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How Robots Are Increasing Productivity For Logistics

TABLE OF CONTENTS

MARKET RESEARCH AND PREDICTIONS

WHERE ARE ROBOTS APPEARING?

MOVING WITHIN THE WAREHOUSE

AUTONOMOUS MOBILE ROBOTS EMERGE

PALLETIZING ROBOTS REPLACE THE FORKLIFT

PICKING AND PACKAGING ROBOTS ADD VISION SYSTEMS

CASE STUDY: RK LOGISTICS FETCHES BETTER PERFORMANCE

HOW SOON TO 'FULL LIGHTS OUT'?

HOW ROBOTS ARE INCREASING PRODUCTIVITY FOR LOGISTICS

In almost every part of the logistics process, robots and automation are seen as a way to improve efficiencies, from the warehouse to the customer's door.

By Phil Britt

To demonstrate a return on investment, robotics must deliver measurable results in efficiency or throughput. It's not merely a matter of saving salaries or reducing errors, although the push toward "lights out" operations promises those benefits.

A DHL report said logistics robotics is quickly taking hold as [robots become essential elements of warehouses](#), sorting centers and even last-mile delivery.

As commerce evolves from brick-and-mortar locations to online ordering and delivery, logistics becomes more complex. Fewer orders are for bulk items delivered to retail locations, but instead are for quantities as low as one box delivered to a person's home, workplace, or retail location for in-store pickup.

Robotics and artificial intelligence solve several issues in the logistics business – they operate faster and more consistently than humans in a warehouse environment, including sorting centers. As these locations become more important with e-commerce advances, robots and automation will be seen everywhere – from shipping/receiving to moving materials in warehouses and distribution centers. The science-fiction of automated transportation from the factory to the end user is not the fantasy it may have seemed only a few years ago.

MARKET RESEARCH AND PREDICTIONS

Research firm IDC projects that by the end of 2018, 45% of the 200 leading global e-commerce and omni-channel commerce companies will have robots in their supply chains for order fulfillment warehousing and delivery.

Newer mobile robots, and collaborative robots designed to work in environments have joined more established robotic transport and picking systems. But this influx is at its beginning stages, according to a Citigroup report, "[Technology at Work v.3.0.](#)"

"While e-commerce is growing at double-digit annual rates, automation penetration remains quite low in many cases," the report states. "Technology is not yet either capable or cost effective in all cases of order fulfillment, meaning that labor shortages are, for now, still a major pinch point."



But the trend is clear. Robots of all types are becoming easier to program, with more intuitive interfaces that enable programmers to easily teach robots new transportation routes and new capabilities. The addition of vision systems, grippers and other features provide robots with additional capabilities so that they can help take over the dirty, dull and dangerous jobs from humans.

IDC predicts that by the beginning of the next decade, 30% of the top 100 retailers will use robots or have pilot programs within the [ship-from-store fulfillment process](#), helping reduce the cost of ship-from-store orders by up to 20%.

But the beginning of 2018 is just the start of the process, IDC said. “Robotics has never been more ready for a commercial offer; we’re seeing companies with a lot of interest in trials,” said Jing Bing Zhang, research director at IDC, in a 2017 whitepaper. “They’re not just fixed-arm robots; they are collaborative robots that offer mobility and can perform a wider variety of tasks.

“Robotics will continue to accelerate innovation, thus disrupting and changing the paradigm of business operations in many industries. IDC expects to see stronger growth of robotics adoption outside the traditional manufacturing factory floor, including logistics, health, utilities and resources industries. We encourage end-user companies to embrace and assess how robotics can sharpen their company’s competitive edge by improving quality, increasing operational productivity and agility, and enhancing experiences of all stakeholders,” Zhang said.

The increasing acceptance of robots in logistic facilities, as well as the increasing capabilities of the robots themselves, will drive further growth within logistics over the next few years, with an expected compound annual growth rate of 16%, said John Santagate, IDC research director, service robots. He said companies need to determine exactly what their needs are, because some can get by with robots with limited functionality, while others will need higher-end, more expensive and complex features.

WHERE ARE ROBOTS APPEARING?

Outside of the warehouse, automation is slowly making its way into shipping and receiving, with automated inventory, logistics applications, and detailed monitoring of trucks and goods in transit, said Stuart Johnson, development operations manager for [Ultraship TMS](#), which provides logistics processing platforms for enterprises.

Automation handles many of the logistics tasks formerly performed by humans, such as in-transit monitoring and reporting, Johnson said.

“The macro trend is moving to more automation. There’s no worry about injury and workers’ compensation; there is better visibility and productivity. You need to be able to manage the flow of goods in from manufacturers and on the outbound side, to customers. Just look at the success of Amazon and the compression of the delivery time.”

Indeed, in some markets Amazon can make same-day deliveries, and Amazon Prime customers can expect free, two-day delivery on most non-specialty orders, a factor that pushed Wal-Mart to make a similar promise. Other companies in and out of retail are looking at just-in-time fulfillment, Johnson said.

Another company showing the reality of autonomous delivery is Starship Technologies, which is using a fleet of autonomous robots designed to deliver goods locally. The company [also launched pizza deliveries](#) in co-operation with Domino’s Pizza Enterprises in selected Dutch and German cities.

Shipping and receiving, like parts of the logistics chain, faces the challenge of different automation providers all having software platforms that don’t always integrate with one another. Yet Johnson said the increasing presence sensors and open application programming interfaces (APIs) will alleviate this challenge.

The promise of autonomous trucks is expected to add other efficiencies over the next few years – and like automation and robots in the warehouse, will



Starship Technologies' autonomous robot can deliver goods locally.

address worker shortages. According to the American Trucking Associations, the [shortage of 50,000 truckers today will grow to nearly 175,000](#) by the end of 2024.

MOVING WITHIN THE WAREHOUSE

Established robotics companies and newer startups are racing to fill the need for additional automation within the warehouse, offering robots that move goods more efficiently.

Some larger companies offer fleets of robots that perform different tasks, while others offer specialized robots that handle specific needs, such as moving a product from one point to another, or placing or picking from bins. Sensors, vision systems and grippers are being incorporated with robots to further enhance their capabilities in aiding with logistics.

“Unlike many of our competitors, we offer a mixed fleet of robots to handle a variety of payloads and applications,” said Matthew Cherewka, business development manager for Vecna Robotics. “Our robots are designed to handle almost any object, from individual totes and cases to carts, shelves, bins, dunnage, pallets, or heavy, oversized SKUs. This also means we cover a broad range of use cases simultaneously, allowing customers to automate omni-channel order fulfillment and replenishment, goods-to-person and person-to-goods picking, and bulk material handling all with one solution provider.

AUTONOMOUS MOBILE ROBOTS EMERGE

Companies like Aethon, Fetch, Locus, and Vecna provide mobile robots that work within a warehouse without the need for beacons or guided tracks that automated guided vehicles (AGVs) use. AGVs must travel along preset electronic tracks, while AMRs can move independently.

Most of these mobile robot companies are only a few years old, so the success of installations at RK Logistics, Netherlands-based Wärtsilä and other companies show the promise of mobile robots in logistics, but the sample size is still extremely small.

Below are some of the companies offering AMR units:

Aethon

Aethon’s recently unveiled [TUG T3](#) and [T3XL model robots](#) offer expanded 1,400-pound load capacity, 48-inch load platform and omnidirectional navigation.

The company’s software platform lets customers



Credit: Aethon

manage the entire fleet, with remote and onsite connections available. Aethon said its cloud command center has managed robots that have made more than 20 million deliveries over 3 million miles.

The Aethon TUG robot can autonomously locate its payload, pick it up, transport it and drop it off all without supervision or added infrastructure.

Aethon's products are currently in use by global manufacturing firms looking to streamline and automate intralogistics, the company said. TUG robots automate material movement in vertical markets such as automotive and transportation manufacturing, electronics manufacturing and assembly, consumer goods, semiconductors, medical devices and contract manufacturing operations.

Fetch

Fetch has grown from a start-up to having a fleet of 75 mobile collaborative robots in the last 1.5 years, serving customers in North America, Europe and Japan, including notable deployments with logistics providers RK Logistics and DHL.

The company offers five different types of [robots for various types of payloads](#), all the way up to 3,300 pounds.

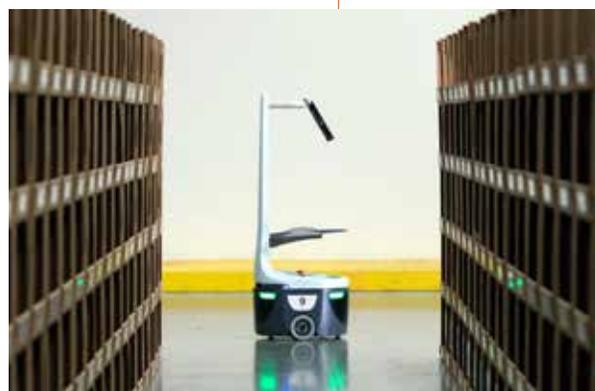


Credit: Fetch Robotics

Locus

The company offers turnkey robots as a service (RaaS) subscription model, enabling customers such as DHL Supply Chain to use its LocusBots, [which work collaboratively with humans](#) to move payloads of up to 100 pounds.

LocusBots can automatically learn the most efficient travel routes through a facility, which improves worker efficiency over traditional cart picking, the company said. The robots offer a flexible design that can be configured to meet several tote and multi-picking bin needs. An on-board, integrated scanner confirms the correct item.



Credit: Locus

Vecna

The company offers AMRs, palletizing robots, picking and packing robots and other material handling automation. The company started pilots in 2015, unveiling many of its solutions in 2017. The [mixed fleet of robots](#) work with the company's software to move throughout different types of facilities.

Vecna offers options from new robots of different types to low-cost kits that companies can add to existing material handling equipment.



Credit: Vecna

PALLETIZING ROBOTS REPLACE THE FORKLIFT

Inside the warehouse, palletizing robots can replace workers using forklifts and lifts to move pallets in and around warehouse facilities, quickening movement of materials within facilities and helping with a labor shortage to perform these chores.

Several companies offer palletizing robots, including FANUC Robotics, ABB Robotics, Kawasaki, KUKA AG and Vecna.

These companies offer several palletizing, picking and packing, and other solutions designed to aid logistics within the warehouse. Additionally, the robots offer programmable solutions that can repeat movements between two locations or can be varied as needed. FANUC, for example, said its palletizing robots with vision are capable of up to 30 cycles per minute or more in a “well-optimized system.”

PICKING AND PACKAGING ROBOTS ADD VISION SYSTEMS

Similarly, industrial picking and packing robots are built with maximum repeatability for more precise, efficient, and sustainable automated solutions. With vision systems and grippers, they can pick from delicate components to large ones and can also distinguish when an object is missing. As with palletizing robots, most of the major established vendors and as well as many younger start-ups offer different combinations of these robots, with different capabilities, depending on the options selected.

CASE STUDY: RK LOGISTICS FETCHES BETTER PERFORMANCE

RK Logistics Group, a third-party logistics provider, was looking to improve

efficiency in its operations, but also saw physical limitations of adding more employees to handle the growing demands as the business expanded.

There is a shortage of people that can move products in a warehouse, said Cindy Traver, senior director of operations at RK Logistics. The company's existing distribution facility not only faced a workforce shortage, but was also limited by Occupational Safety and Health Administration (OSHA) rules as to how many people it could have in its facility, Traver said.

A Citigroup report said [a lack of land for warehouses](#) – particularly where there is a sufficient workforce and sufficient multimodal transportation options – is driving growth of automation and robotics as logistics solutions.

Traver said the cost of adding a new facility for its expanded business was prohibitive, so the company looked into mobile, collaborative robots to fill its needs.

“We chose Fetch Robotics over other options because we felt that Fetch would be the best partner for our business, and every day since then has validated that decision,” Traver said. “Within a few short months we saw a full ROI on our implementation, and we are able to pass the savings from this initiative onto our customers.”

Beyond eliminating the need to hire more people, the Fetch robots tend to be more efficient – they don't take breaks and don't take time to chit-chat with co-workers as they move products from one point to another in the facility, Traver said.

RK uses the Fetch Robotics' VirtualConveyor system, which incorporates the Freight series of autonomous mobile robots (AMRs) and charge docks with the Fetchcore cloud-based fleet management software. The AMRs work alongside warehouse workers in dynamic environments that are also shared with forklifts. The Fetch AMRs can safely do their jobs no matter how busy the surrounding environment, Traver said.

In the past six months, the robots have made 4,500 deliveries over about 1,000 kilometers, the company estimated. “By allocating mundane transportation tasks away from our employees to the robots, we are freeing up our people for higher-value work,” Traver said.

Navigation is managed through Fetchcore, which lets customers quickly set up and deploy the freight robots. The system also creates a facility map of the warehouses – at RK Logistics, this process only took an hour, the company



Credit: Fetch Robotics

said. The robots navigate dynamically using the facility map, planning their own paths to travel quickly and efficiently. Warehouse managers also use Fetchcore to create and schedule workflows in minutes, as well as provide routine task assignments.

“For anyone who wants to see a glimpse of the future with robots and employees seamlessly working alongside each other, I encourage them to take a look at Fetch Robotics in action at RK Logistics,” said Melonee Wise, CEO of Fetch Robotics. Wise said someone can be trained to program the Fetch robots in as little as a day.

Traver and Wise said they expect to see the Fetch Robots combined with robots that handle other warehousing needs, such as movement of pallets and other heavy objects. However, there is a software integration challenge with the different types of robots.

While some robotics companies said they have solved some integration issues, there are still several challenges as warehouse systems, shipping and receiving systems, as well as the robot providers, all have their own control applications that don't always integrate with systems of other companies.

HOW SOON TO 'FULL LIGHTS OUT'?

Logistics will continue to evolve as companies look to save on labor costs while meeting customer demand for quicker shipments. As automation is added, the process gets more consistent and shipments get faster.

As more Internet-of-Things technology gains prominence, this will allow for increased automation as well as “full lights out” facilities that can handle receiving, sorting, stacking, material retrieval and shipping. In the future, monitors in autonomous trucks are expected to confirm shipments all of the way from the warehouse to a customer, whether they're in a store, office or home.