

GAINING EFFICIENCIES THROUGH



End-to-end Warehouse Automation

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Welcome

Seek a strategic, end-to-end solution

Warehouse and distribution center managers in B2B and B2C have never been under more pressure to scale up their operations to meet customer demands in the new, digital economy.



To match these often complex expectations, managers are either looking to upgrade their existing systems or getting ready to take a critical step toward integrating new warehouse automation to improve flexibility, efficiency and accuracy inside their operations.

However, far too often managers find their organizations speeding through decisions, simply laying new pieces of equipment on top of specific, existing bottlenecks instead seeking a more strategic, end-to-end materials handling solution that will contribute to overall business operations.

In this special edition, the editors of *Modern Materials Handling* have collected four articles that will not only help today's warehouse and DC management professional better understand the current operating environment, but will clearly exhibit the benefits of taking a more thoughtful, holistic approach to automation application.

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A Successful Approach to *End-to-End* Warehouse Automation

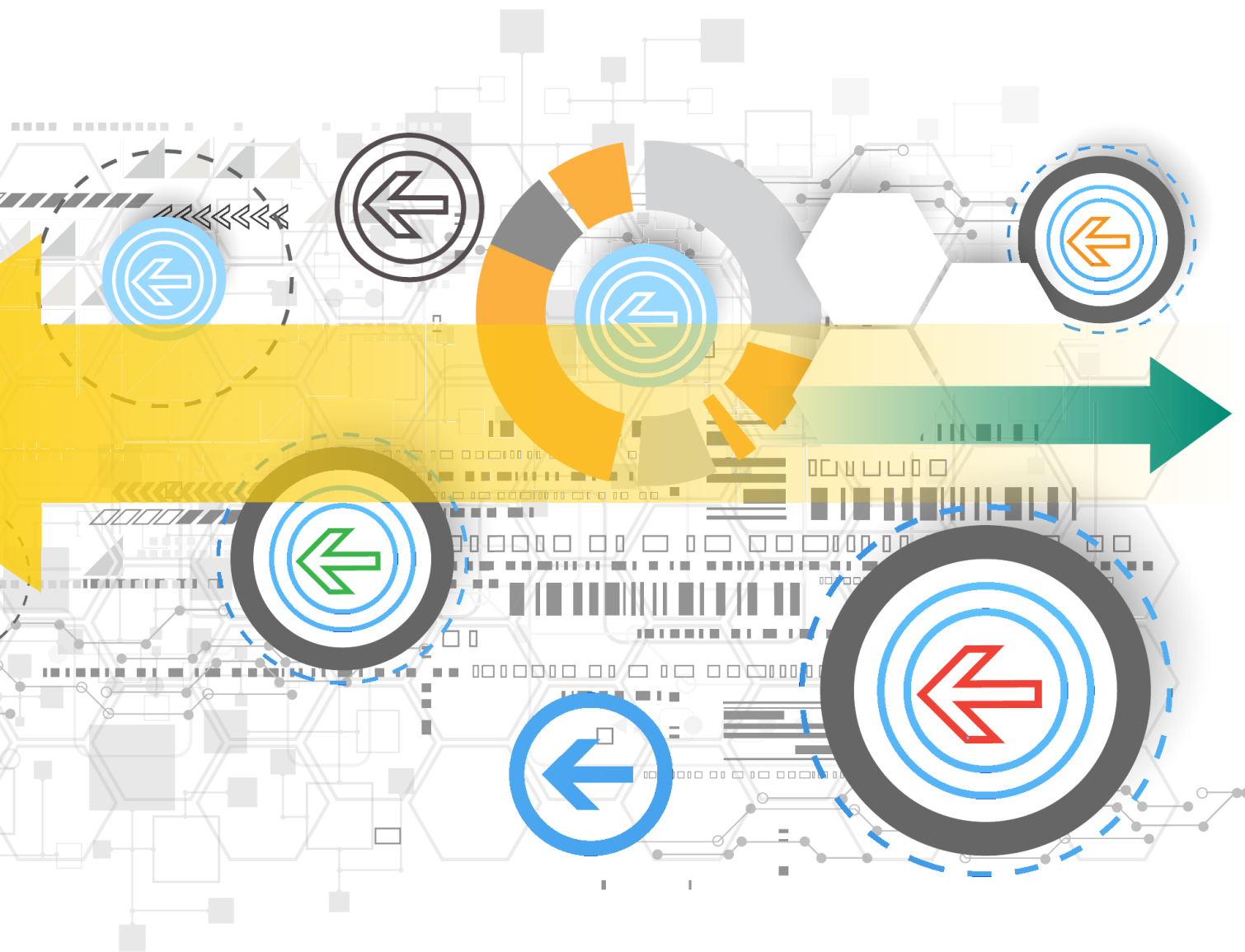
SUPPLYING DEFENSE CONTRACTORS with critical equipment and parts is a challenging role that HCL Logistics, Inc., of London, Ontario, has been fulfilling for the last eight years. Handling about 26,000 SKUs that include everything from tiny washers to 20-foot-long steel sheets to complete engines, the company supplies key components that its customers use to manufacture land-based military vehicles used by Canadian and allied forces around the world.

World-class logistics provider uses a holistic approach to warehouse automation to achieve significant efficiencies and scale up to meet its customers' needs.

In 2012, HCL Logistics found itself in need of a more efficient and streamlined warehouse operation. Intent on improving its flexibility, efficiency, and accuracy in its 500,000-square-feet of warehouse space, the company shopped around for an automated solution that would help achieve its goals.

"We have one major customer in the defense industry that we service, and we had recently won a larger contract that was previously being handled by a different provider," says Tim Van Holst, president. "We were using conventional racking systems in our warehouse, and felt that new equipment like narrow-aisle racking and vertical lift modules would help us get to the 'next level' with our contracts."

In this article, we'll look at the challenges that HCL Logistics was grappling with in its warehouse, tell how the company selected its providers and equipment, and outline the benefits that the company is seeing from its investment in automated storage and retrieval system (AS/RS) technology as part of a larger material handling strategy.



Searching for a better way

Since inception more than eight years ago, HCL Logistics has been providing warehousing, transportation, and just-in-time delivery in a secure defense environment. Like many growing companies, HCL Logistics reached a point in 2012 where its existing warehouse setup was no longer meeting its needs. Rather than simply laying new pieces of equipment or software on top of the problem, the company went in search of a strategic, end-to-end material handling solution.

Van Holst says the initiative was driven by the need for better picking efficiency and improved material and people flow on the warehouse floor. "With the way the warehouse was laid out, we were moving large products (i.e., vehicle

engines) long distances for staging and shipping," says Van Holst. The company also wanted to reduce the number of forklifts on the warehouse floor, improve picking accuracy, and create a more streamlined process overall.

As a starting point, HCL Logistics considered narrow-aisle racking systems that would support its efficiency goals. Working with Brian Rodway of Johnston Equipment, the company also explored the material handling and AS/RS options on the market. During the selection process, Van Holst says the company also had its eye on maximizing its current warehouse space, better utilizing the facility's vertical space, and installing equipment that could be used to batch multiple orders for different customers.

"We started by integrating narrow-aisle racking and that led to our testing vertical lift modules and then moving to radio shuttles," says Van Holst. "We wanted a complete solution that would integrate these various components into a more streamlined setup."

The right solution

In 2012, HCL Logistics test piloted two Kardex Remstar Shuttle XP vertical lift modules (VLMs). Automated high-bay warehousing systems with modular designs that operate on the "goods to person" principle, the VLMs handled the kitting portion of a specific customer's contract.

"Once the two units were installed, we used a 'wait and see' strategy to see how they would work for us," says Van Holst,



who began to notice positive results soon after installation. Automating a manual picking environment, for example, has made employees 10 times more efficient and data entry control nearly perfect.

“Based on the efficiencies and the space savings that we gained, we grew the system from two units to 21 VLMs,” says Van Holst. Combined with a high-density pallet system and narrow-aisle racking, the setup also cut HCL Logistics’ required warehouse space down by about 100,000 square feet. In one section of the facility, for example, the company saved about 30,000 square feet simply by installing the VLMs that now take up just 1,000 square feet of space.

To round out its end-to-end solution, HCL Logistics also installed a radio shuttle system that it uses to move large items that once required much navigation

and logistical coordination. “Our radio shuttle is positioned about 30 feet away from our receiving area,” says Van Holst. “Our larger products now occupy a 4X4 skid, which equates to about a 50% space savings for the area where we store our larger materials.”

More efficient client handling

When shopping around for a holistic warehouse solution four years ago, HCL Logistics wanted a platform that would help it better manage the small parts that it was handling on a day-to-day basis across multiple customers. More specifically, it wanted to be able to take parts that had to be kept separate while on the shelves and batch them during the picking process.

HCL Logistics found what it was looking for in Kardex Remstar’s Power Pick Global inventory management

software client handling module. “With fixed, static shelving, you basically dedicate aisles to different customers and then move through the various zones to pick orders—even if the armed vehicle parts are the same across those zones,” Rodway explains. “With client handling, HCL Logistics was able to keep each customer’s inventory separate, but not physically separate. That allows them to get the benefits of storage density in their VLMs.”

This capability also helps HCL Logistics expand its customers’ material profiles without the need for additional, physical shelving space. Instead, it can simply define more trays for a specific customer, and within a certain tower. “It gives them flexibility and agility to grow,” says Rodway, “and makes it much easier to serve multiple customers.”





Measuring the results

From its investment in an end-to-end automated warehousing solution, HCL Logistics has gained a state-of-the-art warehouse environment that includes vertical space saving storage systems, modern condensed racking systems, wireless handheld scanners, and a real-time inventory management system.

“Our goals of flexibility, efficiency, and accuracy have been met and exceeded,” says Van Holst, “and we are now well positioned for growth and expansion into new markets.”

HCL Logistics has also exceeded its picking efficiency goals and is now fulfilling orders much faster than it once did. “We’ve seen a 15% efficiency improvement as a result of the VLMs and the wire guidance system that’s incorporated into them,” says Van Holst. “For large products, the radio shuttle system has doubled our efficiency in terms of shortening up the amount of driving and material-handling time.”

Other key gains include inventory accuracy improvement—from a previous 98% to a current 99.5%. Cumulatively, Van Holst estimates that the solution could potentially save the company \$3 million a

year on adjustments and inventory alone. “It’s not just about the picks, puts, and inventory accuracy,” says Van Holst. “Cycle counts and physical inventory are also much faster now.”

Finally, he says HCL Logistics’ employees are now working in a safer, cleaner, more ergonomic environment and it’s a benefit that can’t be overstated. “When you’re storing this volume of parts for so long, it’s easy for them to gather dust and for labels to become unreadable,” says Van Holst. “With our new system, the overall cleanliness of the facility has definitely improved.”

Keeping it simple

As he looks around HCL Logistics’ warehouse today, Van Holst is pleased to see that all parts and equipment have their designated “spaces” and that the flow of material through the facility has

Calculating the True Cost of a Mispick

White Paper

Increase your operation's accuracy and reduce costs associated with errors by deploying automated, goods-to-person, storage and retrieval systems.

Calculating the True Cost of a Mispick

become more streamlined, organized, and predictable. To other companies considering a similar, end-to-end approach, he says, “Keep it simple at first and test out the strategy; then grow from there.”

In sticking to its “keep it simple” philosophy, HCL Logistics was also careful not to overcomplicate its new, end-to-end

warehouse management strategy. Within its 21 VLMs, for example, it stuck to just a few different bin sizes in order to keep the process manageable—and to make sure it wasn’t wasting any tray space.

“We didn’t want our operators looking through 120 different bins to try and figure out where to put something,” says Van Holst. “Even though we’re dealing with complex, state-of-the-art AS/RS machines, when it comes to the setup and binning, we kept it as simple as possible and it has paid off for us.” ■



Smarter Materials Handling: Moving from products to *solutions*

To gain more capacity, companies can either build or lease more warehouse space—but that entails significant capital expenditure. A more feasible option is to maximize existing space through a complete storage and retrieval solution that can quickly adapt to changes in order mix or volumes. Here's how it's done.

By **Roberto Michel**, Contributing Editor

In the distribution industry, being busy is a good thing. It means consumers and business customers are buying, and goods are moving off the shelf.

But it can also put a crimp on space in warehouses and distribution centers (DCs) and send managers searching for ways to gain room without building new facilities. At the same time, the growth of e-commerce increases item-level picking, which makes it tougher to keep up with throughput and accuracy requirements using manual picking methods.

Drivers such as the pressing need to carve out more space and optimize throughput in the face of a stronger, digital economy is reflected in the healthy growth curve for material handling systems and equipment. According to a MHI forecast, material handling equipment new orders grew 8.1 percent in 2014 and are expected to grow 9 percent for 2015.

Meanwhile, Peerless Research Group's (PRG) 2015 State of Warehouse/DC Equipment Survey found an increase in number of respondents ready to proceed with system investments, with the percentage of hesitant buyers dropping from 43 percent to 35 percent.

Clearly, there is a need to boost storage capacity and labor productivity to keep up with economic growth. Not only does the National Retail Federation expect retail sales to grow at a 4.1 percent clip in 2015, growth for e-commerce is seen by many analysts at better than double that pace, which has many supply chains changing their warehouse operations to support multi-channel fulfillment.

These trends often add up to a scramble to find more space, say providers of automated materials handling systems. "Many customers are initially contacting us because they're running out of space, either to handle more goods in a warehouse

environment, or if they are manufacturer, so they can allocate more floor space to production capacity,” says Mike Ward, sales consultant with V&H Material Handling. “People are trying to optimize what they can do within the walls of their existing facilities without having to expand them or open up additional facilities.”

To gain more capacity, companies can either build or lease more warehouse space, but that entails significant capital expenditure. A more feasible option for many companies is to maximize existing warehouse space by doing a better job of utilizing overhead vertical space.

To make the most of the “cubic” potential of existing facilities, companies have various options, from going higher with static rack systems to deploying automated storage and retrieval systems (AS/RS), installing mezzanines, or a combination of options. Within the AS/RS category itself, there’s a variety of system types, from higher end mini-load AS/RS, to vertical lift modules (VLMs) and horizontal and vertical carousels.

While each facility will differ in terms of what type of equipment and systems make sense for its operations, and a combination of systems may be needed, VLMs and carousels are proven, relatively lower cost ways to maximize storage and help productivity. They support a “goods to person” process in which items are delivered on trays or carriers to a pick position or window, and are managed by software to support efficient batch picking methods.

So is the answer to today’s needs as simple as running out and acquiring a VLM or carousel? While the systems themselves need to be understood, potential users of dynamic storage and retrieval systems need to look beyond product features and consider what it takes to establish an effective solution.

Kardex Remstar, a manufacturer and provider of dynamic storage and retrieval systems, works with a network of dealers in the U.S. market to deliver solutions across multiple markets, including distribution, manufacturing, healthcare, automotive, government, and many others.

These channel partners know better than anyone what is involved in choosing, deploying, and supporting a storage and retrieval solution, including adapting systems to changes in order mix or volumes. To gain a closer understanding of what’s involved in putting together a solution, these partners shared their insights on a smarter approach to materials handling solutions.

Gain space and more

According to a report from data company CoStar, as of the end of 2014, the industrial real estate market has seen the vacancy rate fall for 19 consecutive quarters, ending 2014 at 7.2 percent to reach a nearly 14-year low.

This has sent rental rates upwards, but yet companies have been reluctant to go on a building binge, with construction lagging behind the high levels seen in the mid-2000s. In short, companies are taking a cautious approach to adding space, which means



operators of DCs, store rooms and parts storage areas must take a hard look at ways to gain more useable space at existing sites.

Mike Rodriguez, senior sales engineer with Alternative Handling Technologies, (AHT) agrees that space constraints are a major pain point, especially with many companies reconfiguring or merging warehouses to cope with multi-channel pressures. “Companies are trying to do more with what they have, so using the vertical space in their facilities becomes more important than ever,” he says.

Dynamic storage and retrieval systems are much more space efficient than static shelving because they have sensing and software intelligence to store inventory in the most efficient open location. In the case of VLMs, a light beam at the back of the access opening scans the height of each tray as it’s stored and automatically adjusts on the fly (or “dynamically”) the storage location based on the height of the tallest item in the tray.

With static shelving, by contrast, a shelf can’t be moved without disassembly, so it cannot adjust on the fly to create dense vertical storage. Additionally, with shelving, inventory typically needs to be assigned to fixed locations for each stock keeping unit (SKU). That means

Dynamic storage systems can save space, time and money within the intralogistics process.



Gaining Efficiencies through End-to-end Warehouse Automation

even if there's zero inventory for a SKU, there's a spot left open for it.

The result is that static rack and shelving systems often waste vast amounts of space. Compared with static shelving, a dynamic storage and retrieval solution typically can reduce amount of floor space required by between 75 percent and 90 percent.

"When we walk up and down the aisles of a warehouse or store room with a client and see an 18-inch deep shelf, and only one item at the front it facing an aisle, the space benefits of dynamic storage and retrieval become pretty obvious," says Ward. "In a typical shelving analysis, only between 25 percent and 45 percent of the

can support batch picking to minimize the time needed to pick multiple orders, thus improving throughput and minimizing labor requirements.

"No doubt that space savings is a big driver for customers today, but so is productivity," says Brian Rodway, systems sales manager with Johnston Equipment. "Once we get in and talk with customers and examine their processes and the areas they want to improve, there are usually multiple benefits that we can identify above and beyond space savings, like pick and inventory accuracy, FIFO management of parts, or batch/lot control. And with 'each' picks becoming more prevalent because of online commerce, the need to be both very productive and highly accurate is stronger than ever, so many of our customers are implementing our systems in response to these demands."

Kardex Remstar's partners have the expertise in material flow, inventory management software, integration with host systems, and batch picking methodologies to ensure clients get maximum benefits from dynamic storage and retrieval equipment. These partners can assess the needs of a user company's order mix, layout, material flow, host system integration, and help establish the best picking methods. When combined with training and support services, it amounts to a complete, smarter solution approach.

Assess and configure

The first step in coming up with an effective solution is to analyze the current operation and assess application needs.

For example, says Rich O'Connor, director of systems

and automation solutions with Raymond Handling Solutions, an important early step is to calculate cubic movement by SKU to determine the proper storage medium. With this type of analysis, one looks at the cubic size of a SKU or item and compares that with sales velocity to come up with a metric for cubic movement over time.

Generally, very fast moving products should be picked from pallet rack, while many medium or slower moving SKUs can be stored and picked from a VLM or carousel with high efficiency and throughput. Even relatively fast moving items, however, could be suited for a carousel or VLM, especially if multiple units are combined to work in concert.

Once cubic movement velocity is known, and knowing that it's usually desirable to keep two to three weeks of supply

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storage capacity is being used."

Further, integrating Kardex Remstar hardware solutions with Power Pick Global inventory management software can offer an even smarter approach to storage. The software has user configurable rules that support picking methods such as first-in/first out (FIFO) picking, picking by expiration date, by priority codes, or by lot or serial numbers.

According to these rules, the software can select the most efficient spot within the system to store goods and



To gain more capacity, a feasible option for many companies is to maximize existing warehouse space by doing a better job of utilizing overhead vertical space.

in a storage medium, the physical size of a forward pick location can be calculated, says O'Connor. While such assessment involves a bit of effort, it lays the groundwork for choosing the right storage medium and sizing the solution. "Customers are looking for assistance from vendors in being able to truly analyze the application need," O'Connor explains.

According to Doug Card, Kardex Remstar's director of systems and special applications, proper upfront attention to inventory patterns is necessary, both in terms of choosing the right automated storage and retrieval system, but also on how to combine the system with overall order and material flow.

"The key is to take a good upfront look at inventory patterns and profiles to really understand which SKUs or parts should go in which type of machine, and which items should go into other systems such as flow rack or pallet rack for the really fast movers," says Card. "Another key upfront consideration is slotting the system properly so that you keep the right quantities on hand for each SKU in the system and have the correct mix of picking to replenishment activity."

In addition to sizing analysis, potential users should also consider ergonomic factors, such as using VLMs and vertical carousels as a way to deliver items to pickers at elbow height so that there isn't bending involved, notes Ward. Since dynamic storage and retrieval units

are "goods to person" solutions, they also eliminate the ladder and stair climbing involved with multi-level static storage systems. "You can dramatically reduce the risk of injury, which is an important consideration today," says Ward.

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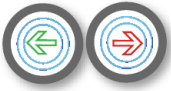
Another upfront considerations is to examine how to best divide parts or items on a tray or shelf within a VLM or vertical carousel. While a user company might want to use the same boxes or containers that were in the static system, it make may sense to "detrash" the box and put the items in dividers or totes to speed up picking, notes Ward.

Finally, once the best storage medium is selected, it's necessary to examine the best picking method to be used with the new system. While for relatively low velocity applications, such as tool storage in a manufacturing plant, it might be appropriate to stick with conventional straight order picking. For many warehouse applications with higher throughput needs, batch picking is often the best method.

Kardex Remstar's partners work closely with clients



While each facility will differ in terms of what type of systems make sense, VLMs and carousels are a proven and relatively lower cost way to maximize storage and help productivity.



to implement batch picking when and where appropriate, including assisting in integration to host warehouse management systems (WMS) or enterprise resources planning (ERP) systems. Partners can also identify opportunities to pair multiple VLMs or carousels to support higher throughput, and how to best configure pick windows, batching stations, and pick-to-light and put-to-light displays on the units.

Intelligent picking

Under batch picking, items from different orders are batched together and delivered to a batching station in as

few movements as possible. A batch pick might involve 10 items being picked from one location on one tray, but the operator would be turning around and distributing three items into one customer order container, three items into another order, and four items into a third order.

Light panels on the equipment clearly direct the operator at the batching station as to how many items to put into each order, so the execution of the batch pick is kept simple for operators.

The whole idea with batch picking is to get goods for multiple orders out of the machine as quickly as possible, with as little movement as possible. Batch picking works because of the intelligence and rules available in software such as Power Pick Global. While it's possible to implement batch picking by having the batches created by a host system, and then sent down to Power Pick Global for execution, Kardex Remstar's software is fully capable of creating batches and managing the rules for batch picking, and it is quite flexible and easy to use, says Card.

For example, explains Card, the software can automatically create batches based on rules—a supervisor can create batches, or the operator can create the batches. Typically, rules for batches seek out some commonality between order lines, such as different orders for the same SKU, or priority codes. For example, a system's rules can be configured so that orders with “priority one” codes are batched and picked first. Other capabilities of the Kardex Remstar software, adds

Servicing the solution

Card, include its ability to manage inventory that sits outside a VLM or carousel, and its ability to coordinate multiple carousels or VLMs to feed one pick location.

“The software is going to maximize the throughput of orders through the equipment, and it can also drive multiple units at the same time, which is going to really reduce operator dwell time and pick time,” says Card.

Software training does take a bit longer for supervisors or other employees who will be the systems administrator handling duties such as setting up new SKUs in the system. Training for operators is more streamlined, says Card, and mainly involves how to use the system to pick parts and run reports. Besides, says Card, users are never far from help, since Kardex Remstar and its partners offer phone support, Web-based training, and other software support services as the support contract for a system.

Support services also include technical assistance with software questions, or help in reconfiguring a system as the user's inventory mix changes, or when seasonal selling patterns make a different set of SKUs the faster movers. With experienced partners close by, help with such questions is only a phone call away, or an expert can be sent on site to provide training or other help, such as answering questions about slotting.

“Slotting is very much a journey, not a destination,” says Rodriguez. “With some applications, slotting changes frequently because the business is constantly changing. We can help them with that journey.”

The role of partners in providing a solution comes down to helping users pinpoint what the application needs are, and discover the full range of capabilities of systems such as VLMs and carousels, says Ward. The solution, ultimately, is not the equipment itself, but how to best apply it to challenges such as space, picker productivity, safety, or leveraging software to ensure that all overnight orders get out on time.

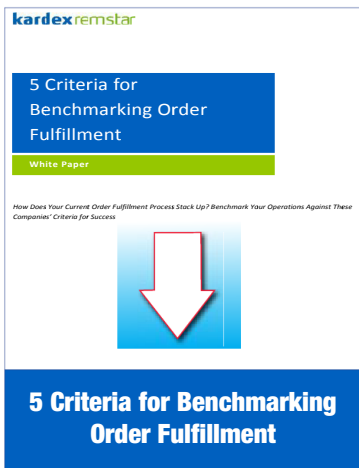
As Ward sums things up: “We help them discover the full capabilities of these systems, and figure out how to best use those capabilities to benefit their operations.” ■

—Roberto Michel is a Contributing Editor to Modern Materials Handling

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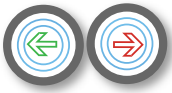
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A variety of equipment and installation options lets operations customize their handling to match inventory profiles, customer demands.

Flexibility: The hallmark of today's automated goods-to-person installations

Goods-to-person is blowing up. If you feel like you're seeing and reading about growth in goods-to-person automation installations at every turn, you are not alone. This growth is being driven by e-commerce and omni-channel. E-commerce distributors need to fill more one- and two-line orders in compressed timeframes with a dwindling and aging labor market. Plus, omni-channel operations that fill orders for multiple channels—brick-and-mortar stores, wholesalers, home deliveries and parcel shipments—need to apply the appropriate goods-to-person solution to match the outbound order's requirements.

Technologies once applied to store slower-moving, broken case inventory in a compressed footprint—such as automated storage and retrieval systems (AS/RS), shuttles and horizontal carousels—have evolved to offer benefits beyond space savings for investment justification. New developments in those systems, along with new mobile robotic solutions, give operations more flexible installation and application options.

By Sara Pearson Specter, Editor at Large

The latest developments

Gone are the days of an eight-figure dollar investment for a single AS/RS storing every stock keeping unit (SKU), with idle space left for future expansion, says Bill Leber, director of business development and marketing at Swisslog Logistics. Instead, systems have become more modular to support anticipated growth. That allows for more modest investment in an installation that meets today's needs, but can easily scale up.



Many goods-to-person systems combine multiple technologies to optimize flow, for example, using AS/RS to store overstock. Instead of delivering to the end of the aisle, the AS/RS automatically replenishes adjacent carton flow rack holding the fastest moving, manual-pick items, and goods-to-person shuttle systems that hold three days of inventory.



At the person end of a goods-to-person system, order put walls (shelves of cubbies that separate individual orders) can be equipped with light-directed pick or put modules to indicate which SKU goes to which order and in what quantity—maximizing throughput and improving accuracy.



A goods-to-person system eliminates travel and search time, plus improves ergonomics, by delivering items to workstations with height adjustments and footrests.

“Today’s installations are in the seven-figure range, and many times less than \$5 million,” adds Leber. “No one technology can do it all; we’re seeing more hybrid systems with different types of goods-to-person automation in a single facility. You can match each technology to different inventory profiles and handling characteristics to create the right total solution.”

Goods-to-person benefits

The ideal handling application for goods-to-person systems is generally medium- to slower-moving SKUs accessed infrequently and typically stored on static shelving in a distant portion of a facility. That requires pickers to spend extensive time traveling to, and searching for, items.

Instead, a goods-to-person system eliminates travel time and improves ergonomics, delivering items to workstations with height adjustments and footrests—all of which contributes to a significant reduction in order processing time, says Dematic’s Khodli.

“Because of the productivity gains,” he says, “goods-to-person picking might extend order cutoff time to 6 p.m., whereas a person-to-goods picking system might require a 2 p.m. cutoff time. The facility still makes its carriers’ deadlines—and gets more orders through.”

Depending on the installation and its control software, goods-to-person systems allow operations to bypass wave picking, says Intelligated’s Reese. “If someone orders an item late in the day, but pays a premium for same-day shipping, that order can automatically be prioritized to the top of the list. That’s simply not possible with paper-based picking.”

Further, adds Swisslog’s Leber, training on automation is easier than on manual systems, appealing to companies with seasonal labor spikes. “If you periodically need temporary help, it can take up to a month for a new staffer to be fully comfortable with voice- or radio-frequency (RF) directed picking and the facility layout. According to one of our customers, learning our AutoStore system takes maybe 20 minutes,” he says.

Leber also attributes the uptick in goods-to-person installations to their increased visibility in the market. “The technologies have become more mainstream and less of a high-risk investment,” he adds. “And, the cost of capital is extremely low, which makes net returns on invested capital very attractive.”

One of the first solutions offered in the goods-to-person picking realm was mini-load AS/RS, says Ross Halket, executive director of automated system design sales at Schaefer Systems International.

“Concentrating slow- and medium-movers from 20,000 square feet of floor space into a mini-load that takes 4,000 square feet, letting an operation increase pick rates from 80 to 120 lines per hour,” Halket says. “The maximum pick rate for a person is 1,000 lines per hour; a mini-load needs nine cranes to support that rate.”

That’s not to say mini-load (or unit-load) AS/RS isn’t deployed in today’s goods-to-person installations. Rather, most current systems combine multiple technologies to optimize flow—and using AS/RS to store overstock destined for manual and automated goods-to-person picking.

“Instead of delivering to the end of the aisle, an AS/RS automatically replenishes adjacent carton flow rack

holding the fastest moving, manual-pick items, and the goods-to-person shuttle systems, too,” Halket explains. “Because shuttles are typically more expensive, they might hold three days of inventory, while 25 days worth is held in a mini-load.”

Matrix, Schaefer’s newest shuttle offering, incorporates multiple lifts throughout each aisle to eliminate end-of-aisle bottlenecks experienced by traditional AS/RS and to speed throughput. “Matrix lets a facility access any SKU from any storage point and deliver it to a workstation at any time, minimizing the number of waiting totes,” he says.

It’s also no longer the case that an extensive installation of conveyor or loop sorter is needed to move the totes from storage to people, says Lance Reese, technical solutions director for order fulfillment at Intelligated. “Now, shuttles are more agile and come in a range of different flavors,” he says. “Some are carrier indepen-

dent and can run on different levels, as opposed to being restricted to certain levels of a system.”

Kevin Reader, director of business development and marketing for KNAPP Logistics Automation, agrees, noting multiple shuttle design variations enable a range of uses within in a goods-to-person application—including storage, sequencing and replenishment, while simultaneously managing overstock, picking and returns.

“Shuttles can handle totes and cartons in the same system. We also install single-, double- and triple-deep load handling mechanisms in shuttle systems up to 18 meters (59 feet) high for maximum density with minimal productivity loss, because item locations are that much closer to the pickup and delivery stations,” he says.

Should seasonal spikes occur, multiple shuttles can run in a single aisle, Reader continues, or they can move from aisle-to-aisle and level-to-level. “The variants in shuttle design make these systems highly responsive and flexible to change. They’re also modular. So, if a shuttle breaks down, it can be replaced.”

Robotic goods-to-person picking systems, like Swisslog’s AutoStore and the Perfect Pick from OPEX, also offer handling flexibility and scalability—making goods-to-person automation cost justifiable to companies doing less than \$50 million a year, says Jeff Hedges, president of OPEX Material Handling.

“Our robotic technology is uniquely flexible and scalable. The number of iBOT robots deployed is based on the throughput rate and storage capacity a specific operation requires,” he says. “Both the system’s footprint and the process can be easily expanded as a business grows, in part because the iBOTs, which can be driven in and out of an aisle in a matter of seconds, don’t require transfers, lifts and conveyors to deliver items to a remote workstation—they deliver directly to the workstation, which is integrated into the storage aisle.”

Kardex Remstar will bring a new technology to the United States in 2016 that will target mid-sized operations with volume handling needs in the 4,000 to 6,000 units per hour range, says Thomas Coyne, regional director and president of North American operations.

“Horizontal carousel goods-to-person picking requires a batch process to get a high level of productivity, but it’s limited to roughly eight orders maximum,” Coyne explains. “Instead, our new system puts 200 to 300 stationary order totes to be picked at one time around a sortation

device that brings SKUs to the operator. For operations considering carousel technology, this new system will increase their pick rates enormously at a more easily cost justified investment level than multi-shuttle systems.”

But, software is key to making any goods-to-person system work—that is, ensuring that the required SKUs arrive at the right workstation at the same time the order is ready to be filled, says Mike Khodl, vice president of solution development for Dematic.

“For proper sequencing, the software algorithms have to optimize and correctly build the flow of stored SKUs to the workstations processing the orders,” he explains. “Ours considers SKU velocity and cube, the order makeup that includes those SKUs, and the productivity requirements in terms of target fulfillment rate and order cutoff time.”

Workstations improve operator speed, accuracy

At the person end of a goods-to-person system, workstations are likewise being flexibly configured to maximize throughput and improve accuracy. Workstations and adjacent order put walls (shelves of cubbies that separate individual orders), can be equipped with light-directed pick or put modules to indicate which SKU goes to which order and in what quantity. Some suppliers offer light curtains that verify the number of picks placed in order totes. Others include a large screen to display an image of the item that needs to be picked.

Dematic, says Khodl, recently introduced the off-board Laser Put solution as a lower cost replacement for light-directed picking modules on put walls. “The operator scans the item and the laser projects a beam of light to one or more put destinations. It can also project text on the shelf front to relay a message about quantity,” he says.

For operations filling 5,000 or more orders per day, systems can be engineered to deliver up to 1,400 items per hour to a workstation. Yet, with these rates starting to outpace the ability of a given operator, Khodl says, “we’re offering conversions to robotic picking.”

Further supporting future goods-to-robot picking, says Reader, is integration of vision systems and software technology into workstation operation. “The technology looks at the items, shapes and colors to identify each item, then directs a picker to a unique SKU for picking out of mixed totes. The same approach is now operating in robotic picking and packing cells,” he says. ■

Companies mentioned in this article

- Dematic
- Intelligrated
- Kardex Remstar
- KNAPP Logistics Automation
- OPEX Material Handling
- Schaefer Systems International
- Swisslog Logistics



8 Beyond long-term storage: new ways to use AS/RS

These innovative AS/RS applications will help you think beyond long-term storage and optimize your automated storage investment in ways you probably never even thought of.

For years, automated storage and retrieval systems (AS/RS) were thought of as being only good for one function: the long-term storage of pallets and cartons in high density unit load and mini-load systems.

Typically, these systems were built to 60-, 70- or even 90-foot heights to save enough horizontal space to justify the investment. Today, thanks to lower cost computing, better controls, more reliable systems and, most importantly, new demands, AS/RS are now being asked to play a key role in activities like sequencing, work-in-process, goods-to-person picking and staging for shipping.

By Bridget McCrea, Contributing Editor

“When we go to visit customers, the mindset tends to be that AS/RS is for large warehouses that need to store a lot of pallets for extended periods of time,” says Jason Perks, manager of sales planning and estimating for viastore systems. “Many of them haven’t even considered the use of AS/RS for anything other than long-term storage.”

In reality, the value of AS/RS solutions today goes beyond long-term storage. Here are eight ways companies are leveraging their AS/RS investments beyond the basics:



1 To better manage “buffer” storage. Sure, AS/RS solutions are adept at placing, retrieving and storing goods over the long haul. Now, they are being called upon to perform those same duties on a short-term basis. In these scenarios, “buffer” storage is held in the AS/RS as other work and projects continue around the warehouse or plant. When the stored goods are needed, those items are automatically distributed to their designated areas or destinations.

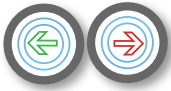
“Instead of using miles of conveyor to buffer and stage products, companies are storing the goods in AS/RS units for as little as 30 minutes at a time,” says Christina Dube, Kardex Remstar’s marketing communications manager.

“This is a fairly new concept within our industry, and one that finds companies gaining from the capacity of the new, high-density buffer space.”

2 For maintenance, repair and operations (MRO) management. System maintenance is more important than ever (See “*MRO Moves to Materials Handling*” on mmh.com). Effective management of MRO parts, supplies and equipment is an ongoing challenge for most companies. One way to solve this persistent problem is by using AS/RS to support the use and or consumption of parts, consumables and even tools within a plant or warehouse.

A company that receives products 24 hours a day can use AS/RS to “stage” the goods in advance and then properly sequence them for distribution.

One Kardex Remstar customer, for example, uses the vendor’s systems to place, store and retrieve all of the spare parts needed to maintain a major league baseball field—from the light bulbs to the field chalk and everything in between. “They’ve found AS/RS to be a particularly effective way to manage all of the maintenance supplies for that facility, in yet another example of how the usefulness of automated storage equipment goes beyond just long-term storage,” adds Dube.



3 To optimize your warehouse management system (WMS).

In many automated warehouse solutions, pallet cranes supply full pallets to de-palletizing machines in a sequenced manner. This activity supports the WMS, which in turn can prioritize the retrieval of selected items depending on the order status and consequently provide quicker and more efficient access to the desired SKU. In addition, Norman Leonhardt, business development manager for WITRON Integrated Logistics, says automated storage systems can supply pallets to a pick front, which can be found in the lower parts of an AS/RS crane aisle.

“This set-up saves time and labor,” says Leonhardt, “as the process of manual storage using forklifts [plus] the replenishment of individual pick slots is eliminated.” In addition, he says there is a potential to save space by reducing the pick front. “If a certain item is not frequently picked, the AS/RS can supply the item during the time it is needed,” says Leonhardt. “Thus, not every SKU in the warehouse will need its own dedicated pick slot.”

4 As a way to improve staging for shipping.

Omni-channel and just-in-time processes have put some unusual materials handling constraints on today’s warehouse managers—many of whom are struggling to match production schedules with specific shipping windows.

By using AS/RS to stage items for shipping, these managers can more effectively streamline their operations and meet the challenges being put in front of them. A company that receives products 24 hours a day, for example, but that relies on 4- or 8-hour-long shipping windows (due to worker shifts, for example), can use AS/RS to “stage” the goods in advance and then properly sequence them for distribution.

The load handling device on this mini-load AS/RS accommodates cartons and plastic tote boxes.



A vertical carousel can be a solution for holding maintenance parts in a compact footprint—keeping them secure, clean, organized and easily accessible to maintenance staff.

6 For enhancing picking systems. An emerging area involves the intersection of AS/RS and picking systems—an area ripe for better automation. For warehouses where goods are moving at a slow to medium pace, for example, Perks says an efficient approach involves four or five operation stations where pallets or totes are delivered using an automated system.

The AS/RS stores those pallets or totes, “instead of having operators walking around the warehouse with pallet jacks,” says Perks. “That allows them to more efficiently pick discrete orders or batch-pick orders.” He says this arrangement cuts down significantly on the number of pickers needed within that slow- to medium-movement warehouse. For DCs operating at faster speeds, pick modules can be set up and the AS/RS can be used for vertical storage and picking. “Cranes will automatically replenish the designated pick locations,” says Perks, “with operators working in specific zones in a goods-to-person format.”

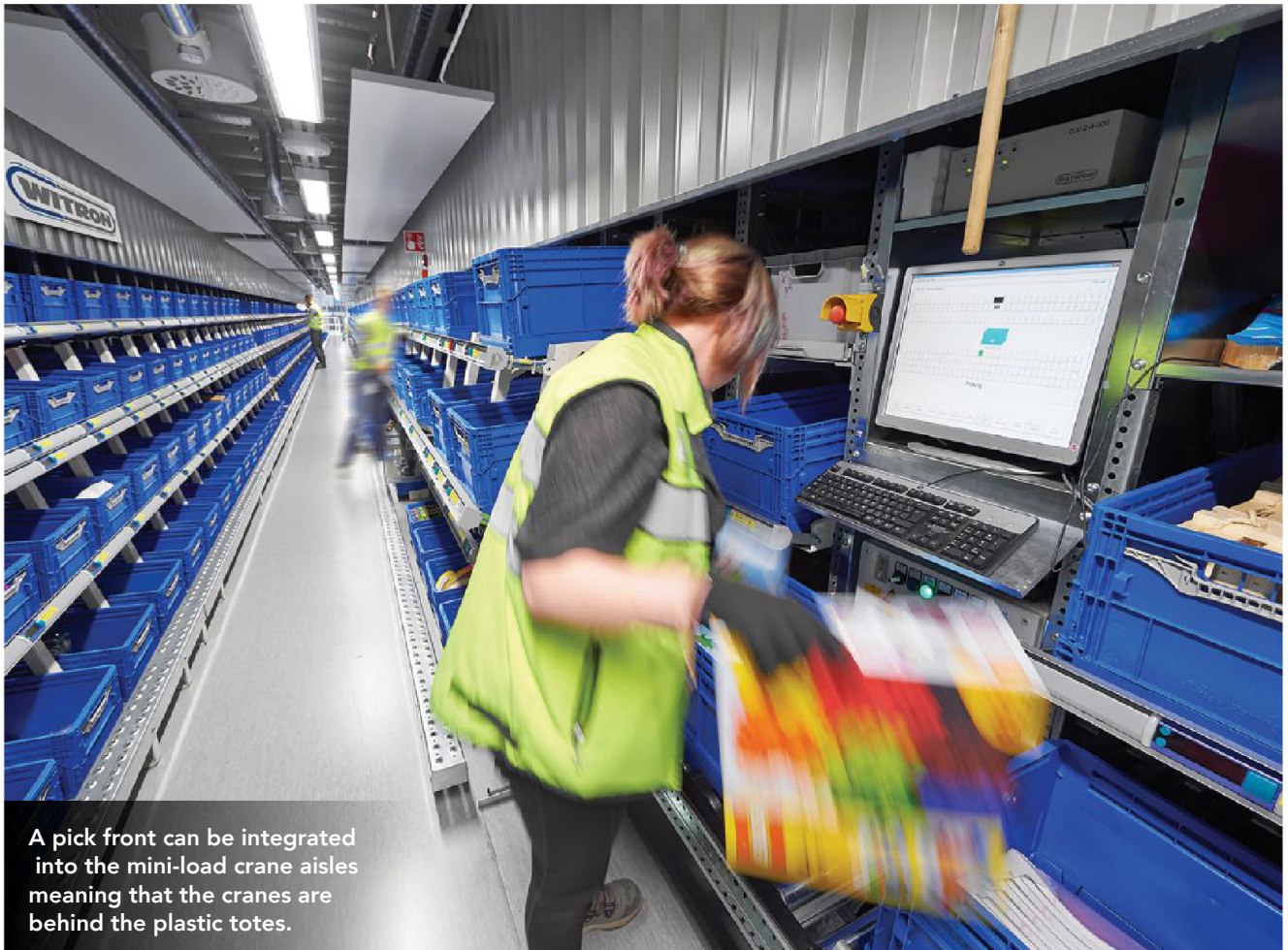
7 To enable work-in-process setups. From a manufacturing perspective, work-in-process is a functional area where AS/RS can play a key role. According to Sean O’Farrell, market development director for Dematic, facilities can use AS/RS as a use point manager. For example, one side of the multi-shuttle or mini-load AS/RS solution can be used to stage raw materials and the other side can be used for assembly operations. Once completed, the assemblies can be placed back into the AS/RS, which then becomes a use point manager by buffering the goods or sequencing them for use in the next workstation.

O’Farrell says food or retail opera-

“That way,” says Perks, “no one is waiting around for production operators or dealing with delays. The goods are on standby in the shipping area, properly sequenced and ready to load on the trucks.”

5 To supply pick and/or pack stations. Within the AS/RS realm, mini-load cranes supply directly to pick and/or pack stations where individual cases are prepared for shipment. “The AS/RS is able to supply cases in a

sequenced manner so that orders can be prioritized and a pallet can be built according to the desired parameters,” Leonhardt explains. For example, heavy cases can be put on the bottom of a pallet to guarantee a minimum crushability. At the same time, the system can keep an individual store layout in mind and groups cases on a pallet. “Just like a pallet AS/RS,” says Leonhardt, “a mini-load crane can supply to a pick front that is integrated into the crane aisles.”



A pick front can be integrated into the mini-load crane aisles meaning that the cranes are behind the plastic totes.

tions can use a similar approach with value-added processing, gift-wrapping, special labeling or kitting. “Whether you want to do value-added processing or end-process type processing,” says O’Farrell, “the automation within AS/RS is flexible enough to handle it efficiently.”

8 For reducing inventory control needs. According to Leonhardt, another advantage of AS/RS technology that goes beyond long-term storage is the fact that it eradicates the need for time-consuming inventory control. “By scanning each item in an AS/RS before it is stored, the WMS knows exactly where each item can be found,” says Leonhardt. “If an item expired or needs to be checked, one can simply retrieve

the item within minutes and send it back just as fast.”

Continued evolution

As technology continues to evolve, and as materials handling needs grow in scope, expect to see AS/RS solutions playing even larger roles in DCs and warehouses. One newer capability to keep an eye on, for example, is the way in which AS/RS technology can be programmed to ensure that cranes follow certain parameters when putting each SKU into a storage slot. For example, an operation can make an entry that liquids, oils or chemicals should always be stored in the lower levels of storage racks.

“That way, in case there is a spill caused by a leaky case, damage to the

goods stored below will be minimized,” says Leonhardt. In another example, he says companies can also easily program the AS/RS to randomly store the same SKU in different aisles. “In case a crane has to go through a maintenance process, every SKU will consequently still be available.”

When assessing the AS/RS options on the market and deciding how to best integrate them into a DC, Leonhardt says operations should realize that cranes literally never sleep. “While one might not have a 24/7 picking, receiving or shipping operation,” he points out, “cranes can optimize the storage over night or on the weekends. Thus, goods will be available faster the next day and the storage space is used even more efficiently.” ■

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