



mmh.com

MODERN MATERIALS HANDLING®

September 2020



Adam Greenberg,
president, NorthShore
Care Supply

NorthShore's new application for AMRs 14

BIG PICTURE

Modern celebrates 75 years 22

EQUIPMENT REPORT

Carts, tuggers and casters 28

INFORMATION MANAGEMENT

Pick-to-light's evolution 34

SPECIAL ISSUE

Materials Handling MRO 41



NorthShore's new application for AMRs

NorthShore Care Supply is using AMRs to automate pick-to-cart processes, while still using the cart.

BY **BOB TREBILCOCK**,
EXECUTIVE EDITOR

Few would argue that robots, especially autonomous mobile robots (AMR), are moving from an emerging technology to another tool in the materials handling tool kit. That is especially true in

the third-party logistics (3PL) industry, where *Modern* has featured AMR implementations at industry leaders like DHL, GEODIS, Rakuten Super Logistics and, in the July issue, UPS.

Those articles highlighted some of the leading AMR solution providers that are now becoming household names, including Locus Robotics, inVia Robotics and 6 River Systems. While each of those providers brings different strengths and strategies to the table, what they share in common is the problem they aim to solve: A more efficient way to do e-fulfillment in facilities handling pretty standard products in standard packaging. In that application, AMRs have evolved from the exotic to a best practice in the right environment.

So, what's next? After recent visits to the Nashua, N.H., headquarters of Waypoint Robotics, and NorthShore Care Supply's new 173,000-square-foot distribution center in Green Oak, Ill., I think the industry is moving to a new





Peter Wynn Thompson/Getty Images for Peerless Media



An AMR is ready for its next mission (top). An associate picks cartons to the cart (middle). AMRs transport carts to the next pick or to packing (bottom).



phase. This is one where a different set of AMRs will be deployed to address a different set of fulfillment issues, using unique products and unique packaging sizes. And, as the technology becomes more mainstream, it is also now in reach of small to mid-sized organizations and not just industry giants. You may not put a \$1,000,000+ multi-shuttle in a mid-sized company's DC, but you can now implement AMRs.

NorthShore Care Supply is an illustration of both those ideas. The company is the leader in the distribution of super-premium incontinence supplies and adult diapers, sold online for home delivery but also with a growing channel shipping to institutions. Either way, orders are stored at the case level rather than the unit level and mostly picked in cases, with a small percentage of item-level picks.

Given the products handled, the cases are large and bulky. And, given the urgent need for the supplies, NorthShore Care Supply's policy is to ship the same day orders are received. Fulfillment speed is critical to make parcel carrier cutoff times. Before building the new facility, associates picked cases to three-tier carts they pushed through the old warehouse. The work was slow and demanding.

"The carts were heavy and the process wasn't scalable to keep up with our growth," recalls Adam Greenberg, the president, owner and founder of the company. The new facility was designed for growth but also to address the shortcomings of the old facility. But instead of replacing carts, NorthShore Care Supply found a way to automate the process and move payloads of up to 700 pounds rela-

tively quickly through the DC.

The ultimate design from NorthShore Care Supply's solution provider (Numina Group, numinagroup.com) features AMRs (Waypoint Robotics, waypointrobotics.com) capable of moving very large carts that can carry up to a 700-pound payload while keeping order selectors in designated pick areas like the more conventional AMRs we're familiar with. A fleet of six AMRs can process approximately 3,500 orders a day. Dan Hanrahan, president of Numina Group, estimates that using a more conventional AMR solution would have required a fleet of 30 robots.

The design also incorporates floor-level pallet flow rack in the pick zones. That allows for the storage of multiple pallets of the fastest-moving SKUs that can be easily accessed by order selectors and easily replenished from the rear as needed.

The solution is delivering on Greenberg's goals for the facility, which were to design for growth, reduce the need for labor, and reduce the number of touches of the product. That's become more important during the Covid-19 pandemic, given the intimate nature of the products handled.

"We wanted to be leading edge, not bleeding edge," Greenberg says of the decision to implement the robots. "We don't want to be the first use case for a technology, but we do very well with companies that have a leading technology looking for another site to Beta test and further validate their technologies."

A better product

Incontinence afflicts millions of adults and children. If that wasn't the case, grocery and drug stores wouldn't devote entire aisles to the category. Anyone with elderly family members and friends undoubtedly knows someone in need of



AMRs pick up the next empty cart in the packing area (top). The pick module features floor-level pallet flow rack for fast-moving products (bottom).

adult diapers, whether for a night-time issue or one that affects them around the clock. At the same time, it's a condition that most of us prefer not to talk about, which means that for many, essential supplies are an embarrassing purchase many prefer to avoid. At least in a store.

That realization led Greenberg to found NorthShore Care Supply in 2002. At the time, he was working on his MBA

at nights and on the weekends at the University of Chicago and looking into a startup venture. He learned about the need for and embarrassment around incontinence products from two family members. "One was reluctant to buy products at the grocery store and another was always running out of supplies," he recalls. "It seemed that for reasons of convenience and privacy that home



Cartons ready for delivery are loaded onto an outbound trailer.

delivery of incontinence supplies made a lot of sense.” From that spark, the Internet-based business was launched.

Almost immediately, the business began to evolve from selling the same quality product you might find in the grocery aisle to a higher quality product with better sizing and better performance that you can’t find in your neighborhood store. “As soon as we turned the website on, we got comments from customers telling us the reasons that a product like Depends didn’t work for them,” Greenberg recalls. “We began to scour the world for higher quality products.” He also learned early on that a caring and knowledgeable customer service department was key.

“Customers call us because what they’re using isn’t working, and they don’t know what will work,” Greenberg says. “They’re frustrated, and we’re patient.”

The third revelation that shaped the direction of the company was that customers tended to order only undergarments on their first order, and not complimentary products like wipes and mattress pads. To build demand for

those other products, NorthShore Care Supply launched a sample program. “Almost from the start, we threw samples in with orders and a Post-it note,” Greenberg recalls. “Customers liked having something in front of them that they could see and use.”

Since then, they have refined the process, with a questionnaire that customers can fill out and that is then evaluated by an algorithm that recommends sample products. The company sends out 100 to 200 sample orders every day in addition to adding free samples to most paid orders.

The company has also launched a subscription service to automate the re-ordering of what are essential products. Today, the average order is about three picks with a \$100 value. That might consist of a large carton of diapers and a smaller box with two to four trial sample items to try.

From a distribution standpoint, the company worked closely with FedEx to develop services that could compete with Amazon. A first step was putting in place processes so orders could be picked and

shipped the same day they were ordered; that was followed by weekend pickups and then seven-day-a-week deliveries. Instead of positioning inventory in multiple facilities around the country, “one central U.S. distribution center is viable for us.” The subscription model creates more predictable demand and reduces the number of rush orders.

Over time, the company outgrew four facilities before the new DC went live in March 2020. The immediate predecessor was an 86,000-square-foot facility located about 10 miles away. It featured the shipping conveyor and print-and-apply line being used in the new facility, but no system-directed processes—no voice or bar code scanning, and no pallet flow rack. And, no robots, of course.

Order selectors picked to a smaller cart than is being used in the new facility, and picking was often in conflict with replenishment in the same aisle, which meant disrupting one to complete the other. With sales growing by 30% a year and a lease set to expire in the former facility, Greenberg realized it was time to “move into a facility with an infrastructure that can scale up to handle many times our current sales volume as our brand awareness increases.”

In 2019, Greenberg met with the Numina Group at ProMat. Together, they toured the show, looked at the available technologies and began the process of designing a new facility.

A new design

Design got underway following that meeting at ProMat. Greenberg knew he wanted a solution that could scale to meet the company’s anticipated growth over the next 7 to 10 years—currently, about 40,000 square feet is available to sublet. He also wanted a solution that would allow him to manage current order volumes on one shift; that would

allow adding a second shift at a later date without expanding the facility.

Last, he knew then that reducing touch points was important: In 2018, during the design stage, that was more related to the availability of warehouse labor in Chicagoland, but now, during Covid-19, reducing the number of times an essential medical supply is touched is an unexpected benefit.

While at ProMat, Greenberg had looked at numerous alternatives to manual push carts, including tuggers, automatic guided vehicles (AGVs) and AMRs. While he didn't know what was the right technology, Greenberg knew that the new facility needed automation in order to scale, and it needed to be flexible.

"We wanted the flexibility of a system that could pick up and drop off a heavy cart without an operator having to be involved," Greenberg says. And, as noted earlier, he was willing to implement a leading-edge technology, but not a bleeding edge solution.

The design study lasted between 6 and 9 months. The task was to present multiple, alternative designs. The first design used a multi-level pick module. That design was rejected. The second design was conventional, using pick-to-cart optimized through a better layout and voice technology and bar code scanning. Greenberg felt that was too much like the facility he was trying to move away from.

Conventional AMRs were ruled out because they would either require too large a fleet moving a few cartons at a time—one estimate was up to 30 robots.

"We knew we were going to use a cart," recalls Numina Group's Hanrahan, "and it would have to hold at least 500 pounds, and we spec'd it at 700 pounds. That meant we were looking at vehicles that could move pallet loads."

AGVs could handle the anticipated payloads but they were ruled out as too



Pallets are stored in the reserve storage area.

hard to add extra AGVs in the future as the business grew.

Still on the search for a solution, Hanrahan came across Waypoint Robotics on the second or third page of a Google search. Following a telephone call with the company's founder and a trip to New Hampshire to see the robots in action in the company's tech center, they felt they had a solution ready to move forward.

Hanrahan was particularly impressed by the depth of functionality in Waypoint Robotics' software and the experience of the engineering team. "They had at least five people who had worked on two other robots before this one," he recalls.

One of the first steps was to design a large cart on wheels that could be picked up by the robot and transported to a pick location or a pack station. NorthShore wanted the biggest cart it could get, Waypoint wanted the smallest and Numina balanced the two. Because the carts are on wheels, the facility can

revert to system-directed manual picking if the automated system goes down.

The next step was designing processes that minimized the required labor at current volumes. Based on initial modeling, the design team anticipated six order selectors in the pick zones. Greenberg wanted to minimize the amount of labor—with the current design and software, the facility operates with four order selectors for a few hours on peak days, but the usual requirement is two order selectors.

Another key to the design was maximizing storage space, not just in the reserve storage area but in the pick modules. Most e-commerce companies have a small representation of a large number of SKUs. NorthShore is the opposite of that, with a high representation of just 400 SKUs.

To maintain enough inventory in the pick zone of the fastest-moving SKUs, pallet flow rack was installed on the floor. That allows NorthShore to index multiple pallets of those SKUs.

Once order fulfillment gets underway, the warehouse management system (WMS) drops a group of orders, including the weight and cube of the cartons. Priority orders are also flagged. With that information, Numina Group's warehouse control system batches the order to generate the highest pick density in a zone with least amount of travel for the robots and order selectors. Multiple robots are dispatched at a time.

When a robot is in route to its first pick location, an order selector is also dispatched to the location by the voice system—another new innovation for the company. Picks are confirmed by a ring scanner. The order selector follows the robot as it moves to subsequent pick locations until all of the picks in that selector's zone are complete.

Meanwhile, the next robot for that zone is queued at a pick location. Greenberg says his fastest selector can do 300 picks per hour, but the typical rate is 175 picks per hour. Just the addition of voice and bar code scanning improved the accuracy of picks and led to a significant improvement in speed.

According to Greenberg, temporary workers were concerned about the impact of automation on their jobs, but given the number of distribution centers in his area, temp workers are nomadic. "Our long-term staff knows our company values are to go above and beyond in everything we do," he says. They were eager to be part of the process, and they continue to give us ideas to improve our processes."

With nearly five months of operational experience at the time I visited the facility, Greenberg says the company is relying less on temporary labor as well as some attrition from associates who chose not to make the move to the new location. Still, the boxes moved per labor hour has greatly improved and the

number of returns due to picking errors has been reduced.

Perhaps the biggest benefit has been the control of fulfilling all orders out of one central facility rather than rely on 3PLs to ship to some parts of the country. "We have control over all of our sales

channels, including Amazon Prime," he says, noting that they are an Amazon-certified Prime warehouse. "We can ship our Amazon Prime orders directly from here, and bypass Amazon's warehouses," he says. "I'm not aware of any of our competitors who can do that."

Optimizing processes with AMRs and carts

Autonomous mobile robots bring a new level of productivity to the handling of bulky cartons.

NorthShore's unique order and product profiles required an equally unique solution. In this case, autonomous mobile robots (AMRs) transport carts large enough to handle full carton picks.

Receiving: About half of incoming product is received on pallets (1) from U.S. manufacturers. The other half is floor loaded in containers (2) shipped from Europe and Asia. At receiving, palletized product is unloaded by lift trucks. Cartons are manually unloaded onto telescoping conveyor and palletized in the receiving area. In both instances, the warehouse management system (WMS) generates license plate bar code labels for directed putaway.

Putaway: Most newly received product will be stored in double deep pallet rack in the reserve storage area (3). Lift truck operators on standup reach trucks are system directed to a storage location. The pallet location and pallet are scanned to confirm putaway.

Replenishment: NorthShore Care Supply's pick module features floor-mounted pallet flow rack (4), especially for fast-moving A and B items (5), as well as some shelving and case flow rack in the sample storage area (6). As

order selectors fulfill orders they also create a list of items that need to be replenished. When an associate notifies the warehouse management system (WMS) that they are available for a replenishment task, the system directs them to a retrieval location and then to a putaway location.

Picking: Orders are dropped from the warehouse management system to the warehouse control system, which creates tasks for the autonomous mobile robots. The WCS groups orders by travel time and pick density and dispatches the robots. An available robot picks up a cart and travels toward its first pick location; at the same time, the voice

NorthShore Care Supply Green Oak, Ill.

SIZE: 173,000 square feet

THROUGHPUT: 2,500 orders per day at peak; 7,500 cartons per week

PRODUCTS HANDLED: Incontinence supplies and adult diapers

SKUs: 400

SHIFTS PER DAY/DAYS PER WEEK:

1 shift, 6 days a week—varies by season and promotion

system directs the nearest available order selector to the pick location. The order selector picks a carton to one of the pick locations and validates the pick with a ring scanner. Once all of the picks in an area are complete, the robot indexes to the next location. On light days, the order selector may walk with the robot. On busy days, order selectors will remain in their area.

Free samples are central to NorthShore Care Supply's marketing program. Once the picks from the pick modules are complete, the robot travels to an area where sample products are stored to complete the orders on the cart.

Pack and ship: The packing area (7) is located near the shipping dock (8), which is serviced by motor-driven roller conveyor and extendable conveyor, which

reaches into outbound parcel trailers. The area also features an overhead trash conveyor. Once all of the picks for a group of orders is complete, the WCS looks at which pack stations only have one cart and directs the robot to that location. The idea is to balance the workload at the pack stations. The WMS uses cartonization to execute the packing process. Labels are printed and applied to the cartons, which are then pushed onto the takeaway conveyor (9). The cartons pass through a scan and weigh station. Cartons that are out of tolerance are diverted to an inspection station and then to an automatic print-and-apply station. Cartons that pass the weight and scan audit are conveyed to shipping and diverted to the right dock door based on the parcel carrier. ■

System suppliers

SYSTEM DESIGN & INTEGRATION, VOICE RECOGNITION, WAREHOUSE CONTROL SYSTEM, AND PRINT & APPLY: The Numina Group

ROBOTICS: Waypoint Robotics

MOTOR DRIVEN ROLLER CONVEYOR: TGW

EXTENDABLE CONVEYOR: Caljan

WMS: NorthShore Care Supply

ERP: Syspro supported by BT Partners

MOBILE COMPUTING & BAR CODE SCANNING: Zebra Technologies

PALLET RACK: Ridg-U-Rak

PALLET FLOW AND CARTON FLOW RACK: Mallard Manufacturing

SHELVING: Western Pacific Storage Solutions

LIFT TRUCKS: Toyota Material Handling

