The brave new world of the automated warehouse

There is a revolution taking place in warehouses all over the globe. It's the automation of the warehouse. The automated warehouse will be plugged into every socket of the nooks and crannies of the distribution system. Robotics stand ready to change warehousing forever, but will price prove an obstacle to implementation?

By Matt Miller, AJOT

Next March, Integrated Distribution Services will inaugurate its new, state-of-the-art 456,000 square feet warehouse near the company's Indianapolis headquarters and some existing warehousing facilities. IDS is in the midst of re-engineering operations and processes for the new building. After that is completed, said president and CEO Mark DeFabis, IDS has to tackle what technology to embrace, not a straightforward or easy task.

"The process of identifying what is useful for you has become much more difficult," he explained, as he reels off various new picking technologies, tagging technologies and robotics. "It used to be there were not so many choices and technologies were independent of each other. Now, we're trying to interface all these multiple technologies and interfacing them with everything else we have to do."

With facilities in both Indianapolis and Salt Lake City, IDS is a warehouse-based 3PL that specializes in e-commerce and direct selling fulfillment. Most of its customers are middle-market, fast-growing e-retailers. "We have to provide them with scale very quickly," said DeFabis. "We're leading them by the hand in terms of technology."

Gone are the days when the primary function of a warehouse was to receive, store and move pallets full of case goods. Certainly, a distribution warehouse dedicated to, say, Kimberly-Clark will be stuffed with cases and cases of Huggies, Kleenex, Kotex and Cottonelle. But more and more warehouses are like the IDS facilities. They must gear their operations toward huge numbers of different goods that could be shipped to their customers or directly to consumers by the case, by the pallet or, increasingly, by the piece. Small orders of disparate goods that are located in far-flung nooks and crannies of vast warehouses

make physical picking difficult, taxing, time-consuming and inefficient.

OMNI CHANNEL

Many warehouses must service both retail stores and consumers. This so-called omni-channel retailing complicates processes even more.

"You have multiple channels going on in the same warehouse and they're not handled in the same way," said Lisa Anderson, a supply chain consultant.

All this comes as retailers and consumers alike demand faster and faster delivery time. Retailers want to cut inventory without sacrificing availability. Consumers want it now. Vendors want to keep costs down. And the warehouse operator is expected to successfully manage all these expectations.

"We have moved from a 'you will receive what I have in stock' mentality to 'I will send you what you want, when you want it,'" said Stephen Halliday, the president of High Tech Aid, a Pittsburgh-based consultancy specializing in automatic identification and data capture technology.

Warehouses depend on increasingly sophisticated warehouse management systems (WMS), which are specialized types of enterprise software. These are necessary to monitor, analyze and link everything from online shopping carts, accounting and shipping schedules, to inventory control, expiration dates and order tracking.

However, warehouses are finding it more and more difficult to merely layer WMS on top of legacy operational systems. That's especially true for older based on static terminals and paper orders. "Many of these are pretty antiquated," said Fetch Robotics CEO Melonee Wise.

Getting rid of paper-based systems, though, requires new equipment to read and process orders and that takes warehouse operators down the technology highway with lots of different routes to take.

Warehouse operators are offered a variety of technologies that promise greater speed, accuracy and what is often referred to as "visibility." This means a heightened ability to see where exactly goods are in the supply chain, from manufacturer to the end customer and everyplace in between, down to where on a conveyor belt a particular item may be.

Just because the technologies are available, however, doesn't mean they're being embraced en masse. The biggest issue is cost, which may be coming down, but is still formidable for small- and even medium-sized operators.

"Price has and is still

challenging for the adoption of robots," said Alfredo Valadez, vice president of business development for the robotics division of Wynright, a subsidiary of the Japanese company Daifuku. Technological breakthroughs have helped reduce costs, he said. "However, the end user still has to have the right operational volumes to support the capital investment. The technology has definitely given smaller companies an opportunity to invest in the technology, but it's still not an all solution for every company."

A BRAVE NEW WAREHOUSE

Another barrier to the brave new world of automation is the warehouse itself. Not all operators have the luxury of building from scratch, which is a multi-million-dollar endeavor that can take years to complete. Most attempt to shoehorn new technology into the existing box.

But even those companies like IDS that are building new facilities face a daunting choice. "Once we've re-engineered our processes, we'll try to think three to five years down the road, which is about as far as you can go these days, and we'll ask, 'now, what technologies can we use?'" said DeFabis. "We are at early days yet."

There are numerous technologies and technology-based approaches to warehousing and fulfillment. Although they are by no means in widespread use yet, robotics, voice automation and radio frequency identification, or RFID, represent three of the most talked-of approaches. Here's a brief look.

Robotics: Amazon.com has probably done more to upend fulfillment – and by extension warehousing – than any other single entity. So when Amazon announced in 2012 that it was paying $775 million to acquire warehouse robotics maker Kiva Systems, the logistics field sat up and took notice. Three years later, Amazon has installed more than 15,000 Kiva robots in its operations. These orange units cruise around the warehouse floor like an army of Pacmen, grabbing shelves with requested items and bringing them to a stationary picker to pack.

Kiva is by no means the only game in town, however. They may not be nearly as developed as their industrial cousins, but warehouse-related robots are slowly gaining traction.

"I very much think robotics is the wave of the future," said DeFabis.

Wynright's Valadez cites three technological breakthroughs that boost usefulness and contribute to greater use. The first involve vision sensors that enable robots to pick from non-uniform loads. A second is mobile platforms that allow robots to navigate to the goods. A third is software advances that translate into more complex tasks, like building pallet loads on the fly.

Established manufacturers like Fanuc and Wynright are being joined by startups including Symbotic, Rethink Robotics and the latest entry, Fetch Robotics.

Fetch Robotics unveiled "Fetch" and "Freight" in May. The San Jose-based company is now undergoing commercial pilot trials and expects a full launch in three to nine months.

One advantage to these robots, Wise maintained, is that they don't require new infrastructure, which is one

(BRAVE – continued from page 6) drawback of many robotic systems.

In an interview, Wise throws around terms like "collaborative behavior" and "intelligent capabilities." But at the heart of these robots are simple, repetitive tasks. One kind of robot follows around pickers, human or otherwise, as a kind of roving bin or shelf carrier. The other can physically pick the goods. A computer server monitors the robots. So floor managers, armed with portable devices, can track not only order status, but inventory in real time. Besides, Wise said, "robots don't take lunch breaks."

RFID: A decade back, Wal-Mart pushed hard for the technology, which tags individual items with an ID similar to a barcode. These tags are read in ways that can illuminate the entire supply chain in real time.

Widespread use, however, didn't follow. Those in logistics say demand for RFID in warehouses remains marginal, although Anderson said it's more and more used.

RFID is now primarily used for tracking containers. In part, the lack of adoption was due to cost and the question of who will pay – manufacturers, retailers or distributors. In part, it reflected restraints on the technology itself.

"RFID is not a simple technology to implement," Halliday said, likening it to the old-style televisions with rabbit ear antennas that constantly needed to be fiddled with.

There are promising advances. "The technology has changed in ten years in massive ways," said Halliday. "The last 18 months made another dramatic change."

Ten years back, he said, a reader had a range of at most two meters. That's been increased to 20 meters, with thousands of items read in a second.

"Today, six RFID readers on a ceiling can see and pinpoint" every item in stock, he said.

This year, Halliday said, the industry expects to ship five to six billion chips. By 2020, the total number of chips in use should top 100 billion, he believes.

Voice Automation: Also termed voice-directed warehousing, this technology is probably further along the acceptance curve than either robotics or RFID. Rather than be bound to an order sheet, or even a portable tablet, pickers can utilize what are often termed voice-picking modules. At their most basic, these are headsets that tell a picker what item to grab. The worker confirms the pick either through a barcode reader, RFID or, most commonly, through speaker confirmation. The headsets are linked to the warehouse management system.

The technology has come into its own because of advances in voice recognition software. (Pickers, for example, can receive orders and confirm them in Spanish.) Also, said John Casagrande, Voxware vice-president, it's far more adaptive to existing warehouses and workers than many other technologies. "It provides flexibility," said Casagrande. "It's how you get the most out of existing facilities. It's how to get more out of your existing people."

Systems providers include Dematic, Lucas Systems, BCP, AL Systems and Voxware. According to Casagrande, there are several advantages to this type of system: It doesn't

(BRAVE – continued from page 8) require new or even retrofitted facilities and workers are easily trained. It keeps both hands free for picking. What's more, he continued, the system allows warehouse managers to better plan how many workers are needed on a particular day. "There's a real focus on predictive analytics," Casagrande said.

Some 350 to 400 facilities now incorporate Voxware systems, said Casagrande, totaling about 30,000 users. Casagrande quotes industry data that speed is improved with voice automation by anywhere from 10% to 20%. Accuracy can be improved to 99.9%+, he said, depending on what system is being replaced. Paper-based picking averages 97% to 98%, but some older systems bring that average down to as low as 90%.