Robotics247

SPECIAL FOCUS ISSUE
JULY 2023

Tools to Manage Robot Fleets

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CONTENTS

EDITOR'S NOTE

More mobile robots are generally better for warehouses, factories, and distribution centers, but only if they're well managed. Fortunately, the software stack for such automation has evolved to keep up with deployments of rapidly growing scale and complexity.

There are plenty of terms, technologies, and techniques for addressing each facility's needs. Most of the experts *Robotics 24/7* has spoken with say you should understand your pain points well before adding any automation or software.

Each robot vendor has its own navigation and data-collection software, and third-party providers offer software and AI for robot operations. Should the warehouse management system (WMS) assign tasks? Where does inventory data go? And how can people on the floor be involved in optimizing operations alongside robots?

This Special Focus Issue examines the latest tools, vendor partnerships and ecosystems, and standards efforts. Interoperability among automated guided vehicles (AGVs), autonomous mobile robots (AMRs), self-driving forklifts, and other equipment is also becoming more important.

The experts we spoke with agreed on another key point: Whether you're new to mobile robots or are growing your fleet in one facility or many, the best time to speak with suppliers and integrators is now, and the best time to invest in robotics is before the global economy heats up again.

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As Mobile Robot Market Matures, Vendors Continue to Improve Fleet Capabilities

Mobile robots continue to be among the most popular automation in warehouses and factories. What advances have been made in fleet management technologies?

BY CESAREO CONTRERAS

Mobile robots are often used to transport goods in a facility. Source: Getty Images

Florian Pestoni, CEO of InOrbit Inc., said he has noticed a change in the past year. Large users of autonomous mobile robots, or AMRs, are increasingly mandating that their systems must be interoperable with other robots.

Warehouses often have challenges integrating robots into their warehouse management systems (WMS), and it doesn't help that each robot vendor has its own software package. The dream of interoperability is that it will streamline the setup and monitoring process for customers.

"I think all of a sudden, everyone is highly incentivized to figure out how to make their robot play nice with other systems," said Pestoni. "I think that's a positive trend. To me, it showcases that the industry is maturing."

The market has grown in the past five years, and customers no longer see AMRs as novelties, he added. With a vast array of options to choose from, it's increasingly likely that customers might have a range of robots from different vendors in their facilities.

"The differentiation is no longer this idea that you have a robot that doesn't bump into the wall, because now there's thousands of companies that offer that," Pestoni said. "Now, it's moving to the software; it's moving to the efficiency. Companies offer different price points, different tradeoffs."

InOrbit provides a robot operations platform that allows customers to monitor and task robots in their facilities. It can connect to a multitude of systems, including Industrial Internet of Things (IIoT) devices. The company said its main goal is to provide users with a system

that provides "end-to-end robot orchestration."

Mountain View, Calif.-based InOrbit has two customer bases—robotics vendors and end users. Its clients work in facilities ranging from warehouses and manufacturing facilities to hospitals and hotels.

The company has been actively involved in promoting interoperability. It has demonstrated its software working with a range of standards, including the MassRobotics AMR Interoperability Standard and VDA 5050.

Pestoni noted that InOrbit supports these standards efforts because they are addressing one of the key issues that customers face when they have multiple robotic systems – fragmentation.

Warehouses can't expand automation without orchestration

While demand for robotics is growing rapidly in the warehouse space, both robot makers and warehouse customers have had challenges scaling up. One report estimated that more than 80% of warehouses globally do not have any automation.

Lijun Zhu, CEO of CoEvolution, said a major reason why warehouse operators don't move beyond piloting automation in their facilities is because they can't get multiple robots to work together. Everything remains separated and siloed.

"It's a chicken-and-an-egg problem," he said. "There is no good integrated solution, so people don't expand their automation. When you want to expand, you need an open software system."

Zhu is trying to address the problem head-on at CoEvolution. The Hangzhou, China-based company makes orchestration software designed to help customers task mobile robots from multiple vendors. The company made its North American debut at ProMat earlier this year.

CoEvolution has two main offerings: the R-Star Flexible Smart Factory Solution and the CO-PICK Smart Warehouse Solution.

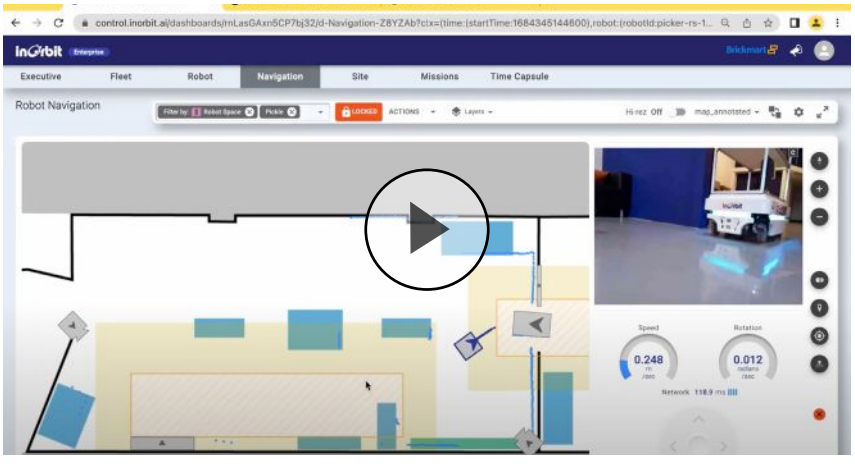
R-Star is designed to help customers more easily integrate automation into their facilities. It allows for the control of different types of mobile robots under one platform, claimed the company. R-Star is compatible with multiple WMS and manufacturing systems.

"It handles the path planning and traffic control of a large fleet of mobiles robots, and its powerful optimization engine continuously optimizes the overall workflow in real-time," CoEvolution wrote on its website. "It streamlines the process of building a flexible smart factory solution, and significantly increases the system efficiency and space utilization."

The CO-PICK Smart Warehouse Solution is intended to help customers increase throughputs at their facility. The system can take advantage of two types of mobile robots for picking tasks. CoEvolution said businesses that have implemented its system have seen throughputs and storage space increase by more than 50%.

Zhu said he is encouraged by all the work going into creating new AMR interoperability standards. CoEvolution noted that its technology complies with VDA 5050.

As of late, it seems as though companies have been placing too much of a focus on hardware advancements and have not paid enough attention to creating strong ecosystems enabled by smart software platforms, Zhu argued. But the standards efforts demonstrate that there is "a strong market demand" for orchestration, he said.



Zhu said he has seen interest grow since he co-founded CoEvolution four years ago. The company recently announced that more than 50 locations around the world are using its orchestration software.

"What's really exciting is we see a lot of customers specifically demand this," Zhu said. "That's really encouraging because when we started a few years ago, it was not well-received."

Wireless charging enables new robot workflows

As the mobile robot market continues to mature, and standardization efforts formalize, companies have sprung up to help address some of the secondary pain points that come with AMR deployment and maintenance. For example, there are several companies working to make charging robots easier. WiBotic is one of them.

The Seattle-based company makes wireless charging products that allow mobile robots to get powered up more efficiently. Each system includes four parts – the transmitter circuit, the transmitter antenna, the onboard charger circuit, and the receiver antenna.

The process starts with the AC- or DC-powered transmitter, which generates a high-frequency wireless charging signal. That signal is picked up by the onboard charger circuit, which can be retrofitted onto any AMR, using the receiver antenna.

WiBotic's system then converts that signal back into a usable voltage. Customers control the process using WiBotic's Control Panel, a web interface that allows users to monitor the charging cycle of each AMR.

"It also lets users modify and customize charging parameters such as voltage and current for each robot if desired," the company stated on its website.

That granularity allows customers to have more flexibility in managing their fleets and a greater understanding of how much energy they are consuming, noted WiBotic CEO Ben Waters in an interview with *Robotics 24/7*.

Oftentimes, customers tend to not understand the value of having a smart charging infrastructure system until they run into an issue, he said. It's not until a robot fails to connect to a charger or dies mid-mission that users really see the need, and that's a problem, he explained.

"The charging infrastructure needs to be as smart as the robots themselves," Waters said. "Otherwise, companies might think initially they won't have issues, but I guarantee they will."

The company has made it a goal to work well with other systems. It offers up its APIs to allow robot makers and others to integrate WiBotic's data into their own systems. It works with InOrbit, for example.

Another company working in wireless charging is CaPow. The Beersheba, Israel-based company's Genesis platform takes advantage of pads and lightweight receiver stickers.

The pads are placed throughout a mobile robot's path to ensure they are continuously being charged up while on the go. The lightweight receivers are placed on the bottom of each AMR to allow them to pick up the pad's voltage.

CaPow CEO Mor Peretz said the system helps customers reduce downtimes and bottlenecks. That enables customers to invest in robots at a larger scale without having to worry about charging constraints.

In addition, users don't have to invest in as many robots to compensate for those that are charging, Peretz said.

Cloud-based software provides quick updates

Companies are also investing in building out their cloud-based solutions. San Diego-based Brain Corp works with hardware vendors to make their machines autonomous, and it provides web-based services.

"Our business model is a little different in that we don't actually do the manufacturing of robots," John Gill, Brain Corp's director of cloud operations, told *Robotics 24/7*. "We provide an autonomy kit with sensors and controllers."

The San Diego company's flagship product is its Brain OS platform. Through that operating system, customers can manage their fleets, report issues, and more.

"We really try and take over and provide with a SaaS [software-as-a-service] solution around robotics," he said. "We've built out a very rich toolset in terms of how we share data with customers."

The company focuses on three applications for mobile robots – moving materials, collecting data with sensors, and cleaning spaces. Its customers work in retail, healthcare, transportation, malls, warehouses, schools, and commercial offices.

Gill works with Brain Corp's applications team to ensure that it has the cloud connectivity to complete new tasks.

"The robot is not being driven directly from the cloud, but we have all these analytics that say stuff like, 'Hey, the robot is getting stuck here a lot. Let's go in and edit the route,'" he said.

Brain Corp shares information with customers in several ways, Gill explained. One method is through a mobile app, which allows robots to see where their robots are in a facility and manage them while on the go.

Customers can also access information through the company's web application, which provides even more data on the state of their robots. In addition, Brain Corp sends out regular email reports to customers with statistics and other important data about their fleets.

For customers with fleets of robots at multiple locations, customers can use Brain Corp's portal application which gives a broader view of the robot fleets.

Looking ahead, Gill said he is excited about advancements being made in the company's autonomy kit. He noted that the next generation will be "a complete top-down redesign" and feature the latest sensors, controllers, and more.

Brain Corp plans to move from an x86-based architecture to an ARM-based one, Gill added.

In terms of features, he hinted that the company is looking to task mobile robots to be able to tie multiple missions together and have a greater understanding of their own operational status. Right now, the software mostly works by instructing the robot to complete just one mission at a time.

The company has thousands of fleets actively being used by customers, Gill said. Those fleets are providing essential data to help Brain Corp improve its products and services. The 14-year-old company has also spent years establishing strong relationships with customers and partners to understand their needs and pain points.

The company believes its maturity in space gives it an advantage over its competitors. "We've really learned how to efficiently operationalize and manage that scale of fleets," Gill added. •

Cesareo Contreras *is associate editor at* Robotics 24/7.

Fleet Management Tools Become Increasingly Important, Useful for Robotics Users

Fleet management tools from a variety of vendors promise to make operations, monitoring, and maintenance easier.

BY JIM ROMEO

Fleets of robots are growing in capacity and functionality, and so is the need to manage them, whether through software or robotics-as-a-service, or RaaS, models.

Organizations are searching for best practices and tools to operate, manage, and maintain their robot fleets. These considerations apply to almost any system promising greater efficiency, from automated guided vehicles (AGVs) and autonomous mobile robots (AMRs) to semi-autonomous and self-driving lift trucks.

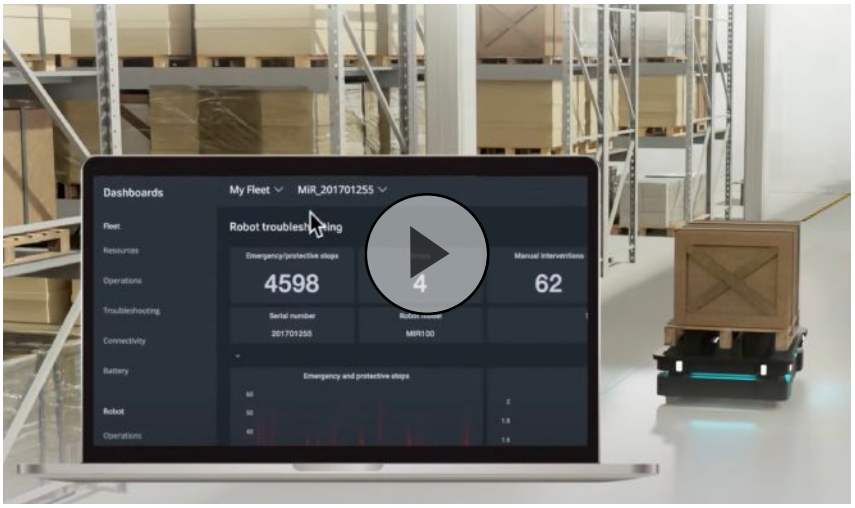
The industrial robotics market was worth abut $41.7 billion just two years ago, according to Zion Market Research. It could grow to about $81.4 billion—about $250 per person in the U.S.—by 2028 and grow almost 12% year over the next few years, predicted the research firm.

Similarly, SPER Market Research forecast that the global market for robot fleet management software will experience a compound annual growth rate (CAGR) of 34.02% between 2023 and 2032.

NVIDIA Isaac ROS offers developers tools for robot fleet management. Source: NVIDIA

Fleet management tools tackle complexity

As robot fleets grow, developers are offering platforms built on top of operating systems, and they can be complex. Such tools can assist operations managers by providing useful information to drive everyday decisions about robot positioning, history, programming, and task assignments.



In many large facilities such as warehouses and distribution centers, AMRs are dispersed assets. Robot deployments can certainly help overall efficiency, but analyzing and sharing data about their status and operations may involve custom algorithms.

Let's look at some of these tools and explore just how they might be used.

NVIDIA Isaac ROS takes robots to the edge

In October 2022, NVIDIA Corp. released Isaac ROS Developer Preview (DP) 2, which uses the open-source Robot Operating System (ROS 2) to enhance robot capabilities with advanced cloud and edge software.

The company said its updated software included innovations and features for robustness, including an array of task management tools for AMR fleets. ROS 2 developers can use it to develop additional capabilities for their unique applications, it said.

Specifically, NVIDIA's Isaac ROS includes individual packages called GEMs (Generalized Machine Learning Systems) and comprehensive pipelines known as NITROS (NVIDIA Isaac Toolkit for Robot Operating Systems). They are designed to unlock hardware-accelerated performance.

In April, NVIDIA announced Isaac ROS DP 3. It includes a new automatic map localizer, updated NvBlox with human detection, a benchmarking tool for ROS 2 graphs, and open-source NITROS packages. It supports the NVIDIA Jetson Orin Nano and Jetson Orin NX platforms, as well as the NVIDIA Jetson Orin Nano Developer Kit.

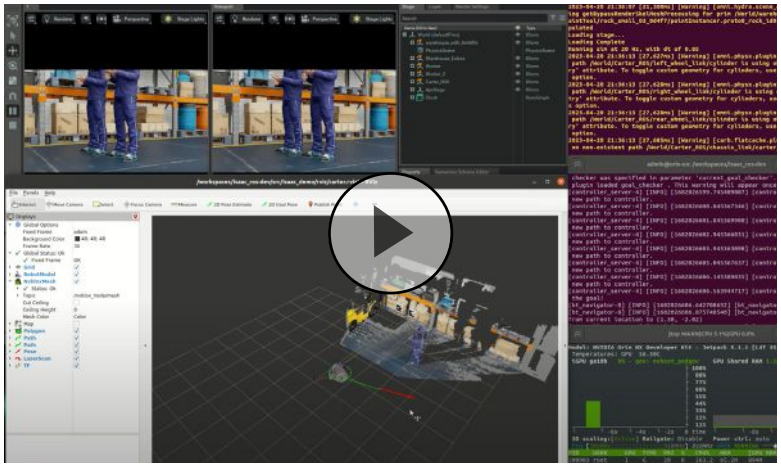
MiR optimizes fleets in the cloud

In another example, Mobile Industrial Robots ApS (MiR) in March introduced MiR Insights, a new cloud-based platform for optimizing the performance of mobile robot fleets. The software is intended to allow fleet owners to track and analyze the operations of their robots, providing actionable insights to drive performance improvements and increased uptime.

MiR Insights reads data from the MiR Fleet software, but it does not interfere with fleet operations, individual robot control, or fleet settings, noted the Danish AMR provider. Data is stored securely in the cloud, it added.

Fleet operators can use MiR Insights to make informed decisions. They can assess overall mission effectiveness, identify recurring challenges in production areas, and evaluate the effects of recent changes on robot throughput.

In addition, the software offers streamlined access to technical data, enabling faster and more efficient troubleshooting, said Mobile Industrial Robots. Some of the tool's key features include data



dashboards and heat maps.

Data dashboards: These convey key performance indicators (KPIs) such distance driven, completed missions, and robot utilization rate through intuitive dashboards.

Heat maps: This feature enables users to visualize robot activity over time and different physical locations. They can identify areas with poor Wi-Fi coverage and potential traffic bottlenecks.

MiR Fleet is hosted on Microsoft Azure, ensuring robust data storage and security, claimed Mobile Industrial Robots. MiR Insights offers flexible data-visualization options and an API for the integration of raw data into external systems, it said.

Furthermore, MiR Insights is designed for continuous evolution based on customer experience and is focused on continually improving AMR fleet operations, according to the company.

FORVIA uses robots, software to optimize operations

In one real-world example of how fleet management software is being used, Tier 1 automotive supplier FORVIA installed 14 AMRs from Mobile Industrial Robots at its Fauercia Clean Mobility plant in Písek, Czech Republic. The company said it realized a return on invesment (ROI) from the fleet in less than two years.

Before FORVIA initiated the project, shop-floor logistics relied mostly on manual processes, forklifts, and stacking equipment. In fact, the risk of human injuries was quite high, so the company decided to automate its heaviest and most dangerous processes to increase safety and productivity.

FORVIA used MiR Fleet to organize its missions, optimizing the logistics flow to and among production lines, all while communicating with doors, gates, and a strapping machine. The operation is fully automatic, and the company said it hopes to integrate MiR Fleet with its enterprise resource planning (ERP) system.

Seven of FORVIA's heavy-duty robots, mainly MiR600s, bring empty pallets to the assembly lines and pick up full pallets of finished goods to the logistics area. MiR250 AMRs operate in a second area moving components from the warehouse to assembly lines. The robots in the plant work 24 hours a day, seven days a week, covering all three operation shifts.

As robotic fleets become larger and more complex, operators are seeking more effective tools, such as cloud-based software, to manage all facets of fleet management and operations. •

Jim Romeo *is a freelance writer and contributor to* Robotics 24/7 *based in Chesapeake, Va.*

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WMS, WCS, WES: A Quick Guide to Systems for Managing Warehousing Operations

Warehouse management control software can work with automation to improve efficiency and throughput, but which one to use depends on your needs.

BY WILL SCHNEIDER, INSIGHTQUOTE

In today's fast-paced market, businesses want to improve their warehouse operations to meet customer demands and remain competitive. A warehouse management system, or WMS, is just one of a number of ways to take on automation and optimization.

The exponential advancement in robotics has revolutionized the way we store and transport goods, transforming the sprawling warehouses of today into hubs of high-tech innovation. In 2021, Amazon had around 350,000 automated mobile drive units in its warehouses.

Over the coming years, most warehouses will have high levels of automation. It is already a significant market, representing over $10 billion in annual global spending, bound to grow to $51 billion by 2030, according to Acumen Research & Consulting. The message is clear: Don't get left behind, so use automation to improve your warehouse operations.

Warehouse managers increasingly rely on automation to respond to the growing demand for prompt and precise order fulfillment. They commonly emply three types of software:

Korber is a leading provider of warehouse control systems, as well as robotics and automation. Source: Korber

- **WMS** Warehouse management systems
- **WCS** Warehouse control systems
- **WES** Warehouse execution systems

Each of these systems serves a specific niche in automating operations, and choosing the right one can make all the difference in achieving cost-effectiveness, efficiency, and accuracy.

Let's explore the differences between WMS, WCS, and WES to help you address your warehousing needs.

Warehouse management systems

Warehouse managers use warehouse management systems to manage the flow of goods and packages throughout a facility and to take care of inbound and outbound processes. A WMS can assign tasks to workers and help optimize a warehouse's layout to maximize the use of the storage space.

A WMS can track inventory levels and the movement of items in real time, identifying areas of the distribution center or warehouse that are underutilized or overcrowded. It can then suggest changes to the layout and recommend placement of inventory items in new locations.

Enterprises can use a WMS to automate and streamline their end-to-end operations, from receiving to the final shipping of the goods out of the warehouse.

Tecsys' Elite WMS is an example of a WMS that is designed to eliminate inefficiencies, improve order accuracy, and reduce operating costs while attaining high service levels for inventory management.

Alternatively, Consafe Logistics's AstroWMS is intended to optimize all manual and automated warehouse processes.

Although WMSes mainly manage inventory movement and storage, note that they can work with robotics to further improve warehouse productivity:

- **Automated storage and retrieval systems (ASRS):** When integrated with a WMS, they can optimize the placement and retrieval of goods.
- **Autonomous mobile robots (AMRs):** A WMS can direct AMRs to specific locations based on real-time data.
- **Robotic pick-and-place systems:** Based on the order and inventory data from the WMS, such robots can help with picking items.

If automation is required, then additional software may have to be integrated with the WMS. For example, managers use a combination of WMS and WCS to direct robots to pick products from shelves and deliver them to the packaging area.

Warehouse control systems

A warehouse control system is designed to control all types of automated equipment within a facility, such as conveyors, pickers, and sortation systems. It manages them at reception, sortation, and transport.

A WMS can provide managers information about where the goods are to be delivered, and the WCS simply executes those directions using automation.

The WCS can also optimize the use of this equipment. For example, it may automatically adjust the speed and routing of conveyor systems to optimize the flow of products through the warehouse. It can also move products based on their importance, ensuring that high-priority orders are processed first.

By optimizing the use of material handling equipment, a WCS can increase efficiency, reduce operational costs, and improve the overall performance of the warehouse. Let's take a look at some examples.

The first example is Körber, whose WCS allows customers to manage and optimize material flow using their entire portfolio of material handling equipment (MHE), rather than individually controlling automation devices. Körber's WCS is vendor-agnostic, and the German company said it creates a single point of data and communication, as well as provides centralized control and management. It can control all types of conveyor technology, shuttle systems, and ASRS, said Körber.

The second example is Savoye, a French automation company that offers a WCS to manage and supervise all scheduling, synchronization, and routing operations in the warehouse. Savoye's X-PTS Pick Station offers different modes for different activities — such as picking inventory.

The final example is Zebra Technologies' Fetch Robotics

unit, which provides the FetchCore cloud-based WCS software that it said provides complete control of warehouse automation. The software can control a variety of robots, such as Freight1500 robots, which Zebra claimed is a workhorse that can safely transport large and heavy payloads autonomously throughout the warehouse.

Warehouse execution systems

Warehouse execution systems can combine the functionality of a WMS and a WCS. They can coordinate all aspects of warehouse operations, including inventory management, order fulfillment, and the movement of automated vehicles and materials.

WESes promise to optimize the flow of goods through a warehouse, increase productivity, and reduce errors. WES can manage the movement of inventory, from the moment it enters a facility until it is shipped out.

By integrating a WES with robots and automation, warehouse managers can manage resources in real time to get inventory out the door automatically and meet accelerating consumer expectations. In addition, you can link a WES with an old WMS to further optimize operations.

For instance, inVia Robotics offers sophisticated software and a variety of advanced robots. A fleet of inVia Picker AMRs operated by inVia Logic WES can automate picking and autonomously and precisely fulfill orders.

In another case, Dematic offers software that it said dynamically manages inventory, labor, and material handling automation in real time. Its WES manages AMRs, which collaborate with warehouse personnel during the picking, retrieving, replenishment, or transferring of bulk stock.

Also, Honeywell's Momentum WES utilizes advanced machine learning algorithms and data-driven optimization techniques to solve warehouse automation. The Honeywell Robotics subsidiary offers AMRs from OTTO Motors with Momentum.

How do warehouse systems work with robots?

Here are some specific examples of how warehouse management control (WMC) and other software can work with robotics:

A WMC system can instruct an ASRS to store and retrieve items within a warehouse. For example, when a customer places an order, the WMC can direct an ASRS to retrieve and transport items to a picking station.

A WCS can communicate with conveyor systems on which items require transportation and their intended destinations. For example, if an item needs to be moved from one end of the warehouse to another, the WCS can instruct the conveyor system to transport it.

WESes will work with AMRs such as Locus Origin, which assist with tasks such as picking and packing items. For example, when an order is placed, a WES would direct an AMR to retrieve the needed items from storage and bring them to a packing station.

Robotic arms integrated with WMCs can pick and pack items. When an order comes in, a WMC, WCS, or WES can tell

the robotic arm to pick a particular item from a bin and place it into a shipping box.

Warehouse software can also work with drones such as those from Verity for inventory management.

Consider the right options

Choosing between a WMS, a WCS, and a WES can be a difficult because the numerous suppliers of these systems offer different functionalities, which often overlap.

When evaluating which system would be best for your warehouse operations, consider these factors:

If your warehouse is small and has mainly manual processes, then a single system such as a WMS may be sufficient for inventory management, order processing, and labor management.

If you have a lot of automated equipment in your warehouse, then a WCS may be necessary to manage and control all of it.

If you have a large warehouse with complex operations, you may need more than one system, such as a combination of a WMS and a WCS.

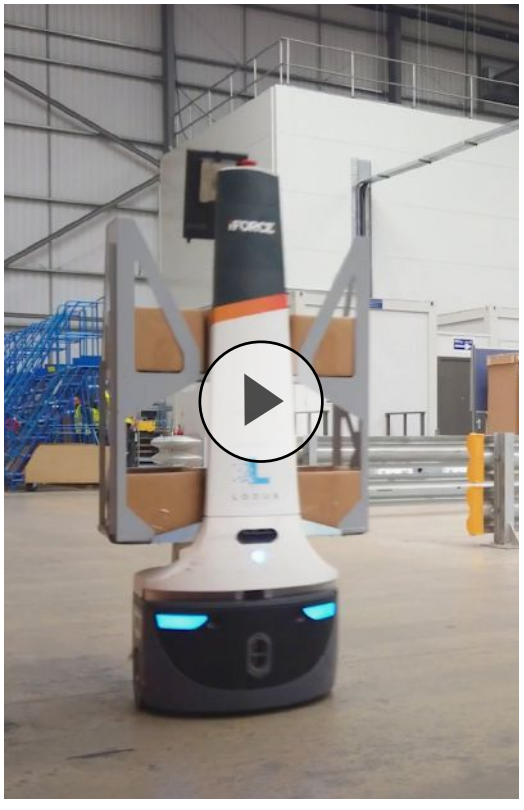
If you also need inventory management for a large automated warehouse, a WES may be necessary. It can provide real-time inventory data and manage automated operations. In addition, robots such as Amazon's Sparrow are great fit for a large warehouse. They can automate the product fulfillment process by moving individual items before they get packaged, and they can handle millions of packages daily.

If you do not want to manage a warehouse yourself, consider outsourcing to companies that offer third-party warehousing facilities.

Evaluate your warehouse's requirements and processe before selecting warehouse software. You should also understand how each system can help to optimize operations and improve overall performance.

A trusted vendor or consultant can help you make an informed decision as you assess your specific needs, goals, budget, and constraints and compare them with the functionality provided by each system. •

Will Schneider *is the founder of InsightQuote, a match-making service for business-to-business services, and writes informative posts about fulfillment services at Warehousing And Fulfillment.*



Rocrich AGV Solutions Joint Venture of Mitsubishi Logisnext and Jungheinrich to Expand in North America

Rocrich to offer automated guided vehicles for major customer use cases and strengthen customer and partner support.

BY ROBOTICS 24/7 STAFF

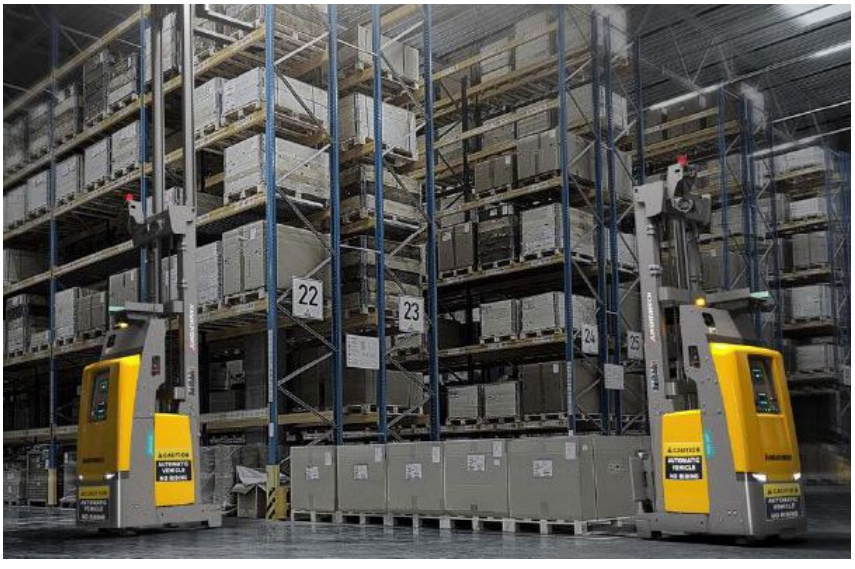
The North American market for materials handling automation is still growing, prompting more supplier partnships. Jungheinrich AG and Mitsubishi Logisnext Americas Inc. recently announced their plans to launch Rocrich AGV Solutions. The joint venture will build on their existing partnership and offer mobile systems for factories and warehouses in North America.

Jungheinrich and Logisnext will hold equal shares in the company, which will be headquartered in Houston with additional operations in Marengo, Ill.

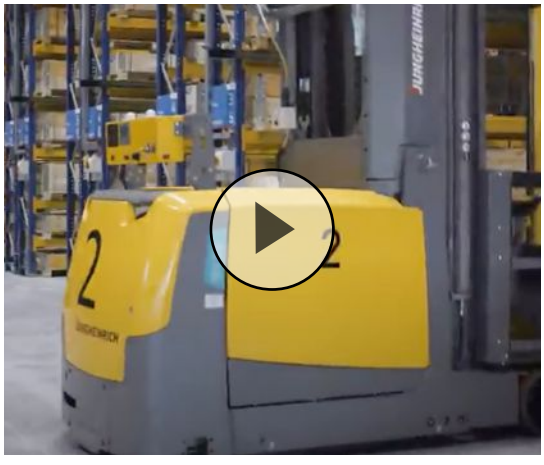
Logisnext and Jungheinrich have already been collaborating in North America for more than 15 years in North America. This includes MCJ Supply Chain Solutions LLC, a joint venture offering Jungheinrich automated guided vehicles (AGVs).

Brian Spradlin, currently president of MCJ with over 15 years of experience in the automation field, will continue his role in the expanded joint venture and serve as president of Rocrich. "We are truly excited to announce Rocrich and to bring together the automation product portfolios of Rocla and Jungheinrich in the North American market," said Spradlin in a press release.

"The combination will enable us to provide our customers and partners with fast and easy access to an industry-leading offering and position us for future market opportunities," he said. "We will combine the best people and products in the industry to scale our business. Our ambition is to become one of the leading players in the market and to shape the future of our industry."



Mitsubishi Logisnext and Jungheinrich have already been working together for 15 years. Source: Mitsubishi Logisnext Americas



Rocrich AGV Solutions to build on portfolio

The North American market for materials handling automation will experience a compound annual growth rate (CAGR) of 7.73% between 2023 and 2028, predicted Mordor Intelligence. Report Ocean was more bullish, forecasting annual growth of 9.85% by hardware revenue and 13.68% yearly by unit shipment between 2019 and 2026.

In order to capture a significant portion of the projected growth in the North American material handling automation market, Rocrich will combine the AGV portfolios of Logisnext's Rocla brand and that of Jungheinrich within the existing MCJ joint venture. This will provide customers and business partners with a single source for product and service solutions from both brands, said the companies.

Rocla and Jungheinrich said they each have more than 40 years of experience offering reliable mobile automation and robotics for warehouses. As one entity responsible for Rocla and Jungheinrich AGV portfolios, Rocrich will streamline processes and offer a single point of contact for customers and business partners as well as a strong service offering across North America, they said.

With the combined offering, Jungheinrich and Rocla said their product and service portfolios will enable Rocrich to cover all major customer use cases, from standard to special-purpose AGVs and automated forklifts. They said Rocrich will build on their portfolios with more products and services.

Joint venture expands North America reach

To become an even stronger partner for the market, Rocrich plans to grow its North American organization and further strengthen its local capacities. As part of this strategy, it will expand its capabilities in the areas of sales, commissioning, installation, and aftersales.

At the same time, the joint venture will rely on Jungheinrich's and Rocla's in-depth expertise to further enhance its existing customer support and experience in the region, according to the companies.

Rocrich will partner with more than 570 Logisnext dealer locations across the U.S., Canada, and Mexico. The partners said the extensive dealer network will provide aftersales services such as 24/7 helpdesk support and a quick local response to inquiries, as well as planned and unplanned maintenance, among other items.

The launch of Rocrich commercial operations is subject to the receipt of various regulatory authority approvals. The parties expect to complete these activities and begin commercial operations in the third quarter of 2023.

About Mitsubishi Logisnext and Jungheinrich

Mitsubishi Logisnext Americas and other group companies of Kyoto, Japan-based Mitsubishi said they have helped customers "Move The World Forward" for more than 100 years. Mitsubishi Logisnext Americas said it offers scalable systems from material handling to automation and extensive fleet support.

The Houston, Texas-based company's portfolio spans five brands – Mitsubishi forklift trucks, Cat lift trucks, Rocla AGVs, UniCarriers Forklifts, and Jungheinrich warehouse and automation products. All products are backed by an extensive dealer network offering customer service and product support.

For 70 years, Jungheinrich said it has been driving the development of innovative and sustainable material handling products for intralogistics. The Hamburg, Germany-based family-owned company generated sales of €4.76 billion ($5.18 billion U.S.) in 2022 and has about 20,000 employees. Its global network includes 11 production sites, as well as service and sales companies in 42 countries. •

Formant Releases Survey Results Highlighting the State of the Robotics-as-a-Service Model

Formant's survey sheds light on some of the challenges RaaS companies face in scaling up.

BY CESAREO CONTRERAS

The manufacturing industry continues to be the hottest market for companies offering their systems through a robotics-as-a-service, or RaaS, model. That was one of the key takeaways from Formant's "2023 State of RaaS Report" it released last month.

For the report, the robot operations company surveyed more than 300 robotics professionals around the globe to gauge how widely adopted the RaaS model has become.

"A majority of the survey respondents work at RaaS companies, but we also received responses from professionals that work at non-RaaS robotics companies, as well as integrators," a spokesperson for the company told *Robotics 24/7*.

Robot makers have touted RaaS as a cost-saving and risk-management tool. With the service model, customers can deploy robots in their facilities without having to buy these systems outright.

Formant is headquartered in San Francisco. Source: Formant

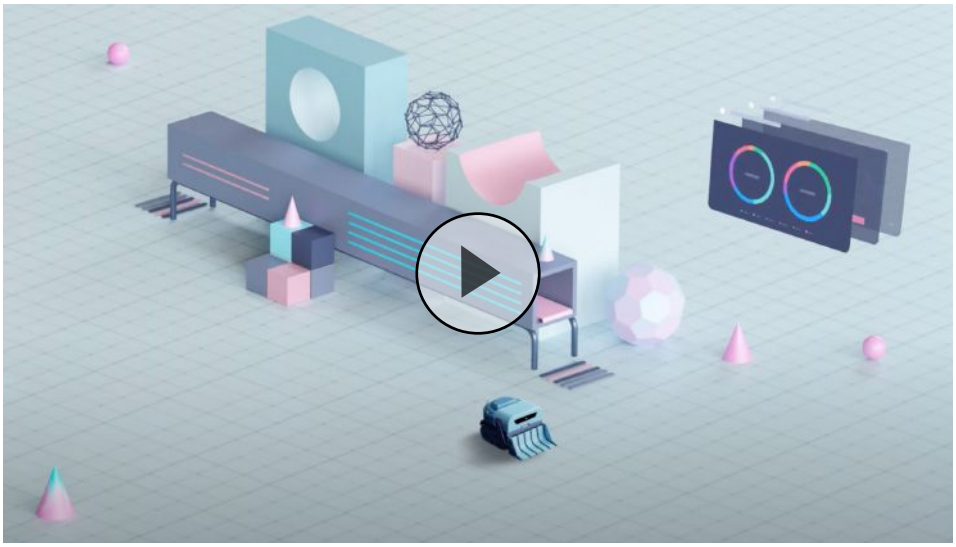
"At Formant, we work with scaling RaaS companies every day and we care deeply about the state of the RaaS market," Jeff Linnell, CEO of Formant, said in a statement. "The robotics industry is still incredibly under-resourced when it comes to purpose-built tools, educational content, and community organization. Therefore, we're excited to bring the results collected from our research to shed light on how other RaaS companies are scaling effectively, and the resources they're using to do so."

RaaS companies still have room to grow

Eighty-five percent of the respondents said they had fewer than 100 robots deployed, and 45% had less than 10 deployed.

On average, customers working in manufacturing have the largest fleets of robots, with 434 being the average size. The next largest is warehousing and logistics space, with customers having an average fleet size of 412, the report found.

Customers working in healthcare, agriculture, and hospitality



have the smallest fleets, with average sizes of 69, 54, and 31, respectively.

Biggest challenges facing RaaS

Fifty percent of the respondents that have 1,000 robots deployed noted that their biggest challenge is bringing in new customers, Formant noted.

Another major concern is funding. Twenty percent of robot companies that have deployed 11 to 50 robots said funding has been a challenge.

"Although the RaaS industry has gained traction over the last 3-5 years, there are significant hurdles that the industry faces," Formant said in the report. "These include fundraising, the cost of development (both hardware and software), and resistance to adoption of robots in more 'low-tech' industries such as agriculture or construction."

ROS and simulation popular

The vast majority of companies surveyed take advantage of the open-source Robot Operating System (ROS). Formant reported that 81% of those surveyed are using it. NIVDIA's Isaac Sim is the most popular simulation software, the company said.

On the hardware front, 80% of those surveyed said they use custom hardware. Sixty-one percent said that at least 50% of their hardware is custom. Six percent said they use off-the-shelf parts.

Looking ahead

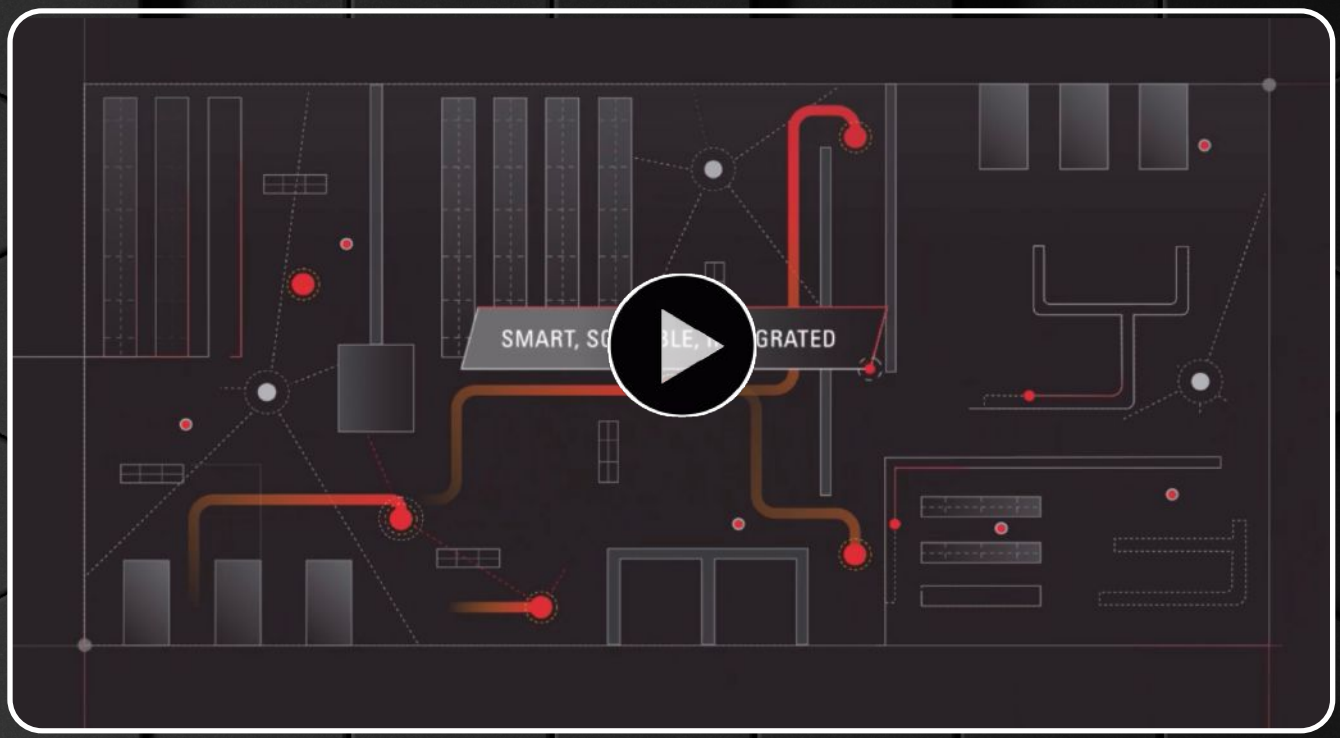
While RaaS companies have plenty of hurdles to overcome, more than half of them still are bullish on the model. Fifty-fix percent of those surveyed said they have a "very positive outlook for the RaaS market." Sixty-seven percent of those surveyed said they plan to fundraise within the next year.

"One of the biggest takeaways from our survey data is that the RaaS industry is still very much in its infancy," Formant said in the report. "With small average fleet sizes and minimal traction in emerging industries, companies in the robots-as-a-service space have only begun to scratch the surface of addressing common challenges with robots."

For the full report, check out Formant's website. •

Cesareo Contreras *is associate editor at* Robotics 24/7.

Raymond Technology Solutions Move Business Forward



No matter where you are in your automation journey, our technology provides your business with scalable solutions to drive costs down, maximize labor resources and get you to market faster. The moment a new shipment arrives our solutions get to work, assisting operators and collecting data to give you operational visibility – while seamlessly integrating to improve material flow—and taking on the heavy lifting whenever it's needed. Raymond technologies streamline each stage of your storage operation allowing you to handle, stack and store more efficiently, optimizing the journey of each pallet for the most efficient path from A to B.

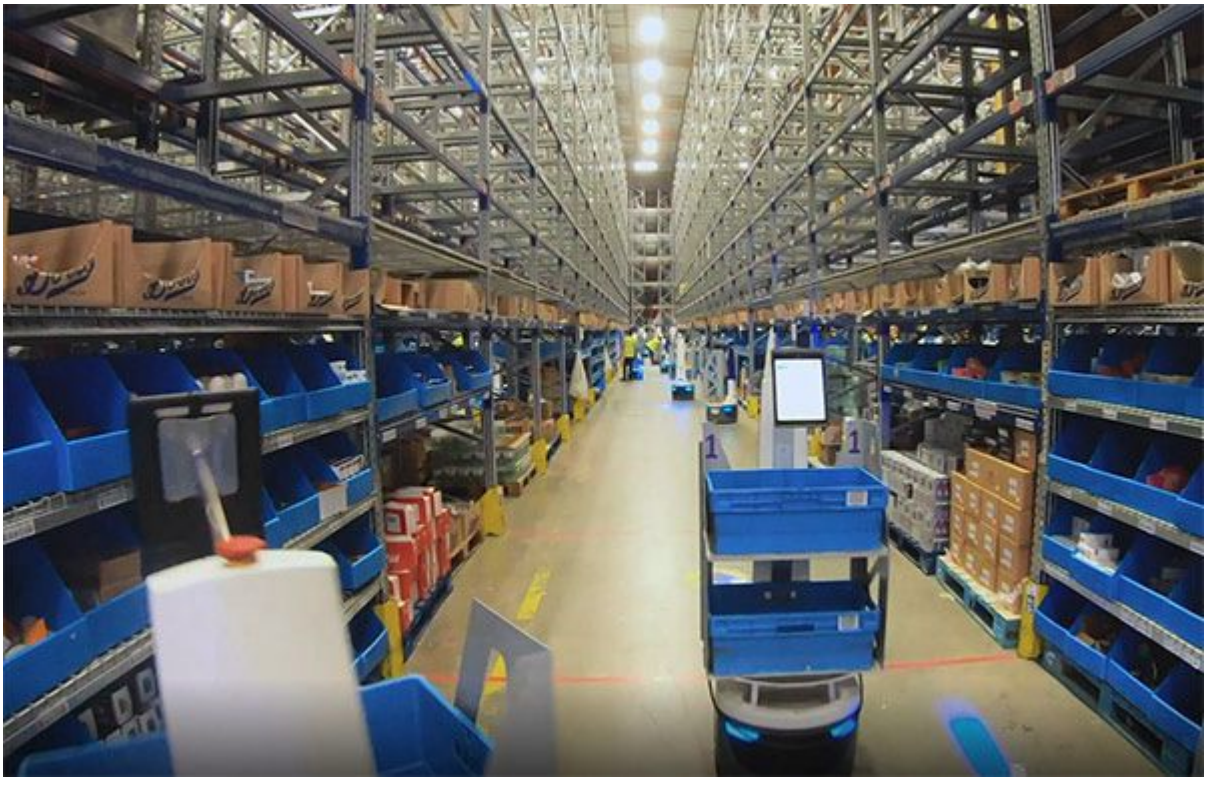
Let us help you run better and manage smarter. Click here to learn more .

RAYMOND

Savant WMS and Locus Robotics to Jointly Offer Robots, Warehouse Management Systems to the Midmarket

By integrating Savant WMS with Locus Robotics mobile robots, midmarket warehouses can gain affordable and flexible automation, said the partners.

BY ROBOTICS 24/7 STAFF



Locus Robotics has worked with technology partners to address new industry segments. Source: Locus Robotics

Savant Software Inc. and Locus Robotics recently announced a new strategic partnership in which they will integrate Savant's warehouse management system, or WMS, and Locus' autonomous mobile robots, or AMRs. The joint offering will provide flexible automation for midmarket companies, they said.

"We are thrilled to partner with Locus Robotics to offer a powerful, cost-effective robotics automation solution for mid-market companies," said Chris Jackson, president of Savant WMS, in a press release. "Our partnership will provide our customers with access to best-in-class robotic technology, while still maintaining the flexibility and affordability

that is so critical to mid-market companies."

Peoria, Ariz.-based Savant said its cloud-based WMS is designed to optimize warehouse processes, reduce costs, and increase accuracy. The company added that its team of experienced professionals provides scalable solutions that are designed to meet the unique needs of each customer.

Savant WMS to provide affordable solution

By integrating Savant WMS with Locus Robotics, warehouse managers will benefit from improved efficiency, productivity, and accuracy in their daily operations, said the partners.

"With this partnership, mid-market companies can now take advantage of the latest advancements in robotics and warehouse management systems, without breaking the bank," they said. "The combination of Savant WMS and Locus Robotics provides a cost-effective solution that can be optimized to meet the specific needs of each individual customer."

The integration of Savant WMS with Locus Robotics will enable warehouse managers to easily incorporate AMRs into their daily operations, claimed the partners. Locus said its systems include a fleet of robots, a proprietary software platform, and integration with WMSes.

Locus Robotics aims for the midmarket

"As e-commerce continues to explode across all channels, access to a cost-effective and powerful WMS system is critical for a successful warehouse fulfillment operation," stated Rick Faulk, CEO of Locus Robotics. "Partnering with Savant WMS will enable Locus to bring our cutting-edge robotic technology to mid-market companies, helping them to drive significant operational efficiency and productivity gains, and deliver a faster time to value."

Wilmington, Mass.-based Locus Robotics said its AMRs collaborate with human workers to dramatically improve product movement and order-fulfillment productivity. The company said its hardware and software can also reduce operational costs and improve workplace ergonomics.

Locus said that more than 100 of the world's top brands, retailers, third-party logistics providers (3PLs), and specialty warehouses have deployed its award-winning systems at over 250 sites. It recently announced that DHL Supply Chain will deploy 5,000 Origin robots across multiple sites. •

Mitsubishi Electric Makes Strategic Investment in Clearpath Robotics

Mitsubishi Electric said it expects mobile robots from the OTTO Motors unit to help factories automate.

BY ROBOTICS 24/7 STAFF

OTTO Motors is expanding its relationship with Mitsubishi Electric. Source: OTTO Motors

Fully automated factories might be a ways off, but industrial suppliers are getting ready for them. Mitsubishi Electric Corp. recently announced that it has made a strategic investment in Clearpath Robotics, which develops and sells autonomous mobile robots, or AMRs.

Tokyo-based Mitsubishi Electric said its investment in innovative companies will strengthen its support for complete factory optimization and automation.

"Mitsubishi Electric, supported by partners such as Clearpath Robotics, is continuously evolving digital manufacturing through integrated solutions that utilize FA [factory automation] equipment, simulators, and other software using real and digital information," the company stated in a press release.

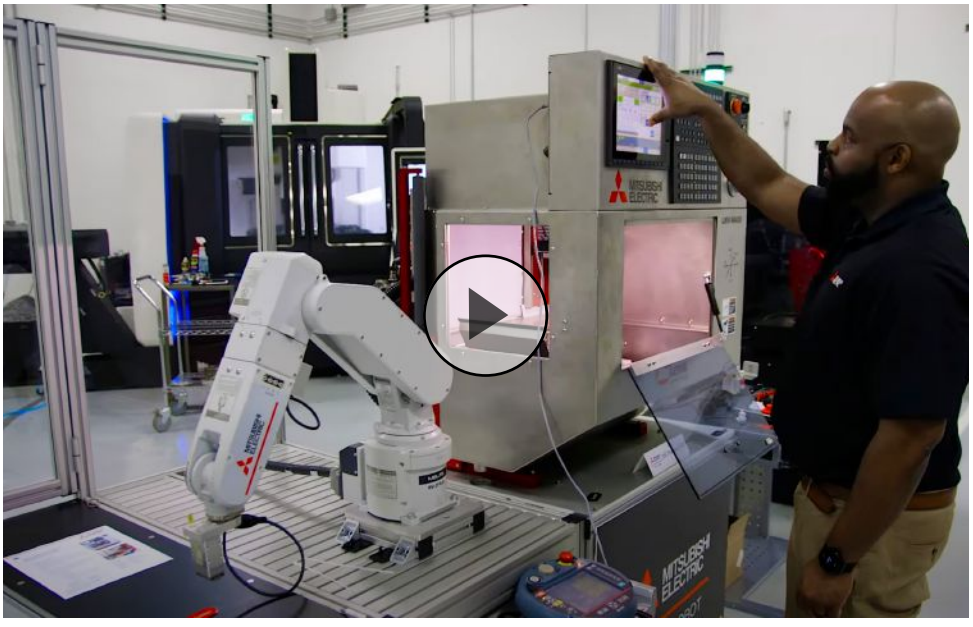
"In the future, Mitsubishi Electric will envisage smart factories that integrate manufacturing and logistics to realize mass customized production and full factory automation by maximizing the use of the integrated solutions," it added.

Mitsubishi Electric said it has more than 100 years of experience in the manufacturing, marketing, and sales of electrical and electronic equipment. Its systems are used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation, and building equipment.

The company recorded a revenue of 5,003.6 billion yen ($37.3 billion U.S.) in the fiscal year ended March 31.

Mitsubishi Electric expects an automated future

The manufacturing and logistics industries are increasingly



using mobile robots in response to labor shortages, noted Mitsubishi Electric. Not only can AMRs convey materials, but they can also provide valuable data through their connections with factory and line simulation software, enterprise resource planning (ERP), and manufacturing execution systems (MES), said the company.

Mitsubishi Electric did not specify the amount of its funding in Clearpath Robotics, which sells software for mobile robots and owns AMR provider OTTO Motors.

Founded in 2009, Clearpath claimed that it is a global leader in the development of mobile robots. Through its OTTO Motors unit, the Kitchener, Ontario-based company said it provides AMRs and related software for materials handling in manufacturing facilities and warehouses.

With more than 4 million hours of production driving experience, OTTO said it is trusted for mission-critical deliveries in the most demanding industrial environments. It said 70% of its customers are Fortune 500 companies, including GE and Toyota.

OTTO Motors cited recent awards, including Fast Company's 2023 Most Innovative Companies, Business Insider Top 40 under 40 and The Vector AI20 Top AI Companies to Watch in 2023. Clearpath Robotics had 335 employees as of January 2023, according to Mitsubishi.

Collaboration with OTTO Motors to continue

Mitsubishi Electric and OTTO Motors said the latest investment expands their strategic relationship and strengthens their commercial collaboration.

"The relationship between Mitsubishi Electric and OTTO Motors is built upon years of respect and trust," said Satoshi Takeda, chief strategy officer at Mitsubishi. "OTTO Motors is well-positioned to become a leader in industrial autonomy. We see a bright future ahead for OTTO Motors and are honored to support their continued success."

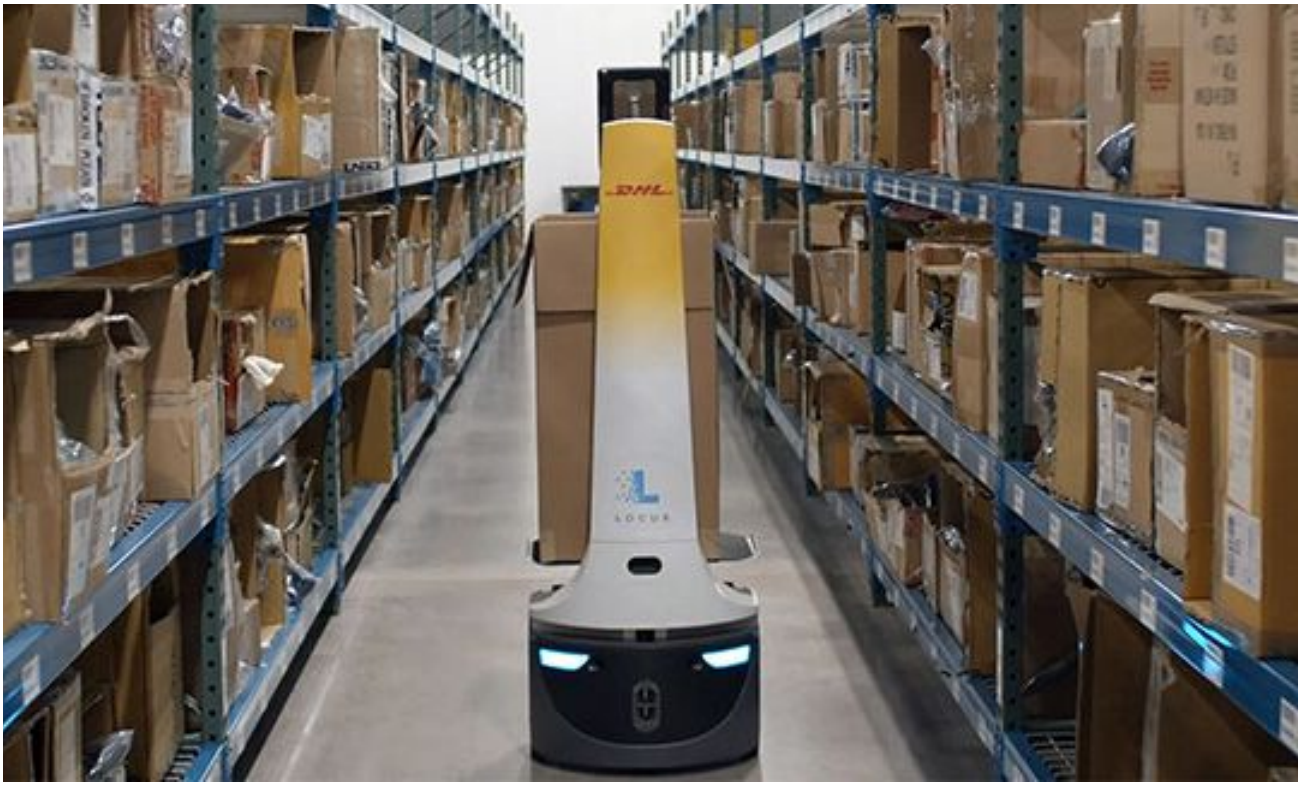
Matt Rendall, co-founder and CEO of OTTO Motors, added: "Industrial automation is continuing to transform businesses around the world. As a globally-trusted leader with a strong mission to invest in continuous technological innovation and ceaseless creativity, Mitsubishi Electric has been an important partner for OTTO Motors."

"We are proud to have their continued support and share a vision to accelerate industrial automation globally," he said. "We look forward to pursuing the tremendous opportunity ahead." •

DHL Supply Chain Expresses Confidence in Locus Robotics With Fleet Expansion

Mobile robot users seeking security in uncertain times can learn from growing partnerships such as that of DHL and Locus.

BY EUGENE DEMAITRE



DHL Supply Chain plans to deploy a total of 5,000 Locus mobile robots. Source: DHL Supply Chain

The demand for more efficient warehouse operations has continued as the COVID-19 pandemic abated and in spite of recessionary fears. For example, DHL Supply Chain in May said it will be growing its fleet of autonomous mobile robots, or AMRs, from Locus Robotics.

At the same time, some AMR users faced more uncertainty with the news of Shopify Inc.'s layoffs and sale of 6 River Systems to Ocado Group PLC. According to industry observers, relatively few mobile robot suppliers are profitable, but most agreed that Locus is one of them.

DHL Supply Chain said it plans to deploy Locus Origin robots across its global network of warehouses and distribution centers. The companies claimed that it is one of the industry's biggest AMR deals to date, growing from nearly 4,000 robots since 2021.

DHL seeks select robot providers

As a major third-party logistics provider (3PL), DHL works with several robotics suppliers, including AutoStore, Boston Dynamics, Crown Equipment, and Vecna Robotics. Locus Robotics is arguably one of the more mature AMR providers.

"We look for best-of-breed technologies and partner with companies of all sizes," Brian Gaunt, senior director of DHL Supply Chain, told *Robotics 24/7* at Manifest 2023.

Sally Miller, global digital transformation officer at DHL Supply Chain, replied to the following questions from *Robotics 24/7* about the company's expanded partnership with Locus Robotics:

About how many DHL facilities will be adding robots from Locus?

Miller: This will be across some of DHL Supply Chain's 1,500 global network of fulfillment and distribution sites worldwide—depending if the operational profile fits.

How did previous collaboration lead to this expansion?

Miller: LocusBots currently deployed at DHL Supply Chain facilities have proven their value with consistent 2X to 3X performance improvements, faster cycle times, and lowered operational and labor costs.

In addition, workplace quality and workplace safety have improved. DHL Supply Chain seeks to continue that success with additional deployments across its global network.

Sally Miller, DHL Supply Chain

What will the total number of Locus robots in DHL facilities be?

Miller: Locus will deploy 5,000 Locus Origin AMRs as part of this expansion agreement.

Were any changes in software or support necessary to scale up?

Miller: None. Locus can scale up at any site with an unlimited number of bots as part of the LocusONE system. Just add more bots!

Locus Robotics pursues strategic partnerships

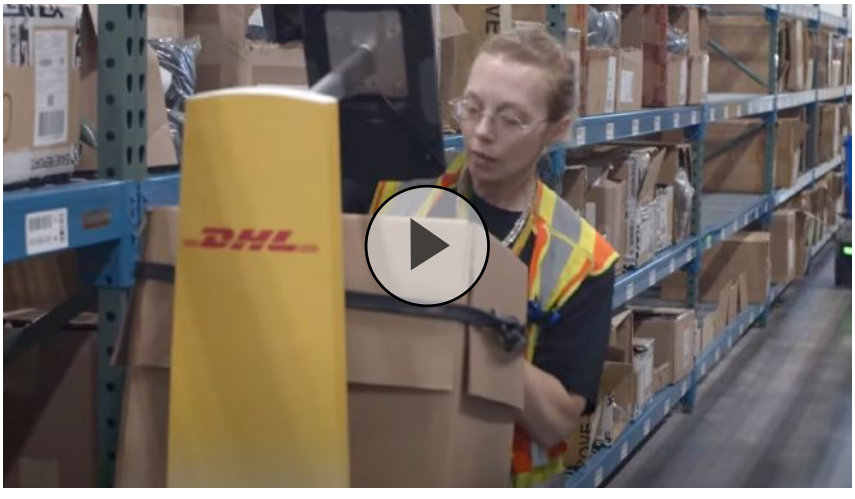
After Amazon.com Inc. took Kiva Systems off the market in 2012, Locus Robotics spun out of Quiet Logistics in 2014. In November 2022, Locus raised $117 million in Series F funding, bringing its valuation to close to $2 billion.

The Wilmington, Mass.-based company reported that its systems, which collaborate with human warehouse associates, completed more than 230 million cart picks during last year's holiday peak.

While it has stayed independent, Locus has recently also partnered with several companies on automation deployments, including Berkshire Grey, Design Future Japan, FANUC, Körber Supply Chain, and Optoro.

At ProMat in March, Locus Robotics introduced LocusONE, a warehouse orchestration platform intended to enable central management of different AMRs in large warehouses. •

Eugene Demaitre *is editorial director of* Robotics 24/7.



OTTO Motors Adds Support for VDA 5050 Mobile Robot Interoperability Standard

OTTO Motors worked with partners such as NVIDIA and InOrbit to support VDA 5050 and open-source its connector.

BY ROBOTICS 24/7 STAFF

OTTO Motors collaborated with InOrbit and others on mobile robot interoperability. Source: OTTO Motors

Growing adoption of mobile robots has led to efforts to get fleets from multiple vendors to work together. OTTO Motors recently said that it is one of the first autonomous mobile robot, or AMR, vendors to support the VDA 5050 interoperability standard and to open-source its connector.

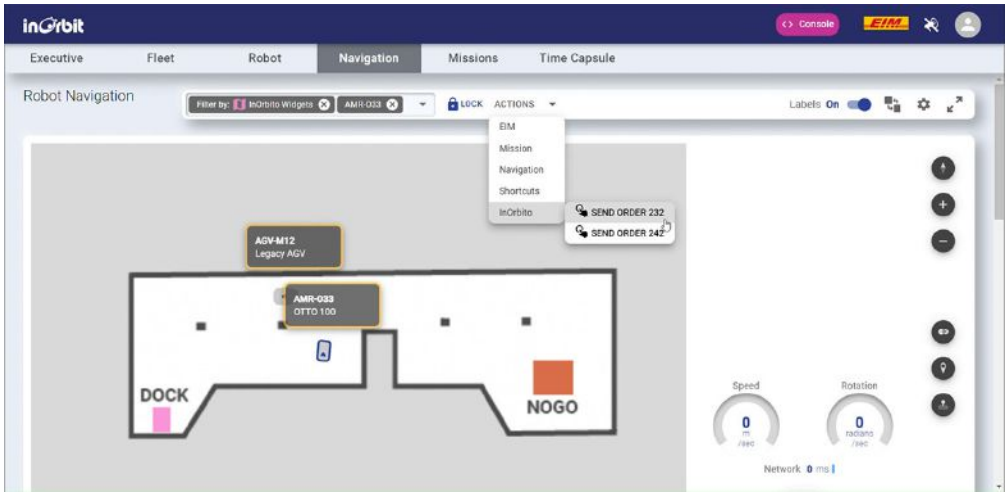
"Interoperability, particularly compliance with standards like VDA 5050, will play a crucial role in facilitating the adoption of automation by manufacturers worldwide," stated the Kitchener, Ontario-based company. "As the industrial automation industry evolves, OTTO Motors is dedicated to supporting and enhancing interoperability to unlock new possibilities for autonomous material handling."

OTTO Motors said its AMRs have accumulated more than 4 million hours of driving experience, automating materials handling in factories and warehouses. The company was recently recognized as a top 10 global robotics provider, named to Fast Company's 2023 list of "Most Innovative Companies. Seventy percent of OTTO's customers are Fortune 500 companies such as GE and Toyota.

VDA 5050 offers benefits to mobile robot users

VDA 5050 is an interoperability standard created to establish a common interface among

multiple automated guided vehicle (AGV) and AMR providers. Initially developed for German automakers, it outlines specific requirements and guidelines related to safety, performance and communication for AGVs and AMRs.



A user sends an order to an AGV using InOrbit's master control, which is built on the VDA5050 standard. The master control pauses the AMR when the AGV gets close to it, keeping traffic flowing. Source: OTTO Motors

The standard provides many benefits to manufacturers looking to introduce automation, including reduced costs and downtime, as well as improved safety and flexibility, said OTTO Motors. However, these benefits cannot be fully realized until all mobile robot vendors ensure that their systems are VDA 5050-compliant, noted the company.

"Supporting VDA 5050 is a significant milestone for OTTO Motors," said Jay Judkowitz, vice president of product at OTTO Motors. "By adhering to this standard, we're empowering global manufacturers with more sophisticated and cohesive automation solutions to tackle their toughest operational hurdles. As the automation landscape evolves, it's vital for all AGV and AMR vendors to follow suit."

OTTO Motors collaborates on interoperability

Along with InOrbit and Ekumen, OTTO Motors claimed that it has made further strides toward interoperability by being the first vendor to make its VDA 5050 connector open-source. OTTO said it enables any ROS-based AMR to be controlled by a VDA5050 Central Control—including competitors' systems if they adopt the standard.

This also ensures quick compatibility and accelerates global support for the standard, said the company, whose open-source code can be accessed on GitHub.

OTTO Motors added that it has conducted rigorous tests to verify the functionality of VDA 5050 support in its AMRs. These tests proved that VDA 5050 compatibility can enable seamless communication and integration between AMRs and third-party controllers, it said.

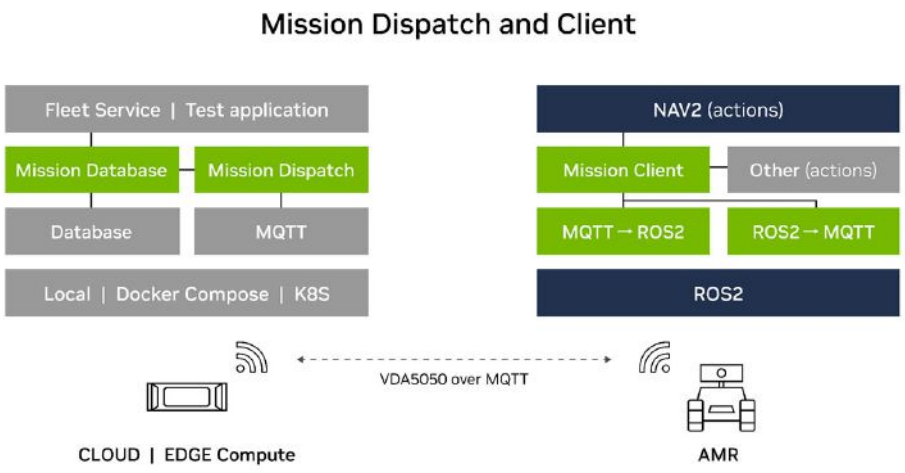
One of these tests was conducted by industry leader NVIDIA, which confirmed in simulation that its Mission Dispatch software worked seamlessly out of the box with the OTTO Motors VDA 5050 connector.

"Managing and testing fleets of autonomous robots requires two computers—one in the robot and one in the cloud—to dispatch tasks and communicate the status of these tasks to and from the robots," said Gerard Andrews, product marketing manager for robotics at NVIDIA.

"As part of the NVIDIA Isaac robotics platform, we built Mission Dispatch and Mission Client on VDA 5050 to facilitate interoperability for users handling heterogeneous robotics fleets," he said. "OTTO Motors embracing VDA 5050 will help to further advance interoperability."

InOrbit demonstrated VDA 5050 compatibility

In October 2022, OTTO Motors' commitment to VDA 5050 compatibility was further demonstrated with InOrbit's robotics operations (RobOps) platform. In this demonstration, OTTO 100 and an AGV were seamlessly



Architecture of Mission Dispatch and Mission Client software built on VDA 5050. Source: NVIDIA

controlled by InOrbit's master control, unlocking new levels of flexibility for material handling operations.

In the video below, InOrbit's master control was able to directly issue an order to OTTO 100, and when it detected that the two robots were positioned too closely together, disrupting traffic flow, the master control paused the AMR and allowed the less capable AGV to proceed.

"InOrbit and OTTO Motors are aligned in our commitment to accelerating the adoption of robotics through effective robot orchestration," said Florian Pestoni, co-founder and CEO of InOrbit. "We believe that the ability to manage material handling across multiple vendors is critical for the industry to thrive."

"Our collaboration with OTTO Motors is a crucial step towards achieving this goal," he stated. "We are excited about the impact this will have on the industry and look forward to continuing our partnership."

OTTO Motors AMRs execute a variety of tasks

OTTO Motors said its spring 2023 software release has enabled its AMRs to execute a variety of tasks under a VDA 5050-compliant central controller:

- Navigate to a specified point: OTTO AMRs can be commanded to navigate to a simple coordinate, a predefined waypoint, a configured docking endpoint, or a configured charger.
- Pause and resume motions: The VDA5050 standard allows for a simple pause and resume command to be sent to any robot within its control. This is helpful when considering and designing intersections.
- Powered endpoints: Once an OTTO AMR arrives at a docking endpoint, it can be commanded to transfer its payload with either an OTTO-standard conveyor or lift.
- Work in place: OTTO AMRs will not accept any other commands until the work in place has been ended, which it said ensures a safer and more predictable interaction between humans and robots where a manual load or unload is required.

More about the VDA 5050 standard, including discussions about its importance for manufacturers and the considerations for adoption, is available at *https://ottomotors.com/vda5050*. •

BlueBotics and ProLog Automation Partner to Drive AGV Adoption in Germany

The Swiss vehicle navigation leader has teamed up with the Stuttgart-based AGV experts to promote its Autonomous Navigation Technology across Germany.

BY ROBOTICS 24/7 STAFF

BlueBotics is exhibiting at events including ProMat and LogiMAT 2023. Source: BlueBotics

BlueBotics SA and ProLog Automation GmbH recently announced that they have entered a strategic partnership to encourage adoption of automated guided vehicles, or AGVs, across the German manufacturing and logistics sectors.

"This partnership is exciting news for BlueBotics," said Dr. Nicola Tomatis, CEO of BlueBotics, in a press release. "Germany is the most developed market for industrial and mobile robotics in Europe, and ProLog Automation has been a key component of that growth."

With more than 20 years of industry experience, BlueBotics provides its Autonomous Navigation Technology (ANT) and expert support to help customers bring their AGVs, automated forklifts, or mobile robots to market.

BlueBotics aims to grow ANT-driven robot fleets

BlueBotics described ANT as a "market-leading" natural feature navigation technology. Companies can build on the software platform for robust, scalable, and even interoperable fleets of automated vehicles, it added.

More than 4,000 ANT-driven AGVs are currently in operation worldwide, claimed St-Sulpice, Switzerland-based company.

The unit of ZAPI Group also offers ANTdriven.com, an educational resource to help professionals explore how mobile robotics can help their businesses thrive. BlueBotics said it expects its partnership with Stuttgart, Germany-based ProLog Automation to help German industry.

"Together, we will enable more German businesses to reap

the flexibility and robustness benefits that ANT technology – and our partners' ANT-driven vehicles—can bring, meaning more successful German AGV projects and more competitive German businesses in these challenging times," said Tomatis.

ProLog to build on consulting, integration expertise

Under the terms of the agreement, BlueBotics engineers will extensively train ProLog Automation's AGV consulting and integration teams on ANT.

"This collaboration is a perfect alignment, combining our team's deep industry knowledge with ANT, which is clearly today's leading AGV navigation platform," said Marco Bernstein, head of partner management at ProLog. "Having an internal team of ANT experts here at ProLog, and working closely with BlueBotics and its vehicle partners, will mean we can help more German businesses benefit from the efficiency and productivity benefits that mobile robots can bring."

ProLog Automation provides services for manufacturers and users of AGVs and autonomous mobile robots (AMRs). The company said its experts can help customers "realize projects and services in a cost-effective and timely manner."

ProLog supports mobile robot makers in the aftersales business in the areas of maintenance, repairs, and modifications. It said it also provides service hotlines.

The company offers mobile robot users consulting packages, simulations, project management, training, and mentoring. ProLog said its partners and customers include well-known AGV and AMR makers and medium-sized companies. •

Otto Group Works With Covariant to Apply AI Robotics to Its Logistics Network

The companies have begun by deploying more than 100 AI-driven robots.

BY ROBOTICS 24/7 STAFF

Peter Chen, CEO of Covariant, with executives from the Otto Group. Source: Otto Group

As the logistics industry undergoes unprecedented change, the Otto Group recently said it is entering into a long-term strategic partnership with Covariant to build a foundation for future growth. The Otto Group said it will use Covariant's artificial intelligence-powered robots to automate a wide range of manual fulfillment activities that require hand-eye coordination and object manipulation.

"Logistics faces the challenge of being as cost-efficient as possible," said Kay Schiebur, member of the executive board for services at the Otto Group, in a press release. "The use of a generalist AI allows us to rethink processes that were not possible before and provides an answer to the massive shortage of workers."

"In times when handling is often outsourced to cheaper locations, we are especially happy to continue to be close to our customers and strengthen the European, and especially German business location," he added. "The use of AI will be a key success factor in logistics in the future,"

The Otto Group invests in the future

"In times of a challenging market environment, it is essential that

future investments do not fall by the wayside," Schiebur said. "We invest here and now in our future viability to strengthen our position as a market leader in Europe."

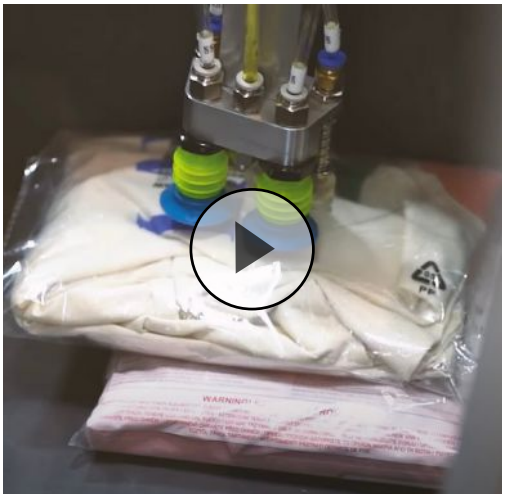
Founded in 1949, Otto GmbH claimed that it is the largest online retailer of European origin, with about 43,000 employees in 30 corporate groups. The Hamburg, Germany-based business includes platforms, brand concepts, retailers, services, and financial services, and its primary presence is in Germany, Europe, and the U.S.

In the 2021 to February 2022 fiscal year, the Otto Group reported €16.1 billion ($17.6 billion U.S.) in revenue and had online sales of around €12.1 billion ($13.2 billion). The company said its partnership with Covariant will enhance services for its customers and enable it to take a step "towards a digitalized and AI-driven future."

The Otto Group said it plans to deploy Covariant robots to increase operational efficiency, build resilience against workforce challenges, and improve the overall quality of work within its fulfillment centers. It said it expects the investment to create new work profiles and attractive jobs while improving productivity and ensuring more reliable delivery times, especially during periods of high or fluctuating demand.

Covariant Brain to power robot rollout

Covariant claimed that it "delivers the widest portfolio of robotic picking, placing, and sorting solutions available in today's market." Each of these systems runs on the Covariant Brain, a deep learning platform that the company said "enables robots to see, think, and act."



Under the strategic partnership, the goal is to install hundreds of Covariant AI-powered robots across all of the Otto Group's fulfillment centers. The companies said they are starting with deploying robots at facilities in Haldensleben and Altenkunstadt, Germany, this year.

The Otto Group will use these robots to autonomously handle the dynamic and unexpected fulfilment scenarios that have previously limited picking automation. They included the challenge of successfully processing ever-changing products without having to pre-program data, said Covariant.

In addition, Covariant said all its robots – regardless of facility location – can learn together as a fleet to ensure that lessons and operational improvements automatically propagate across the entire Otto Group network.

"This is a huge step forward for the automation of Europe's e-commerce market, as it represents one of the largest investments in a foundation model for robotics to date," said Peter Chen, CEO of Covariant. "We're honoured that Kay and team recognize the importance of developing a universal AI for robot learning, and we look forward to delivering the operational improvements that will help maintain Otto Group's market-leading position for years to come."

About Covariant

Research scientists who developed modern deep learning techniques founded Covariant in 2017. Emeryville, Calif.-based embodied intelligence inc., doing business as Covariant, said it delivers AI-powered automation "to address the change and scale of today's modern warehouse."

With offices in North America and Europe, Covariant said it has customers in 15 countries. Nearly 300 robots are powered by the Covariant Brain, a universal platform that enables robots to interact with and learn from their dynamic environments, said the company.

Covariant offers robotic picking applications, including order sortation, item induction, goods-to person order picking, kitting, and depalletization. It said its robots can autonomously pick virtually any SKU or item on Day 1 in industries spanning apparel, health and beauty, pharmaceuticals, logistics, and general merchandise.•

Now Is the Time to Integrate Heterogeneous Robots, Say Automation Experts

New heterogeneous robotic integration tools are helping different systems interoperate for greater efficiency in distribution centers.

BY GARY FORGER

Integrating robots in distribution centers can involve an emerging software stack. Source: Getty Images

The objective sounds relatively simple: On a designated day in a single distribution center, pick, pack, and ship a particular set of SKUs in a range of desired quantities to 24 retail stores. Or 50. Or 100.

That's what a distribution center (DC) does, right? Yes and no. But there's a problem—all those new robots.

Fulfilling orders is not all that simple if several types of robots are involved. That list could well include autonomous mobile robots (AMRs), automated lift trucks, piece-picking and goods-to-person systems, robotic putwalls, and even shuttles in an automated storage and retrieval system (ASRS).

While they can all operate in the same facility, they don't typically interface with or talk to one another. They are islands of automation. That's a blast from the past that wasn't a compliment in the 1980s and 1990s, either.

Furthermore, there's the matter of pacing and sharing the workload across those robots so store shipments can be made on schedule. Quite simply, how do they get the work done?

Good old-fashioned inventory management is both part of the challenge and central to the solution to integration of those robots.

"You want there to be enough SKUs distributed across various buffers," said Grant Beringer, vice president of integrated systems at Swisslog. "And you don't want to have too many items of each SKU or too few, limiting flexibility."

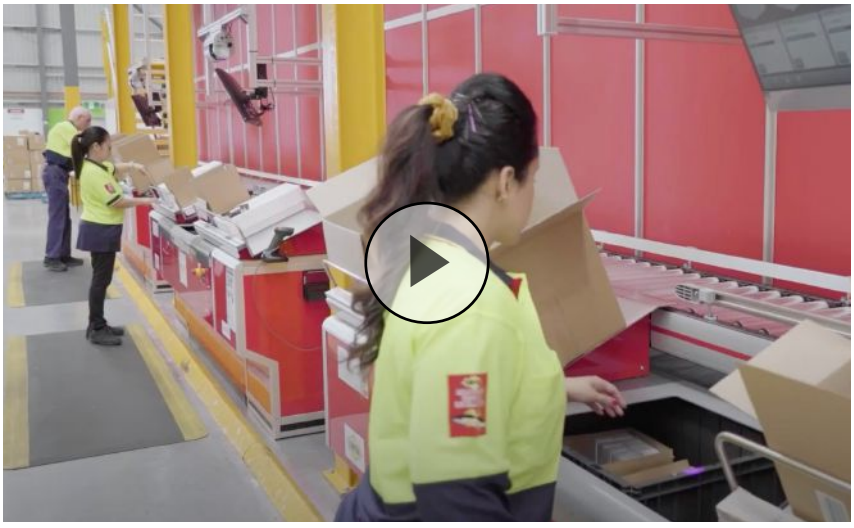
None of this is a hypothetical or a one-off. Beringer and others said they have been asked more than once lately to get different types of robots to be interoperable.

As it turns out, this can be a bit of a real-world conundrum. Welcome to the new world of heterogeneous robotics integration, or HRI. (Not that we need yet another acronym, but this rolls off the tongue much more easily than that tongue twister.)

The conundrum of interoperability

HRI really is a conundrum. If you're looking for the root of HRI solutions, start with Dwight Klappich, research vice president and Gartner fellow, and Kevin Kuntz, head of supply chain at Gap.

Klappich saw a lot of robots



running around completely independent of one another, and he identified what has to happen next to make them work together.

Kuntz is the thick of it, learning how to integrate different robot types at a Gap facility in Gallatin, Tenn.

Neither is trying to be a hero. They're just trying to solve "the biggest, hairiest problem in automation integration today," said A.K. Schultz, founder and CEO of SVT Robotics.

Last year, Gartner ran a survey about user wants and needs for supply chain technologies. About 96% said they currently use or plan to use robots. Similarly, 93% plan to increase the size of their robotic fleets. And 94% plan to pursue other robot use cases in their facilities.

"By 2028, 50% of large enterprises will have adopted some form of intralogistics smart robots in their warehouse and manufacturing operations," said Klappich.

Of course, no one type of robot fits all applications. In fact, Klappich said there are 34 different categories of intralogistics smart robots. They already touch operations from truck unloading and depalletizing to putaway, picking, sorting, packing, and shipping. Not to overlook replenishment and inventory management.

All of this is going to require orchestration. Klappich noted that a multi-agent orchestration platform that assigns, prioritizes, and coordinates those islands of automation is a tall order.

In his facility in Gallatin, Kuntz is living Klappich's dream.

He already has automated storage shuttles from TGW, robotic putwalls from Kindred, robotic truck unloading from Boston Dynamics, and a storage and retrieval system Exotec dedicated to returns.

The key to innovation success is identifying quickly whether a technology can be integrated into the flow, said Kuntz. At this point, a warehouse execution system from Vargo makes that possible in Gallatin.

Or as Swisslog's Beringer pointed out, the challenge is to integrate each robot successfully so it performs well not only on its own, but as an integrated member of an automated handling system that fills orders accurately and on time.

Physical and digital connections

Fortunately, a range of suppliers is in hot pursuit of solutions. For this article, we talked with robotics, software, and complete solutions providers, and there are many others.

As you might suspect, each supplier has its own perspective on HRI, for the most part built on its current niche. And no one can go it alone. Both conditions make it clear just how new HRI is.

"The core story of heterogeneous robotic integration is all about making physical and digital connections," explained David Schwebel, head of sales and strategic business development at RightHand Robotics.

On the physical side, each robot needs to do its job as a stand-alone piece of equipment. In addition, many of these robots need to be able to physically interface with other materials handling equipment such as conveyors or automatic guided vehicles (AGVs).

In other instances, robots need to physically interface with other robots. This is where it can start to get complex.

For instance, a piece-picking robot needs to select and remove eaches from a tote on an automated storage shuttle. But as Beringer explains, the proliferation of robots in DCs means the

number of permutations of robot combinations can accumulate in relatively short order.

Then comes the tough part.

Each robot has its own software and APIs, explains Zac Boehm, vice president of innovation and technology at Hy-Tek Intralogistics. None were written to interface with other robots or additional types of automation.

But to be effective, new, digital connections have to kick in. The different robots have to communicate to move and manage the needed inventory. This digital connection is where stand-alone robots literally take on a new life with heterogeneous robotic integration.

As Boehm explains, there's a problem to making that happen. "To communicate horizontally across equipment, you have to first communicate vertically to any of three systems—warehouse control systems [WCS], warehouse execution systems [WES], or warehouse management systems [WMS]."

Sounds simple enough. But it's not. Klappich may have a name for it—multi-agent orchestration platforms—but they are just now being developed. As it turns out, it's not all that easy to assign, prioritize, and coordinate tasks across islands of automation.

Orchestration platforms

The core challenge is the considerable difference between people and robots, noted SVT's Schultz. People can fill in for themselves the tasks needed to hand off an item to a tote, for instance. However, robots need to follow written code to translate each desired task into an action, says Schultz.

Writing that code is only one step, and custom developers typically connect each point-to-point solution across technologies and with enterprise software.

There's also the matter of determining priorities for robots in each moment. That's where the WMS, WCS, and WES come in. Each manages equipment and inventory in its own way, based on a set of priorities created to fill orders for the day. But then there needs to be a communication layer between robots and those software systems.

That's where these multi-agent orchestration platforms come in, said Sandy Stephens, executive vice president of software and consulting at Hy-Tek. He described these platforms are a clearinghouse for data exchange among multiple autonomous agents. That's the integration everyone wants.

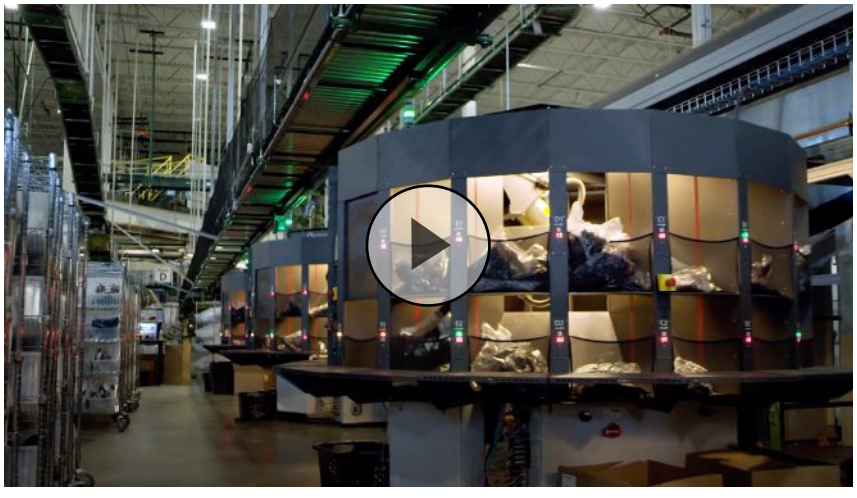
"An orchestration platform does not just send messages," according to Schutlz. "It also makes decisions and sets priorities for each piece of automated equipment. It stitches together all the ecosystems in an automated system."

And while the platforms from Hy-Tek and SVT Robotics are different, they are both trying to agnostically enable robots of all types to interact in real time to maximize workflows.

Orchestration platforms such as these also address a common sore spot in integrating automation for materials handling. The time to write softwware for the initial integration is a common source of system launch delays.

With pre-set platforms, more of that software is already in place and ready to make full integration a reality in much less time.

If HRI sounds intimidating, that's because it is. And while we may be at the early stages of making it manageable, there are a lot of great minds working on the problem. Your robots will not be alone. •



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