

Robots in the Warehouse: Who's Your New Friend?

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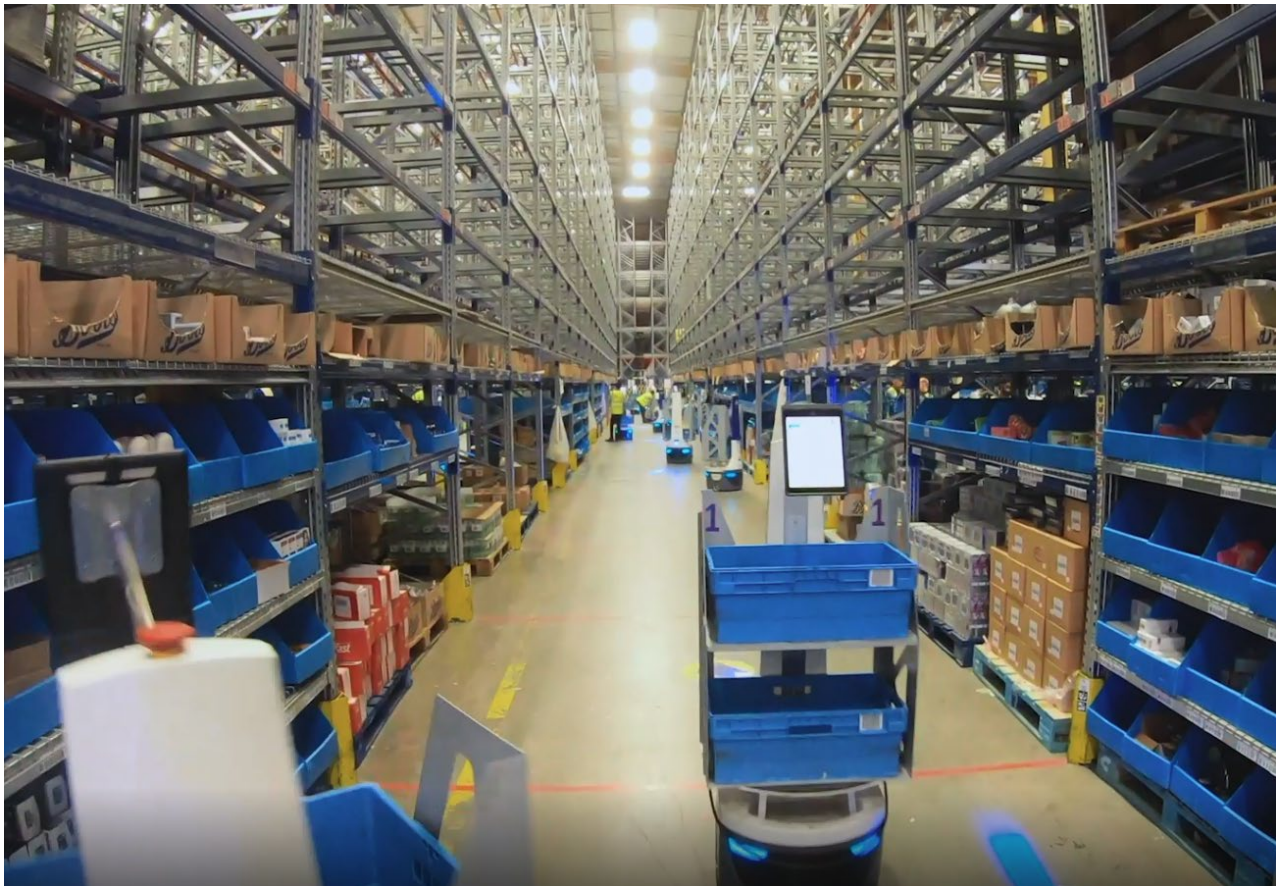
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A new generation of robot helpers has boosted productivity in fulfillment operations as warehouses struggle with COVID-19-era traffic surges and staffing shortages. A robust holiday season now promises added benefits of robotics in putaway and inventory replenishment as returns flood in.



The autonomous mobile robot (AMR) consists of a tablet mounted on a pedestal that can be configured for a range of various sized bins or totes. The base travels on pivoting wheels similar to luggage, on a route optimized for multiple "missions," filling orders generated by the warehouse management system. Pick missions originate and ultimately terminate at the packing station with the robot. Workers deployed in zones in a wave-picking operation meet the robots aisles, follow pick instructions displayed on the tablet, scan and load SKUs in the appropriate bin on the pedestal, certify completion on the tablet, and are directed to the next robot in their area.

Light-weight robots navigate using light-detection and ranging (LIDAR) technology and 3-D cameras, which enable them to move more quickly and with greater agility through the warehouse, among equipment and people. Using the robots, picking operations are able to achieve two to three times the efficiency of a fully manual, cart-based operation, enabling an order that normally takes an hour to manually pick to be completed in 20-30 minutes. By optimizing the pick process by eliminating non-value added associate travel and reducing unproductive walking time, employee fatigue that can slow performance throughout the shift is virtually eliminated. The model estimates an average 129% return on investment after four months.

Now, with e-commerce acceptance growing, an anticipated second wave of COVID-19, and online holiday orders surging, retailers, third-party logistics providers, and distributors of critical medical supplies are expanding their use of robots to optimize fulfilling orders and manage returns and replenishment as well.

Rise of the Robots

Supply-chain technology provider Honeywell Intelligrated estimates that 80% of warehouse operations are still manually driven. The key obstacles to widespread adoption of automation — including robotics — have been cost and complexity of implementation, from setup and programming to employee training.

The first industrial robot, a large stationary robotic arm, was installed in a General Motors assembly plant in 1962. Today, robotics may take the form of automated guided vehicles (AGVs), usually carts moving inventory along magnetic tracks; autonomous mobile robots (AMRs) to help with picking, sorting and inventory checks; aerial drones; and automated storage and retrieval systems (AS/RS) such as shuttles, mobile cranes or climbing robots, which move inventory in or out of storage.

Only in recent years has the right mix of sensor navigation, location mapping and imaging, Wi-Fi, open-source software, machine learning and battery-storage technology been integrated with warehouse-management systems (WMS) software, allowing autonomous robots to maneuver freely and perform tasks in an industrial environment among human workers. "Robots don't replace people, but they're a resource to improve productivity," says Dan DeShaies, director of customer service for Locus Robotics, a Wilmington, Massachusetts manufacturer and lessor of AMRs deployed in distribution centers. With the steady rise of year-on-year online retail sales, accelerated by the coronavirus crisis in 2020, and with the first COVID-19-era holiday shopping season underway, De Shaies says Locus has seen "significant growth in the numbers of bots in the field, and not just in percentage levels but in multiples." This year alone, Locus has picked over 200M units for its customers, and they expect to hit 300 million by the end of the holiday season.

Locus is an outgrowth of fashion and apparel industry 3PL Quiet Logistics, which utilized Kiva Systems AMRs and proprietary software in its warehouses beginning in 2009. Amazon acquired Kiva in 2012, intending to bring its software and



robots in-house. At that point, Quiet began developing its own warehouse robotics system, seeing a void in the marketplace for itself and other Kiva clients. Locus was launched in 2014. At first the company served only one client, Quiet, but in 2016 it began offering tailored systems under a robots-as-a-service (RaaS) lease model. The new robots, known as LocusBots, are smaller, lighter and more maneuverable than the earlier Kiva robots – 120 pounds versus 1,300 – lending themselves to the smaller footprints and the higher volumes of smaller orders common to omnichannel e-commerce fulfillment.

The company currently serves more than 40 clients at 80-plus sites in the U.S., United Kingdom and Europe, in four key verticals: industrial, retail, 3PL and, more recently, healthcare. Most sites are in the range of 20,000-100,000 square feet, with anywhere from 12 to 200 AMRs deployed at each. Among its clients are DHL, U.K. health and personal care retailer Boots, 3PL Geodis, and omnichannel warehouse operator Port Logistics Group.

Demand has surged in 2020, as e-commerce popularity, COVID-19 and holiday peak preparation have converged. Omnichannel growth at the end of 2019 was already challenging traditional warehousing operations. COVID-19 closed down warehouses as workplaces in February and March, but while brick-and-mortar retail demand slowed to a crawl, online orders of essentials — food, cleaning supplies, healthcare products and medical supplies — soared. Orders were smaller and more frequent, with more delivery options, affecting packaging and last-mile handling. Delivery was touchless; warehouses required social distancing, in a job market where experienced warehouse workers had suddenly become scarce.

Adding Flexibility

Robots can speed up picking operations and act as a force multiplier, handling more orders with the same number of people or, alternatively, allowing the same work to be done with people spaced farther apart for the duration of the pandemic. After an initial three to four-week setup period — involving mapping the service area, integrating the robotics software with the WMS, installing the Wi-Fi network, optimizing the flow of robots, and training workers that takes just minutes — scaling the operation is relatively simple, explains field service manager Keith Burbage.

> **"For many businesses, the brick-and-mortar days aren't necessarily over, but e-commerce clearly is the future. They're realizing that if they want to survive and thrive in this new environment, they need to start looking at new ways to adapt quickly."**

New robots added to an existing operation can be operational the same day, and available short-term. Two to four-month lease provisions within a standard lease allow customers to quickly ramp up capacity to meet demand surges. Worker training is usually same-day as well; employees follow instructions on the robot's pedestal-mounted tablet in a choice of languages, pick and scan the SKU, drop it in the proper container, and click to certify completion. Robots generate valuable internal data to the WMS, with e-dashboards showing the location of workers and robots throughout the mapped area in real time and tracking order volume, orders processed, and picks completed and pending, to measure operational performance and identify process chokepoints. The RaaS model provides for year-round onsite delivery, pickup, maintenance and replacement of units.

The convergence of omnichannel, COVID-19 and the holidays hasn't so much changed how robots are deployed, but the added freight volume and workforce volatility has created a new sense of urgency going forward, De Shaies says. "For many businesses, the brick-and-mortar days aren't necessarily over, but e-commerce clearly is the future. They're realizing that if they want to survive and thrive in this new environment, they need to start looking at new ways to adapt quickly."

Impacts to customers have varied by sector, he stresses: a Midwest

automotive service center group saw business slow in six states, while a healthcare provider has increased robot orders at New York and Atlanta facilities handling hospital supplies. Locus chief customer officer Jasmine Lombardi points to a home improvement retailer that had been preparing to introduce robots at one of its DCs when COVID-19 hit. When business initially dropped off, the company decided to take advantage of the temporary lull. "They were slammed by COVID-19, but they took a chance at the location and went live in April," she says, not expecting the home improvement boom that followed as people sheltered in place. "Because of the robots, they were able to keep up with the volume."

DHL deploys as many as 47 robots for a staff of more than 80 during peak periods, for a retail customer's operation within its 358,000-square foot Manhattan distribution center, doubling productivity from 70-80 to between 150 and 180 units per hour. At the onset of COVID-19 last March, DHL announced plans to deploy a total 1,000 AMRs in 12 additional North American facilities. Boots, the UK's leading health and beauty supplier, upped its U.K. deployment from 135 to 200 robots as ecommerce sales doubled over the course of the pandemic, creating peak-level output throughout the spring and summer. The robots, and more specifically the RaaS, allowed them to meet these Black Friday esq volumes at a moment's notice.

Managing Returns

Warehouses have deployed robots mainly in their pick operations up to now, but the rise in omnichannel retail presents new challenges with returns, especially during holiday peak periods, where robots can add value.

Re-stocking and replenishment is typically a discrete operation within the traditional warehouse, involving separate teams receiving large orders working with large carts, and often done overnight to avoid slowing overall productivity or creating unsafe conditions during peak hours, particularly at pandemic staffing levels. An e-commerce fulfillment environment is even more disruptive, given the increased order volume in both directions. In addition, many return items are only partial orders, sent back in different packaging. The result, in terms of putaway, may be a single tote with 20 items strapped to a robot versus a single carton.
AMRs can, technically, just reverse the pick process using the same robots and, where it makes sense, the same staff doing picking, replenishment and putaway — a process known as true task interleaving. Again, moves would begin and end with an AMR moving between a central receiving station and workers re-stocking in the aisles. Alternatively, picks may be done overnight for shipping first thing in the morning, with returns put back during the day.

"As an investor you're looking for areas where you can extend the benefits of the technology," De Shaies says. "You might do the pick for 12 hours, but then what can you do for the rest of the day to get higher utilization from the equipment?" Extending use of the AMRs for standard replenishment can increase productivity by a further 30% to 60%, he adds; the gains from putaway returns can be twice that.

Online retail sales over "Cyberweek" were up more than 21% year on year for Thanksgiving and Black Friday, with a 15% gain on the following Cyber-Monday, for a total of $25 billion in e-commerce sales, according to Adobe Analytics. This holiday season LocusBots helped pick over 70 million units on behalf of its global retail and 3PL customers, averaging a record-setting 1.2 million units picked a day, and resulting in a 250% increase over last year. Even at pre-pandemic growth rates for omnichannel e-commerce, traditional warehousing and fulfillment models are becoming overwhelmed. Research and Markets expects the current $55 billion logistics automation market to average more than 12% annual growth to nearly double by 2025. It's more a matter of when, rather than if the robots are coming.

For more information:
https://locusrobotics.com/features/putaway/