhoff and what we offer with our connected DC infrastructure," Joice says.

### Effective e-commerce solutions deliver results

Honeywell Intelligrated achieved significant advantages by implementing PC-based automation technologies from Beckhoff. The increased flexibility, scalability and connectivity allow the company to provide the greater functionality and the data their customers need to help them offset labor challenges and reduce engineering requirements. These advantages, according to Joice, enable the GTR solution to easily scale up based on demand. "With the expandable Beckhoff control platform and EtherCAT, we can install a central station and then add on multiple distributed locations for associates or additional robots to increase capacity. That gives ultimate flexibility to our customers, whether it's a multi-billion-dollar e-commerce company or a start-up trying to increase output for e-commerce, order fulfillment or manufacturing," he says.



Beckhoff Regional Sales Engineer Mark Mosher (second from the right) works closely with the Honeywell Intelligrated team in Mason, Ohio, including (from left) Jason Johnson, Senior Manager of Machine Control Development; Kristan Viox, Senior Marketing Coordinator; Alan Smith, Software Engineering Supervisor; and Matt Kramer, Senior Engineering Technician.

For the MC4 system, Beckhoff solutions prove most reliable and cost-effective, according to Johnson. "We've installed more than 80 Beckhoff IPCs to run MC4 over the past five-plus years without any failures – well, besides one where an entire cabinet was destroyed by an errant fork truck," he says. "Since we don't have to use air-conditioned cabinets or install PCs in the IT space, Beckhoff Industrial PC technology saved us upwards of 50% in hardware costs, even over PLCs. Our customers like these embedded PCs because they look similar to a PLC. Although some are uncertain about transitioning from legacy PLC technology, they mainly care about performance and uptime. The fact of the matter is: both are industrial-grade machine controllers with an operating system, but unlike hardware PLCs, Beckhoff PC-based control is cost-effective, flexible and transparent."

Beyond the technological advantages, Honeywell Intelligrated appreciates the close collaboration with Beckhoff engineers across the U.S. The added expertise is crucial during every phase of a project, according to Joice, from research and development of new intralogistics systems to commissioning and troubleshooting. "Our close working relationship with Beckhoff sales and support engineers offers dynamic collaboration. We both work well together, and Beckhoff always strives to understand our needs and provide the best solutions to every challenge," he says. Honeywell Intelligrated's close collaborations and tireless innovation drive development of new technologies that meet today's labor challenges and the evolving technical demands of e-commerce. Through enabling and accelerating digital transformation, the connected offerings continue to enhance performance, reliability and maintainability.

Further information:

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