

ROBOTIC AUTOMATION

EVOLVES

SMARTER ROBOTS WILL BE
CRITICAL TO HANDLING DC
ORDER VOLUMES, SPEEDS
AND COMPLEXITIES

Today's distribution center (DC) operations are struggling to keep pace with the speed and complexity of modern e-commerce. U.S. online distribution volume grew faster in 2017 than it has since 2011¹, and continues to accelerate at around 25 percent each year².

DCs have a strong motivation to keep pace, even as growth strains the limits of their capacity, because of rising customer expectations for order speed and accuracy. A negative delivery experience will turn away at least half of all consumers, while an estimated 73 percent of positive experiences will generate repeat business³.

Demand for labor is increasing significantly as a result, outpacing the available pool by a rate of six to one. To make matters worse, 60 percent of supply chain jobs require skills that only 20 percent of the workforce can offer⁴. Even when workers can be found, many tasks are repetitive and even dangerous — resulting in low worker satisfaction, high turnover, regular retraining and associated costs. All of these factors are combining to make the business case for automation stronger with each passing year.

The declining cost of automation is another driving factor. According to the International Robotics Federation, the average selling price of industrial robots fell by a compound annual growth rate of 7.5 percent between 2013–2017, and is expected to continue dropping until at least 2023⁵.

Now a new generation of smarter, more versatile robots is coming onto the scene, promising to help distribution centers function at a level far beyond what has been available to date. Recent strides in technology are enabling a significant evolution in vision systems, sensor and grasping technology, mobility and more. Armed with the latest advances in machine learning, artificial intelligence (AI) and connectivity, these new mechanical helpers will offer cost-effective ways to maximize DC productivity, from receiving to sortation and shipping.

RELENTLESS CHANGE IS DRIVING A DIGITAL TRANSFORMATION

Industries like manufacturing have been bridging the labor gap with robotics for some time, especially in the automobile and electronics sectors. Automation has traditionally been easier to implement in these environments, where the weight, shape and size of everything touched by robots can be carefully defined in advance and kept within those parameters.

However, machines in warehousing and distribution environments have far more challenging jobs. Products and packaging materials are constantly changing. Products move around in response to orders or logistics needs. Robots also have to “share the road” with people, both on foot and operating equipment such as lift trucks. Navigating these constantly changing environments requires human-equivalent levels of awareness and flexibility.

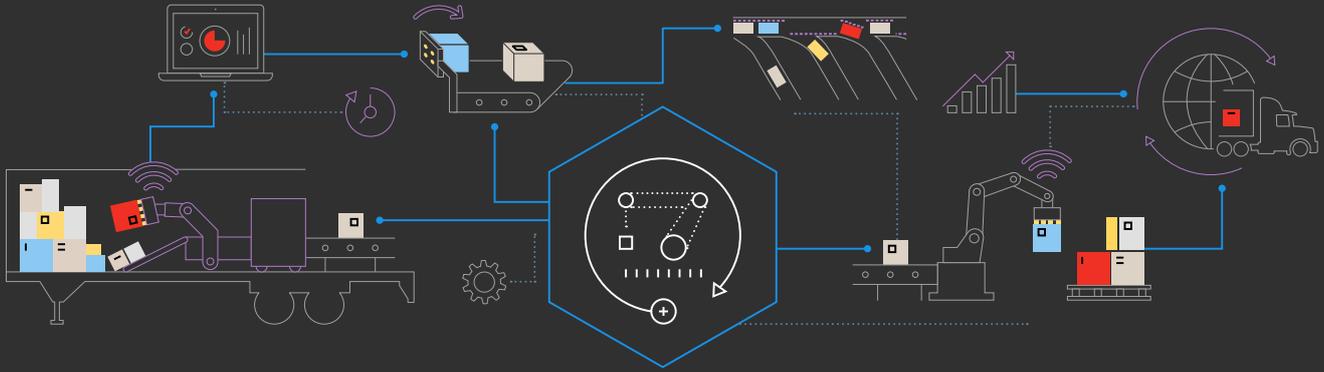
While these variables aren't insurmountable, their complexity may account for the fact that manual operations remain the norm for about 80 percent of DCs today. But this business model is becoming increasingly unsustainable, and not just because of labor shortages. The boom in e-commerce requires more labor per item as DCs pick and pack online purchases individually. Freight and parcel handling labor is also on the rise, as a growing amount of goods are shipped in separate packages directly to consumers' homes.

TOMORROW'S ROBOTS WILL TEACH THEMSELVES – AND EACH OTHER

Robots that will begin rolling out later in 2019 are designed to take full advantage of “the power of connected”. These new robots will use a universal control platform, essentially a cutting-edge “brain” capable of driving many different types of robotics. This solution combines the latest sensor technology with the processing power needed to handle massive volumes of data, plus state-of-the-art machine learning and AI. The result is robots that see better, think smarter and act faster.

This approach not only enables enhanced visibility into the robots' operation, it allows them to adapt to changing conditions and improve their own performance over time. Building off a single platform also offers new benefits to connected distribution centers:

- **Better performance in DCs** — The coming smart robots are designed specifically for dynamic, unstructured environments like distribution centers. This will make it possible to automate more tasks like unloading shipping containers, sorter induction and more.
- **Increased speed to market** — Advanced simulation capabilities will speed the development of new applications by enabling virtual code development and training from machine learning models. Robots use the same code to “talk” to the simulation models and the real world, simplifying the validation of system operation and performance across multiple scenarios. In addition, perception and intelligence developed for one type of robot can be leveraged into other types, further reducing implementation time and costs. [Continue on page 16>](#)



➤ A common connected platform creates economies of scale by enabling robot-to-robot and site-to-site communication.

- **Ongoing performance enhancements**— A common connected platform creates economies of scale by enabling robot-to-robot and site-to-site communication. Once a single robot learns the solution to a new problem, its training model can be pushed out to every robot performing that application across all of a user’s sites.
- **Fewer operator interventions** — Smart robots take full advantage of the most sophisticated reporting, diagnostic, notification and alert capabilities found in emerging material handling equipment, with the additional benefit of connecting these solutions across the DC and between sites. Potential challenges can be spotted early, often preventing problems before they occur.

THE ROBOTS ARE HERE...

The latest wave of automation solves many automation challenges by providing support in the most labor-intensive areas, especially pick/put and material transfers. Robots also take on the burdens of the most physically demanding and injury-prone jobs, such as docking and palletizing.

Best of all, many of these solutions are no longer science fiction. Here’s a quick rundown of what’s already available:

ARTICULATED ARM LOADING/UNLOADING

In situations where trailers transport stacked products of a consistent size, vehicle-mounted articulated arms can do double duty by both loading and unloading trailers. These robots operate quickly and require minimal operator supervision or intervention. There’s also no need to change processes or add supporting equipment.

MOBILE ROBOTICS

Autonomous roving vehicles are among the most significant robotics advances available to DCs today. Capable of transporting loads up to 1,500 kilograms, these free-rolling bots use vision and mapping technology to perceive and navigate warehouse environments without requiring changes to the facility’s infrastructure. They’re intelligent enough to recognize and avoid everything from people to fork truck tines.

Mobile robots can be inserted into a DC with little or no new infrastructure, requiring only a short integration period to learn their surroundings. A variety of “tops” are available for applications such as cart handling, conveying and RFID scanning.

ROBOTIC EACH PICKING

AI-powered autonomous robots with gripping and vision technology are already augmenting the human workforce in each picking applications. Able to grasp objects with dexterity comparable to the human hand, these robots automatically retrieve, sort and fulfill orders, and have already demonstrated the ability to perform more than 600 picks per robot per hour.

Cutting-edge visual recognition enables these robots to pick from heterogenous or homogenous bins of product with little or no human supervision. If the robot needs help, workers can handle exceptions remotely via a simple user interface.

ROBOTIC PALLETIZING

Robotic solutions for placing products onto pallets are relatively easy to integrate with distribution systems where product sizes and weights are known. These solutions fit into compact layout configurations and are available with a wide variety of peripheral equipment. They're also among the simplest automation systems to use, with exceptional load identification and tracking accuracy.

FULL-LAYER DEPALLETTING

This solution rapidly pulls complete layers off single-SKU and limited-SKU pallets, handling more than 500 pounds per layer. These systems relieve workers of some of the most arduous, repetitive and injury-prone tasks, freeing up labor for more rewarding, higher-value jobs.

Today's full-layer depalletizing robots can handle a wide variety of items commonly seen in fulfillment operations, from cases to bags. They're capable of working with variable layer heights, sizes and weights, while easily adapting to packaging and labeling changes. While the system works most efficiently with limited-SKU pallets, it is flexible enough to unload some mixed-SKU pallets as well.

SIGNIFICANT NEW ADVANCES FOR 2019

Two major steps forward will arrive in 2019. Both will be among the first to take full advantage of a common universal control platform (see sidebar on page 14).

ROBOTIC UNLOADING

A major labor challenge will be addressed by fully automated unloading of trucks, trailers and shipping containers. These robots are capable of unloading diverse case sizes and weights — even from trailers that haven't been loaded with robots in mind — using a combination of vacuum arms and a conveyor sweep system. Products are discharged in a semi-singulated flow through the body of the machine onto a take-away conveyor. No fleet modifications are required.

These robots from Honeywell Robotics will be among the first to benefit from a common universal control platform that combines improved vision and machine learning-based decision making with advanced motion planning. Robotic unloaders will also offer full connectivity, allowing them to incorporate advanced machine learning and use data from other robots to improve their own perception and decision making. These enhancements will allow the machines to work at a significantly faster rate while handling packages with greater care.

ROBOTIC SORTER INDUCTION

Traditional manual induction is limited by the speed and awareness of the operator. Autonomous solutions can replace or supplement manual induction, boosting efficiency while freeing limited labor from monotonous positions.

The Honeywell Robotics sorter induction solution will be able to handle a variety of package sizes and types, including polybags, jiffy bags and boxes. Integration costs and technical risks will be low because the robots have been designed to fit existing workflows and handle the typical products seen in postal and e-commerce applications. Further efficiencies will be provided by automated label orientation and optimized sorter tray loading.

Honeywell Robotics is leading the development of these solutions to solve challenges in DCs and manufacturing environments. Together with Carnegie Mellon University and strategic partners Fetch Robotics and Soft Robotics, these solutions will combine the latest research and technology with Honeywell Intelligrated's established expertise in the logistics, distribution and materials handling industries. ■



FOOTNOTES

1. <https://www.digitalcommerce360.com/article/us-ecommerce-sales>
2. <https://retailmarketer.com/article/global-ecommerce-topped-23-trillion-2017-emarketer-estimates/5a6f89f5ebd40008bc791221>
3. <https://multichannelmerchant.com/operations/study-finds-expectations-not-met-ecommerce-delivery/#%20%20>
4. <https://www.datexcorp.com/labo-shortages-in-the-supply-chain-workforce>
5. International Robotics Federation, internal analysis

DC NEXT

What's Your Next?

SMART ROBOTICS

END-TO-END DC CONTROL

REAL-TIME ASSET HEALTH MONITORING

RESOURCE RETENTION STRATEGIES

FUTURE-PROOF SCALABILITY

LABOR PRODUCTIVITY

e-Commerce pressures continue to create unprecedented complexities in distribution and fulfillment environments. Rising consumer expectations, labor challenges and relentless order demands are forcing many businesses to question their current and future fulfillment strategies.

If you're seeking answers to the question "What's next?", then we're here to help. Preparing for the future will mean increased integration of warehouse automation software, labor-enablement and management technologies, and robotics. But this is not a journey your business needs to take alone.

Honeywell Intelligated is helping companies of all sizes make the transition to a more efficient present and a more certain future. With decades of industry experience, our experts can guide you to your next levels of reliability, predictability and profitability.

Join us at an industry event near you to speak with our experts and learn more about the latest fulfillment technologies.

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