Bastian SOLUTIONS
a TOYOTA ADVANCED LOGISTICS company

MODERN MATERIALS HANDLING

How to ease labor challenges with advanced automation

THE DAUNTING THING ABOUT WAREHOUSE ECOMMERCE FULFILLMENT is just how much *more* of everything is required. There is more picking and packing of single items to fill online orders; more pressure to hit tight cycle times and carrier arrival windows; and now, added concern about social distancing and employee health and safety.

That is the vexing side of *more.* The good side of *more* is that much more is possible with advanced automation: more flexibility; more scalability; and a greater ability to orchestrate automated systems and people processes with software. These added possibilities are achievable when companies can tap into expertise that spans warehouse automation systems, software and data management, and deep knowledge of operational best practices for distribution centers (DCs).

The need to do more is relentless. For 2019, ecommerce growth in the U.S. market was up by 14.9 percent, according to Dept. of Commerce figures, 1. While according to Shopify, worldwide ecommerce is expected to nearly double by 2023. 2. The COVID-19 pandemic is adding to the online buying increase, with a recent analysis by Adobe Systems finding that during two early months of COVID-19 disruption (April to May 2020), consumers spent $153 billion online, up 7 percent from online spending during the 2019 holiday season (November and December 2019).[3]

For DCs and warehouses, the megatrends translate into more picking of the "each" level items that make up ecommerce orders. Filling these orders on foot via more manual methods consumes a great deal of labor, and may necessitate a small army of hard-to-find workers to keep pace. In fact, 55 percent of a typical DC's operating cost can be attributed to order picking, according to a Georgia Tech report.[4]

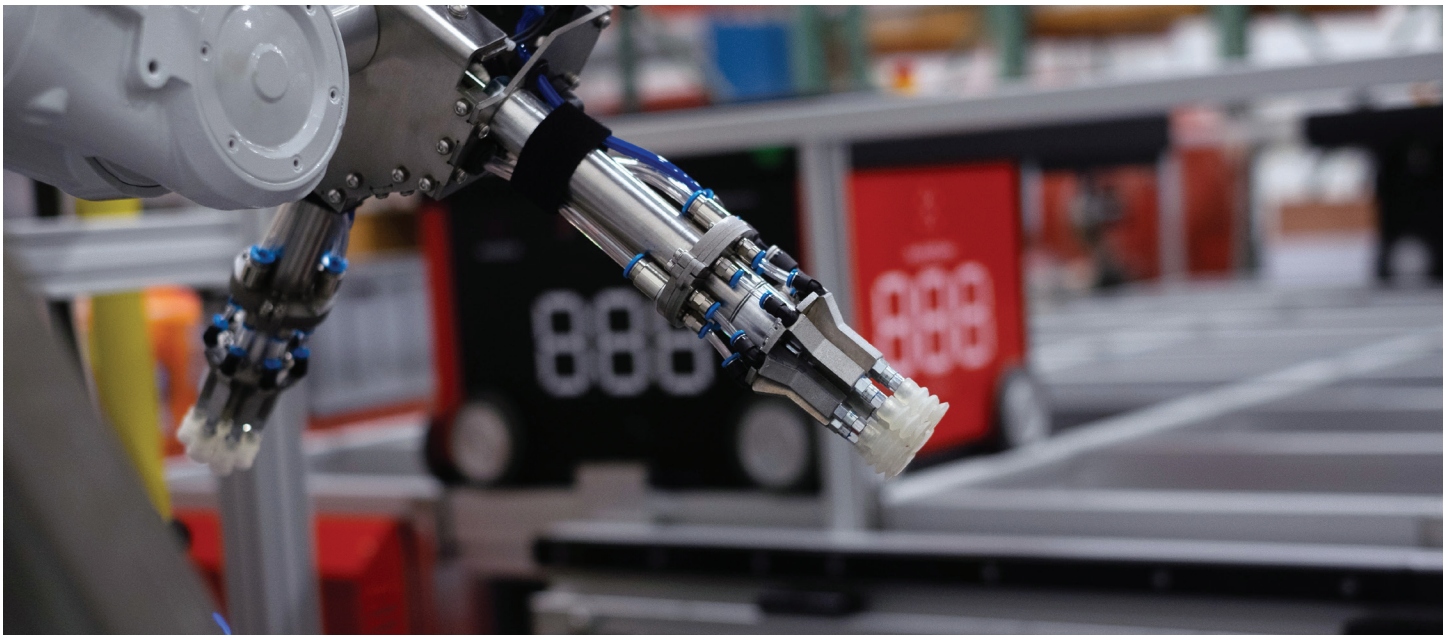
"One of the main cost components in DC operations is picking, and it becomes more of an issue in facilities doing ecommerce or omnichannel fulfillment, because of the all the each-level picking," explains Marvin Logan, VP of consulting and integration with Bastian Solutions, a Toyota Advanced Logistics company and systems integrator offering automated distribution and production solutions and software. "As a result, many of the solutions we implement for operations are about reducing the time and effort involved in order picking. There are other workflows that can be streamlined with automation, but because of ecommerce, picking is where much of the automation focus has been in recent years."

The struggle many DCs continue to have in finding enough warehouse associates means that an operation simply can't throw bodies at the need to keep pace with rising order fulfillment requirements. Multiple studies have found that finding enough labor continues to be a top issue for DC operations, including MHI's Annual Study and industry survey done in conjunction with Deloitte, which again last year found hiring qualified workers continues to be the biggest industry challenge.

"For many years, the automation focus was on how to reduce cost, but now we're also applying automation as a response to the labor availability problem, because being able to get orders out the door on time, given seasonality and demand spikes, has become so mission critical when there just isn't enough available labor," says Logan. "The other factor is that more companies are revamping the DC networks for ecommerce to have more regional DCs with effective automation so that they can be closer to population centers and serve their customers more efficiently."

As a result of these industry and consumer buying trends, companies with dc operations are looking to automation as a way to ease their labor challenges. However, a one-size-fits-all approach won't work. Effective automation solutions for today's labor challenges tend to focus on order picking but can also be applied to processes including packing/shipping, replenishment, or receiving and put away.

Above all, says Logan, they should be flexible, scalable, and capable of tying together different types of automation and operational processes to achieve the desired labor performance and efficiency goals. "Every DC environment is going to be different, so it's not just one type of automation solution that may be needed across the board," Logan says. "We consider the order profile and the economics around each possible solution before recommending the right technology for our customers. That being said, in the last several years, solutions like goods-to-person automation have really caught on."



Automation's Impact

As the order picking burden on DCs has grown during the last few years along with ecommerce, certain types of automation have caught on, most notable goods-to-person (GTP) systems and autonomous mobile robots (AMRs). The key benefit of GTP automation and methods, explains Logan, is that they all but eliminate the considerable walking travel involved with less automated methods of order fulfillment such as picking to a cart.

Bastian Solutions, for example, has deployed systems such as AutoStore and OPEX Perfect Pick for dozens of companies. While there are differences in GTP automation, generally, these systems use robotic mechanisms that navigate track within a dense storage system, delivering goods to workers at light-directed stations. Instead of travelling up and down aisles, workers stay in one place and efficiently pick product with the guidance of lights. This reduces the number of order pickers needed to keep up with order volume, while ensuring high order accuracy.

"Typically, 40 percent to 50 percent of the traditional picking function is walking between pick locations," says Logan. "When you have a system that brings product to the picker, that makes the picking inherently labor efficient. The other big benefit of goods to person systems is that they offer very dense storage. That helps to further reduce the cost of an operation."

The future for GTP solutions, for some operations, will be to replace the person with a robotic picking arm, in what's known as a goods-to-robot system. The sensors and the artificial intelligence (AI) software that allows robotic arms to figure out how to grasp and pick goods have advanced in recent years, making goods to robots feasible even for operations with a fairly broad product mix. Bastian Solutions has also developed an end-of-arm tool for gripping handling different sized products. "There is a lot of interest in goods-to-robot solutions right now because of the labor availability issue," says Logan. "The vision systems and AI used by goods-to-robot technology to pick all different types of products is becoming more reliable, though they are not 100 percent there yet."

HR Insight: Advanced Automation as Opportunity

According to the MHI 2020 Industry Report, 55 percent of supply chain professionals surveyed use reskilling of existing workforce and promotion from within as the top way of dealing with the talent gap. To discuss some of the challenges wrapped up in the labor gap issue, and give insight on how to approach training, we asked Shelby Shay, human resources manager with Bastian Solutions, about how to educate the workforce in today's environment.

Q: *There seems to be some fear about advanced automation "replacing" everybody. Is that the whole story regarding automation?*

A: I believe that you can't fully replace people in most operations. Companies simply can't cost justify automating everything, and beyond that, it's people that build the culture and the strength of a company. It's true there are automation technologies that will bring labor efficiencies, but most of these also are going to mean some new opportunities for workers and managers who can learn how to best interact with and leverage the automation. The other factor is that automation can make work safer, and support social distancing, which creates a healthier work environment.

Q: *When front line workers in a warehouse have to work alongside robotics, what is the upside for the workers?*

A: The main upside is the chance to learn new technologies, and gain experience working with advanced automation. Working with automation is also going to contribute to that safer work environment, with less risk of injuries and some productive ways to support social distancing. Overall, robotics provides opportunities to learn new systems and master the latest technologies, which will make you a more valuable employee.

Q: *Do workers today always have to be reskilling?*

A: The rapid evolution in the automation is a chance to learn some new skills and workflows or step into new roles with a new type of system. On the other hand, there's a shortage in certain skilled labor roles—such as operators of CNC machinery, or welders, or industrial painters, or skilled positions in warehouse operations, like operating a lift truck. Professionals in those roles are in such short supply that they can stick with their skilled role and do continuing education without "reskilling" in a whole new area. Since Bastian Solutions has manufacturing operations for some of the systems we produce, I know from experience these highly skilled roles are difficult to keep filled, so people who commit to them and stay current on training can have a long an rewarding career.

Q: *At Bastian, what's your approach for ongoing educational requirements?*

A: As part of our performance evaluation process, employees in concert with their supervisors look ahead to determine career development goals, and what each employee wants to learn and accomplish. The training that comes from that will vary by person, according to their goals. For professional services roles, we do have an extensive onboarding program— we call it a boot camp. We also have some compliance and safety training that is required. We also encourage cross training, which has paid off in these challenging times of pandemic, because we've had people who been unavailable and others who have had to come in to serve a different role. For most organizations today, cross training is extremely important because it supports business resiliency.

Q: *In the face of all these emerging new technologies, how do you keep your people engaged and enthused, rather than overwhelmed?*

A: In this environment, and with automation changing so rapidly, that appeals to people who want to be innovative and push the envelope. I think the people who seek out Bastian as a place to work want to be challenged. Our people can always be learning new ways to apply technology, and finding ways to combine technologies to help our customers' operations. Yes, it's challenging, but being innovative with automation is what really motivates the people we have and keeps the work exciting.

Much of what Bastian Solutions does is to study a DC environment and come up with the appropriate automation to increase labor efficiencies and ensure high throughput, even during peak demand periods. The range of automated systems that might come into play include:

GOODS-TO-PERSON & GOODS-TO-ROBOT SYSTEMS

These systems use robotic mechanisms, dense storage, and light-directed workstations to efficiently pick customer orders while eliminating picker travel. Some operations may benefit from using a robotic picking arm to do the picking duties, freeing up precious human resources for other tasks and workflows in the warehouse.

AMR SOLUTIONS DEPLOYED FOR MATERIALS TRANSPORT, OR IN A GTP CONFIGURATION

In a materials transport role, mobile robotics can be used for duties such as replenishment of order picking modules or automated storage, or transport goods to other automation like put walls.

CONVEYOR AND SORTATION SYSTEMS

Fixed automation has become more modular and easier to adapt, making conveyor and sortation a continued good choice for many DCs. A fully automated loading and unloading solution called ULTRA®, which uses vision and sensors to automatically load and/or unload cases and packages from trucks.

AUTONOMOUS LIFT TRUCKS AND AUTOMATED GUIDED VEHICLES.

Automated lift trucks can be used to make repetitive receiving and put away work flows more labor efficient, rather than using traditional lift trucks driven by operators, which often results in empty “dead head”return trips.

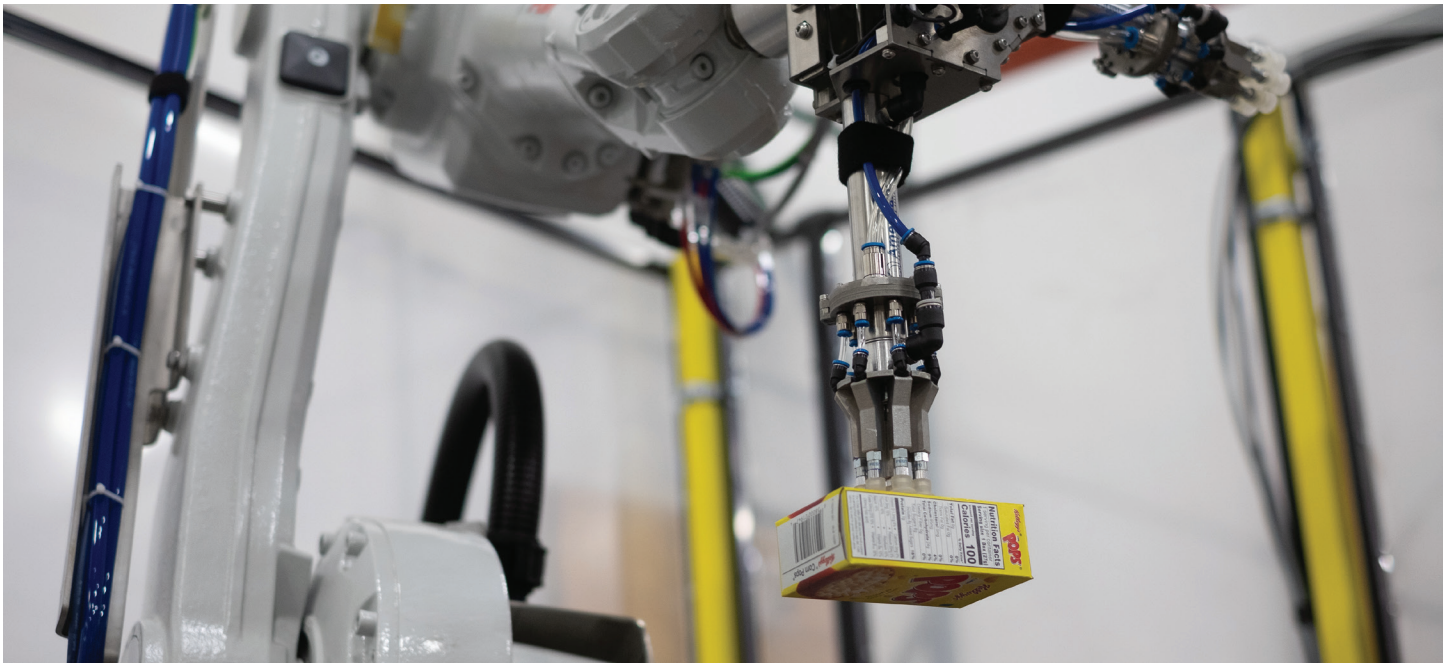
PICK TO LIGHT STATIONS OR LIGHT-DIRECTED PUT WALLS, as well as automated packaging solutions, to speed up the final downstream steps in order fulfillment. Warehouse management system (WMS) and warehouse execution system (WES) software functionality to connect different zones of automation and people-focused processes into one cohesive material flow.

While warehouse automation is advancing rapidly, and WES software can be used to orchestrate different zones to meet order cycle times and carrier pickup windows, most DC operations still can't justify total automation. According to Logan, the complete "lights out" DC isn't cost justifiable for most operations, though many will benefit from automating key workflows that consume the biggest share of labor and put the operation at risk of missing fulfillment promises.

"The closer you get to fully lights out, the more costly the automation solution becomes," says Logan. "That's why it's important to have a trusted partner who can help you determine the level of automation that makes the most sense based on your unique challenges, product mix, and operational characteristics."

For businesses, automation can ensure operational stability and the ability to ramp up throughput to meet demand without scrambling to find more workers. For warehouse associates in DCs, automation brings a safer, more ergonomic workplace with less walking, bending, and reaching. Systems such as automated GTP solutions place workers at ergonomic workstations where they can rapidly pick orders using guidance from light bars and software. The actual picking movement at these workstations is in the "golden zone" between waist and shoulder height, which makes for less strain on the body. And importantly given COVID-19 precautions, automation can be configured to keep warehouse associates at separated workstations or picking zones, rather than crossing paths in busy warehouse aisles.

"With goods to person, for example, there is typically a workstation where the goods are being presented to the worker, so a side benefit of that efficiency is that social distancing," says Logan. "You can space out workstations and manage zones to support social distancing and contact tracing objectives."



Making it Work

By becoming more flexible and tolerant of variability in product mix and package sizes, warehouse automation is becoming more feasible for more operations, says Dean Starovasnik, director of consulting sales for Bastian Solutions. While variability is still a constraint to some extent, advances in software and AI now allow robotics to dynamically adapt to factors such as different-sized cartons that need to be handled. Advances in vision systems, AI and information processing have made goods to robot automation a viable solution for at least part of the product mix in some facilities, explains Starovasnik.

"The envelope of products you can successfully handle and pick with a robotic arm has grown significantly in the last few years," Starovasnik says. "In today's world, the demand for additional services is growing tremendously, but the other trendline is that the automation solutions are more flexible and able to do more than in the past, and at a lower cost, even further driving the automation trend.

A warehouse automation partner can help an operation assess which products and stock-keeping units (SKUs) are appropriate for certain types of automation, and which SKUs, due to factors such as size or infrequency of ordering, are best handled through more manual methods. Bastian Solutions' independent consultants also know the speed and throughput potential of each type of automation, and can factor that into a solution plan, using simulation tools to see expected outcomes.

For instance, Starovasnik says, automated guided vehicles and autonomous lift trucks can potentially ease DC labor constraints in receiving, but the project has to factor in that AGVs move at a slower, steadier speed than manually operated lift trucks. "We can use simulation to validate the design of solution to make sure it will behave the way we expect it to," says Starovasnik.

Case Study: Automation Brings Labor-Efficiency

One of the country's top omnichannel sporting goods retailer's, DICK's Sporting Goods partnered with Bastian Solutions to improve order fulfillment speed and accuracy at a new omnichannel distribution center (DC). The DC in Conklin, N.Y., near where the first DICK's store was founded, has helped the retailer keep up with the surge in e-commerce purchases this year during the COVID-19 pandemic.

The DC is the company's fifth nationally with 650,000 square feet of space, 7.7 miles of conveyor, and servicing up to 160 stores. The DC handles both retail and e-commerce orders for the eastern U.S. region, with 250,000 sq. ft. of the facility dedicated to e-commerce. The systems put in place include Bastian Solutions' Exacta warehouse execution system (WES) software, AutoStore goods to person automation, and extensive use of conveyor/sortation.

The order routing logic in Exacta knows which incoming goods are bound for stores or customers, and which goods will go to bulk storage. The roughly 20% of goods going to back stock is "peeled off" after it's received, thus freeing up capacity in conveyor/sortation.

There are multiple ways that the automation put in place reduces labor requirements. The AutoStore system is at the heart of the e-commerce operation, and provides for dense, highly automated storage and order picking of goods.

The AutoStore system provides multiple levels of bin storage with robotic units that move along the top of the structure to select and move bins that hold stock-keeping units needed to fill orders. The robots rapidly move needed bins to light-directed workstations or "pick ports" along the side of the system where associates pick orders.

There are also replenishment ports at the side of the system. The AutoStore implementation saves a significant amount of labor versus more manual methods of order picking since it eliminates worker "travel" to pick locations and the lights speed up picking.

The DC in Conklin was up and running in 2018, well before COVID-19 caused massive disruption in retailing, providing the company with the automation it needed to efficiently meet the surge in online orders for the eastern region.

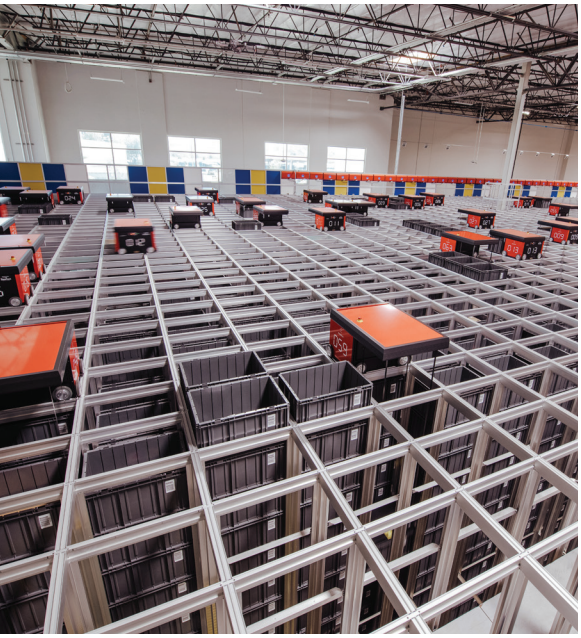
According to a Wall Street Journal article from August 26, DICK's online and curbside orders comprised about 30% of second quarter 2020 sales, compared to roughly 12% in 2019. Such an e-commerce increase would be difficult to meet without labor efficient automation in place.

Other forms of automation in the DC such as semi auto tapers and automated stretch wrapping also save on labor in packing and shipping while the extensive use of conveyor automates the flow of goods. There also are pick to light and put to light systems in the DC that save labor by reducing picker travel and providing light-directed guidance.

Other parts of the solution include:

- 182 lanes of pallet flow rack for staging outgoing store shipments, increasing vertical space usage and eliminating need for additional expansion
- Utilized gap and store, or reverse accumulation to improve conveyability of wide product mix.
- Cognex camera label scanners improved read rate from 85% to over 98%. More labels being scanned correctly means more product flows to the correct destinations.

As George Giacobbe, DICK's Sporting Goods senior VP of supply chain, states in a video about the deployment, the drivers for the systems the company seeks to put in place are all about "how can we be fast, how can we be flexible, and how can we be flawless."



The secret sauce in making different types of automation work in concert is software, says Starovasnik, in particular WES software that knows the real-time status of each automated zone, combined with WMS-level knowledge of orders and delivery commitments. Bastian Solutions' software platform, called Exacta®, combines these WES and WMS capabilities to maintain level flow and throughput across zones, while also controlling features like cross docking and sorting.

In addition, a WES is able to create efficient order waving, batching, and zone picking methods that make the most of available workforce, rather than using less efficient discrete order line picking or large, static batches of work.

In many cases, says Starovasnik, a DC can gain major labor efficiencies via goods to person strategies, as well as through zone picking and efficient batch picking supported by Exacta. "The economics for automation play well in order picking because that is the area of the DC that uses the most labor, and with picking, we can also exert more control over what goes through the automation," he says.

Bastian Solutions also studies facility-specific factors, such as the number of dock doors or the types of trailers and/or fleets used in a facility, when assessing how to automate receiving and shipping. With some clients, the solution design spans an entire DC network, including designing and deploying regional DCs that can rapidly fill online orders by being closer to population centers, and using automation like automated order picking/GTP solutions.

One example of this network approach is with Best Buy, the omnichannel electronics retailer. Bastian Solutions helped Best Buy implement AutoStore automated order picking systems across eight locations (five regional DCs and three metro ecommerce centers), as well as the Exacta system, to help the company rapidly fulfill ecommerce and store orders with high labor efficiency and rapid shipping. The updated network allows Best Buy to offer free, next-day delivery to 50 million consumers, while segregated (by store) tote delivery allows for easy store replenishment.

Ultimately, automation projects happen for multiple reasons. With labor increasingly difficult to find and retain, automation ensures operational stability and speed. For workers at the DC, automation makes for a healthier, less strenuous workplace. While labor savings factor into automation decisions, any warehouse automation solution also needs to be fast and accurate in this era of rapid delivery expectations.

"The need for more labor with ecommerce, and the labor availability problem, are key challenges that drive companies toward more automation, but the solutions put in place also have to be fast and accurate," says Logan. "On the fast side of the equation, it's all about reducing cycle times to meet shipping cut-off times."

Simulation and modeling of an automated solution can verify that the cycle time range involved in processing orders through the to-be system, to accommodate future swings and demand with modular designs. Via WES software, hot orders or orders that can be cross docked can flow through to shipping without going through unnecessary stops like bulk storage or sorting. Sorting or pick to light solutions can be built into a DC's upfront processes after receiving to provide for efficient "early outs" for orders that can be completed quickly and go straight to packing or shipping.

For example, one of Bastian Solutions' clients—DICK'S Sporting Goods, a major omnichannel retailer of sporting and outdoor goods—turned to Bastian Solutions for automation solutions that not only save on labor, but also reduce cycle times at its omnichannel distribution center in Conklin, New York. The deployment included Exacta software, pick to light and put to light systems, conveyor/sortation, and automated stretch wrapping.

Upon receiving, goods are scanned and sorted based on two categories: products earmarked for specific orders, and products that will be held for future use, which is palletized immediately and stored in bulk. This "peeling off" of back stock frees up capacity in the conveyor system.

Meanwhile, the DC's design with 7.5 miles of conveyor minimizes manual materials transport tasks, with use of pick to light and put to light makes order picking highly efficient because it minimizes picker travel, and adds speed and accuracy through light-based instructions.

As Logan sums up the needs the industry faces today: "Flexible automation and software can address both the labor availability challenge for an operation, and also the speed and accuracy imperatives that come along with ecommerce and omnichannel. There is no single 'must-have' automation for everyone. We focus on consultative solutions that look at a customer's unique requirements and develop a solution that makes sense for them."

Footnotes

"U.S. Ecommerce Sales Grow 14.9% in 2019," Digital Commerce article, Feb. 19, 2020.
https://www.digitalcommerce360.com/article/us-ecommerce-sales/
"What Is the Future of E-commerce? 10 Insights on the Evolution of an Industry." Shopify blog.
https://www.shopify.com/enterprise/the-future-of-ecommerce
"Online Shopping During COVID-19 Exceeds 2019 Holiday Season Levels," Adobe Systems blog.
https://theblog.adobe.com/online-shopping-during-covid-19-exceeds-2019-holiday-season-levels/
"Warehouse and Distribution Science, release 0.97. Georgia Institute of Technology. See page 47 of PDF.
https://www2.isye.gatech.edu/~jjb/wh/book/editions/wh-sci-0.97.pdf
"Hiring Qualified Workers Continues to Be Biggest Supply Chain Challenge as Firms Struggle to E mbrace a Digital Mindset." MHI press release, March 11, 2020 https://www.mhi.org/media/news/37484

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About Bastian Solutions

We are a trusted supply chain integration partner committed to providing our clients a competitive advantage by designing and delivering world-class distribution and production solutions.

Our people are the foundation of this commitment. Our collaborative culture promotes integrity, inclusion, and innovation providing opportunities to learn, grow, and make an impact.

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