MULTICHANNEL MERCHANT
OPERATIONS SPECIAL REPORT

The Next Wave of Innovation in Warehouse Automation

By Douglas P. Clement

The principal factors accelerating adoption of warehouse automation innovation for ecommerce fulfillment, such as deployment of computer guided mobile robots, can be explained by a twist on one of the business world's oldest equations: Supply and demand.

Not surprisingly, when supply chain and fulfillment industry leaders discuss the catalyzing factors for embracing automation, the influence of Amazon is the elephant in the room.

On the demand side, the need for speed in the warehouse is driven by customers' expectation of two-day or even same-day delivery. In terms of supply, Amazon's move to a $15-per-hour wage for warehouse workers—combined with hiring domination in markets across the country—has shrunk the volume of available workers. This has exacerbated preexisting labor supply issues for efficient and effective ecommerce fulfillment.

"From our perspective, what we're seeing is this is a lot like real estate, where the mantra is location, location, location," said Jeff Lammert, a client executive in system sales at VARGO, a provider of material handling system integration, warehouse execution software and equipment solutions for ecommerce distribution centers. "Three important things: Labor, labor, labor— the availability, quality and cost of labor. That's really driving people to consider various forms of automation."

"The labor market is still the predominant challenge we hear about," Fergal Glynn, vice president of marketing at mobile robotics firm 6 River Systems told The Robot Report. "Whether it's migration, lack of available local workers or competitive salary pressures from other local warehouses, retailers and logistics companies are looking for ways to make up for this challenge."

"You have to have speed," added Steve Johnson, managing principal at Johnson Stephens Consulting. "In order to do that you have to automate your facilities."

Thinking Inside the Box

When warehouse workflow is optimized, ecommerce orders are packed into boxes as quickly and efficiently as possible for fast shipping and arrival. But there's one critical step, an age-old challenge, that remains surprisingly pervasive: Packing orders in the right-size boxes.

"The typical ecommerce company uses 60% of the usable space in a box," said Jack Ampuja, President and CEO of Supply Chain Optimizers. "If you're Kellogg's and want to put 12 boxes of Corn Flakes into a master box, that's easy. Pick-pack [for ecommerce] is a whole different animal, especially with 20,000 prod-

uct SKUs in a warehouse. You order two or three things and your wife orders something different. Forty percent of the space in the box is air and filler." Because shippers pay fees based on weight and cube through dimensional pricing or DIM, Ampuja said, the question becomes, "How many boxes do I need to optimize that?"

Ampuja said retail and ecommerce companies are using technology solutions to optimize packaging and save costs, including computer-aided dimensioning tools which weigh and measure each item for shipment and select the proper box size. The obvious upside involves increasing profits or even saving capital to be reinvested in best practice automation.

"Robots are really the things that are separating the top guys," Ampuja said, citing swiftly increasing capabilities and diminishing costs. "That's the next big jump up."

Automation Essentials

Depending on size, resources and order volume, not all ecommerce companies are ready for robots in warehouse and distribution centers, but embracing, enhancing and expanding automation is increasingly a must in order to compete.

One option for many ecommerce businesses that have relied on a standard pick-pack system manned by associates is making the jump to an automated storage and retrieval system (AS/RS), either a unit load or mini load, with options including fixed or moveable aisle unit load systems with cranes, a carousel-based system and a vertical lift module.

Johnson describes an AS/RS system that's 16 to 18 feet tall with no aisles that looks like a Rubik's Cube—a sophisticated "big box" with picking portals. "It does what it's supposed to do," he said. "The software and control systems run so well. It's kind of a renaissance."

Control systems, or warehouse execution systems (WES), are the specialty of VARGO, where automation increases the efficiency of human resources and in some cases replace it, especially for highly repetitive tasks. The central thread running through conversations about automation options is the question: "How can I remove walking out of the process … and get the product from point A to point B without having to have someone move it?"

Part of the problem is that pick/pack/ship methodologies were not developed with ecommerce customers in mind. Many companies are working to upgrade their warehouses from distribution to ecommerce fulfillment centers, as the former were built to handle masses of items, often at the pallet level, for retail replenishment.

"It's important that you know your business and you're adding automation to be complementary to what's in your fulfillment center."

Jeff Lammert, client executive, system sales, *VARGO*

Whether a fulfillment center is anchored by fixed conveyors, surveyors or unit sorters, or has incorporated features like AS/RS that feed items to stations where orders are assembled, automation systems management makes it go. "It's kind of like for a fighter jet – it's not actually aerodynamic without the flight control system," Lammert said.

A WES like VARGO's COFE software creates automated workflow management that synchronizes all the technologies and workers in an FC in a goods-to-person process.

In normal wave picking, a large group of orders drop for processing. Items are then batch picked together from various zones and brought to a pack area for sorting. Problems arise, however, when picks are not properly coordinated. By contrast, waveless picking – such

as a VARGO system in use by American Eagle Outfitters – continuously assigns new orders to pickers and optimizes pick paths to reduce movements. An order can be dynamically inserted into a pick path at any time, reducing travel distance and time for associates and optimizing both personnel and equipment.

The pick assignments are relayed to workers with RF wrist scanners, directing batch picking of SKUs required for multiple orders into totes. A worker picks items into the tote until it's full or until instructed to release it to sorting.

To give a sense of scale, the system at American Eagle includes a Dematic crossbelt sorter that divides batch picks into individual orders. It has about 370 cross-belts running in a circular path past 480 accumulation locations.

What works for American Eagle isn't for everyone, though. The first question to ask is, are you meeting the demands of customers, Lammert said. "It's important that you know your business and you're adding automation to be complementary to what's in your fulfillment center," he said. "Then apply the right technology. I've seen technology applied in a silo to solve one issue, but you've achieved nothing."

Going Boldly Where No "Man" Has Gone Before

The right technology more than ever, even for smaller companies, is robots, which have gone from wire-guided to mobile, adaptive and AI enabled.

"They are better in nearly every way," Bruce Welty, CEO of Quiet Logistics and a director of Locus Robotics, told The Robot Report. "[Facility] mapping is faster and more robust, navigation is better, localization is much tighter. It is now possible to add more context to the map, such as one-way aisles, stop signs, and speed zones. … There is a lot of machine learning and AI that intelligently combines orders and clusters picks with workers."

Glynn of 6 River Systems said there have been significant improvements in the capabilities of robots. "In short, it's software advances," he said. "Unlike traditional automation, which depreciates from the moment you install it, a robotic system can actually get better day after day, thanks to improvements in the artificial intelligence and machine learning that powers it."

Industry experts like Glynn, Lammert, and Johnson all see robots working alongside human workers as the ongoing status quo for automation optimization. "It makes the picker more effective and more valuable," Lammert said.

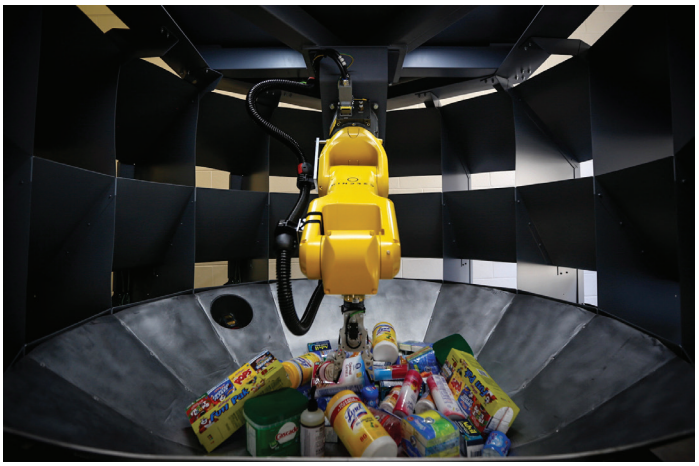
Johnson points to a growing trend by 6 River Systems and others to offer collaborative robots as short-term rentals. That is very attractive to companies that can't cost-justify buying and integrating robots into the ecommerce fulfillment center workflow to increase picking efficiency if just used during peak demand.

"I think there's a real groundswell there," Johnson said of robot rentals. "You don't need to spend a lot of capital and be done and set up quickly." 6 River Systems, in fact, allows existing clients to rent additional "Chucks" on demand for peak periods.

Bottom Line: It's Still a Balancing Act, Even for Cost-Benefit

When robots are managed by computer, Ampuja notes, they don't make mistakes, but work at a continual pace. And unlike some human employees, they always show up for work.

Still, there are other factors in the conversation about embracing robots or other types of automation. "I believe that the human is still the most scalable module resource you can bring in," said Lammert. The question, he says, given the Amazon factor, is: "Would I be better off paying $20 for that time, rather than the



"There are some interesting things that have happened over the past 12 months that have kind of amped it up for companies considering higher levels of automation, and robot-assisted picking is at the top of the list."

Steve Johnson, Johnson Stevens Consulting

cost of automation?"

"I haven't done the math on what is the break-even point between higher labor cost vs. automation," Lammert said. He added that factors for the analysis including the fact that humans may not be reliable as automation or robotics, and that paying someone a higher rate during peak periods can raise the labor cost bar for the rest of the year.

"You can say, 'I'm going to go to $16 an hour to try to poach labor from other facilities," Lammert says in describing one strategy. "It's more that there's a very real concern that I can't get the people in the building to do the amount of work I have to get out, especially during peak demand around the holidays."

Automation is on the table for more and more companies, Johnson said. "There are some interesting things that have happened over the past 12 months that have kind of amped it up for companies considering higher levels of automation, and robot-assisted picking is at the top of the list," he said.

Lammert finds the business model for robots compelling, citing the fact that the units are scalable, modular, mobile, and have a fairly short implementation cycle time. "You could take a facility cluster picking to a cart, and in two months you could switch to bots with very little change," he said. "It's a fairly inexpensive short pilot to set up, and the business model is a leased system. You're adding resources as needed, and if I need it for peak I can flex up and then take them out of service afterward."

"In logistics, robots can pay for themselves within three to nine months, and with lower purchase prices, easier-to-configure robots and greater capabilities of robots that can find their way around a building, even small- and mid-size companies can now more easily deploy robots and gain a fast return," said Paul Myerson in a 2018 Industry Week column. "So, there is in fact no reason to fear the rise of the robots—at least in the case of logistics—as the robots are our friends."

It seems that he's on to something.

"We are seeing the market use collaborative robots, not only as a way to differentiate services from a business development perspective, but also from a hiring and retention perspective," said Glynn of 6 River Systems in The Robot Report. "As an example, I was at a distribution center in Orlando recently and I overheard one of the associates excitedly telling his family, who had come to pick him up, about the collaborative mobile robot called 'Chuck' he was working alongside that day."