Get an easy overview: 10 AMR applications that can help you automate your logistics processes

EBOOK

The potential of automating internal logistics workflows is huge – it's just about getting started

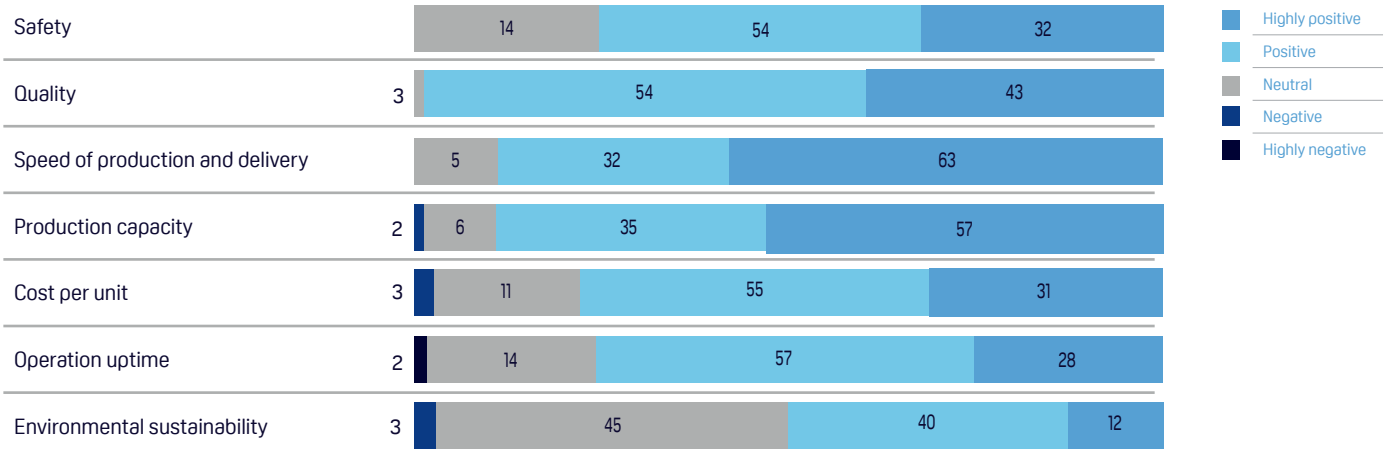
Across industrial sectors, companies are betting big on robotics and automation. Material transport across the value chain is a time-consuming, non-value adding task for most manufacturers. Autonomous mobile robots (AMRs) are a simple, efficient, and cost-effective way to automate material handling and in-house transportation tasks in nearly any situation where employees would previously have been required to push carts around the facility.

Sub-assemblies, assemblies, and other consumables are often manually transported over long distances from the warehouse to the assembly line and between inbound and outbound logistics areas. This task can be efficiently accomplished by AMRs, freeing up workers for higher value activities. Additionally, AMRs save the workers from pushing heavy carts and enable companies to increase operational uptime by providing a reliable and continuous transportation flow.

To optimize efficiency and save time on internal transportation, many companies have intermediate storage in production. However, this reduces valuable space and decreases the flexibility of the production layout. Integrating AMR software can with MES, ERP, or WMS systems can automatically deliver materials lineside, meeting just-in-time and agile processes, eliminating the need for storage within the production.

Production sites are typically dynamic and highly populated environments, making them unsuitable for manned fork trucks. Even manual carts and tuggers can be challenging for workers to navigate in these areas. However, AMRs can move safely and efficiently through even the busiest manufacturing environments, automatically stopping to avoid collisions and maneuvering around people or other obstacles. With no infrastructure required, AMRs can be easily rerouted for new production layouts or assembly lines, and their missions can adapt to match delivery requirements for faster processes.

Automation will have a positive impact on speed, safety, quality and capacity.

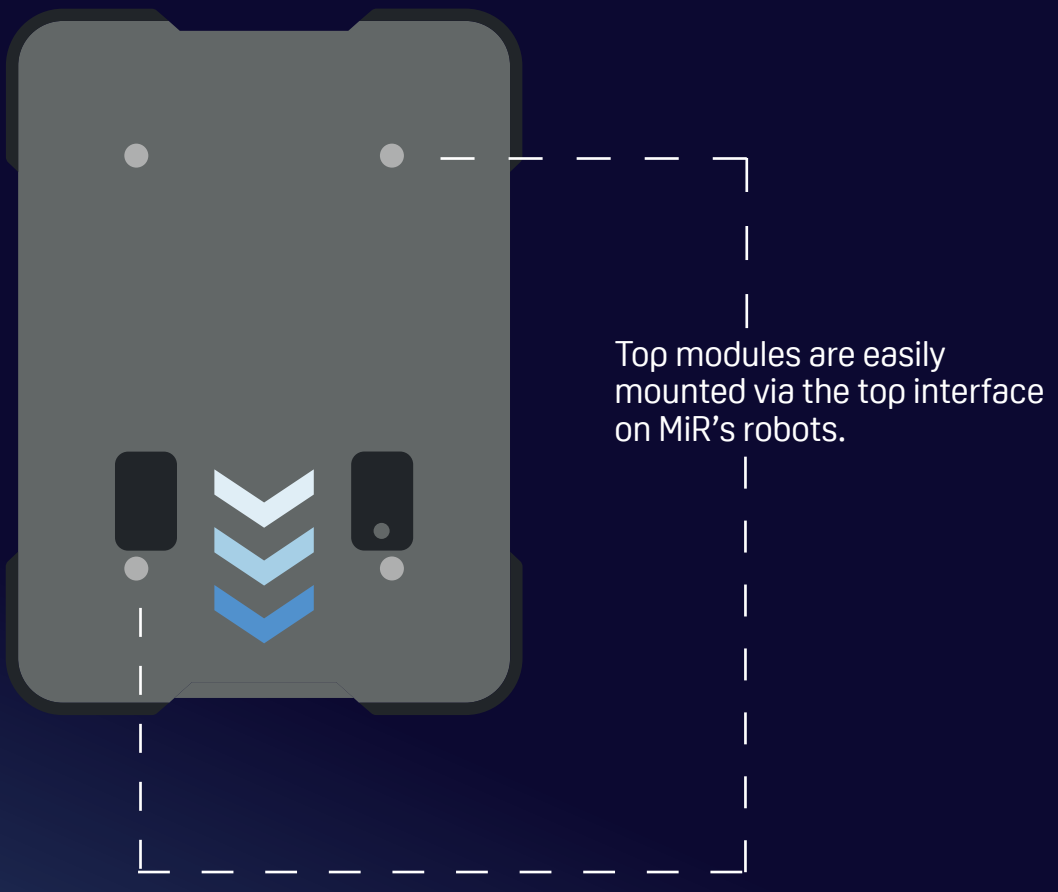


Source: McKinsey Global Industrial Robotics Survey, 65 senior leaders and executives in automotive; food and beverage; life sciences; healthcare; and pharmaceutical; logistics and fulfillment; and retail and consumer good sectors, August 2022.

How it works:

First, here's a small introduction to how you can customize your mobile robots for your specific workflows.

Workflows are different in all types of industries, but the flexible and adaptable robots from MiR can be customized to fit almost any business needs; these mobile robots have an open interface, meaning that they can be mounted with customized top modules whatever your application demands.



SOLUTION #1

Karakuri systems for fully automated loading and unloading of materials

For fully automated solutions, companies are integrating a Karakuri system on top of an AMR. This is a gravity-based system with mechanical linkages. Gravity allows the rack to offload and onload onto the robot. A Karakuri system can fully automate the process of loading and unloading onto an assembly line for maximum efficiency.

Typically, mobile karakuri systems are used to automatically transport materials from a warehouse to the production line, where it unloads the materials in a static rack. At the same time, it loads waste materials from the production line, which it brings back to a disposal area, this helps companies stay lean in the production while employees save time moving waste materials.

Example: Forvia uses mobile karakuri systems for 24/7 operations

Forvia uses a fleet of MiR250 robots to pick-up monoliths in the warehouse. The robots then transport the monoliths over a long distance and deliver them in the production, where they pick up empty boxes. The robots run 24/7 at Forvia, ensuring a consistent material delivery for maximum operational uptime.

Read Forvia case

SOLUTION #2

Conveyor systems as the flexible link in the production

When AMRs are deployed with a conveyor top module, they can work as the adaptable link between fixed conveyors. A mobile robot deployed with a conveyor belt on top is often part of a fully automated solution where the AMR moves sub-assemblies from warehouse to production or between assembly lines.

Most manufacturers are looking for flexible production setups that allow them to adapt to changes quickly and efficiently in customer demand. When adding mobility to conveyors, companies add a lot of flexibility to the logistics processes compared to having fixed conveyor throughout a site. This solution adds agility to a site, as it is very easy to change the AMRs' routes and positions when the factory layout is updated, while it is time consuming and expensive to move conveyors around.

Example: Honeywell uses mobile conveyors to stay lean

4 MiR100 robots are equipped with conveyors at Honeywell Safety and Productivity Solutions. The robots connect to conveyors in the warehouse to pick up assemblies and transport them to 15 different stations in the production area. Honeywell has reorganized the production area several times to keep up productivity, and the AMRs have easily been redeployed throughout the process.

Read Honeywell case

SOLUTION #3

Towing solutions for automatic pick-up and delivery of cages and carts

In a wide range of industries and in logistics, a lot of movement of partly completed materials, packages and goods are done manually in carts and cages. This is not just time consuming it often also affects the work environment, negatively as employees may have to push cages of several hundred kilos over long distances several times a day.

This process can be automated by the MiR250 Hook mobile robot solution, that can automatically pick up, transport and drop off carts. The MiR250 Hook identifies carts by April Tags or QR codes and autonomously transports them to the designated position. The versatile robot solution can collect carts at different heights, so there is no need to modify existing carts or the facility layout when implementing the MiR250 Hook.

MiR250 Hook is a patented solution from MiR. The mobile robot solution is able to pick up carts up to 500 kg.

MiR250 Hook

SOLUTION #4

Pallet lifts for safe and efficient transportation of pallets

When moving large items from a warehouse to the production, from inbound logistics to the warehouse, or from the production to end-of-line heavy duty AMRs can take over the pallet movement. With customized pallet lifts and racks, AMRs can pick up, transport, and deliver pallets autonomously from the warehouse, offering an efficient transportation.

Most manufacturers want to remove forklifts from the factory floor as they constitute a safety hazard and take up a lot of space in a factory layout. With extensive safety features and autonomous navigation, AMRs are a safe alternative to forklifts, and they dynamically avoid people and other obstacles on their paths.

Example: Novo Nordisk automates pallet movement from inbound logistics to warehouse

Five MiR500 equipped with pallet lifts improve the warehouse logistics within Novo Nordisk by transporting packaging materials from the depot area to the warehouse. The distance is 100 meters per trip with 3 to 4 twists and turns and driving in crowded areas. The robots deliver pallets automatically in pallet racks, and the pallets are then pickup by manned high-reach trucks to be placed in the warehouse. In this way, Novo Nordisk automates the time-consuming task of transporting pallets over long distances while keeping the specialized work of placing the pallets to skilled employees.

Read Novo Nordisk case

SOLUTION #5

Static racks and shelves for fast and simple AMR deployment

When companies seek to automate material handling tasks currently performed manually, a simple method is to mount shelves directly onto the AMR. Employees can load the robots, send them on their way and then unload them again.

This semi-automatic approach requires minimal or no integration with other systems. AMRs with racks on top are used across industries throughout workflows, facilitating the transfer of smaller items, sub-assemblies, tools, or instruments from the warehouse to production or between production lines. The racks can be designed according to customer need to move a special size of boxes such as KLT.

Example: TN Værktøjsslibning improves efficiency with automated transport of components between production lines

TN Værktøjsslibning uses a MiR250 robot equipped with a shelf to transport the semi-finished tools throughout the production. Manufacturing cutting tools involves many operations that each tool must pass through before it is sent to the customer. The phased production and logistics process was previously done manually. This meant that employees spent time moving items around while the CNC machine itself stool still. With this semi-automatic solution, the logistics step is now automated and employees can focus on higher-value activities.

Read TN Værktøjsslibning case

SOLUTION #6

Mobile manipulators for automated workflows around machine tending

Simply put, a mobile manipulator is a collaborative robot arm put on an autonomous mobile robot platform. Collaborative robots collaborate with humans and reduce operator intervention and boost productivity directly. When adding mobility, these collaborative robots can achieve a high degree of autonomy, and automate new types of tasks within material handling and production and allow workers to focus on higher value activities.

A common workflow to automate further with mobile manipulators is machine tending. Collaborative robots have over the past years been implemented to automate machine tending tasks, but by adding mobility, this combined solution now allows the same collaborative robot to be used for different machine tending tasks for maximum utility. Mobile manipulators can thereby increase efficiency and improve the ROI significantly.

Example: SGIMRI uses a combination of MiR AMRs and Universal Robots' collaborative robots for CNC machine tending

SGIMRI has developed a combined solution of MiR's mobile robots and UR10 cobots that collaborate with a CNC machine. The loading and unloading of machine tools are demanding for positioning accuracy of mobile systems, but the fleet of MiR robots meet the requirement for stability and reliability. The mobile manipulators has made the layout of the entire production line more flexible, and production processes more efficient.

Read SGIMRI case

MiR

SOLUTION #7

Flexible pick-up and delivery of multiple carts in free space with shelf carriers

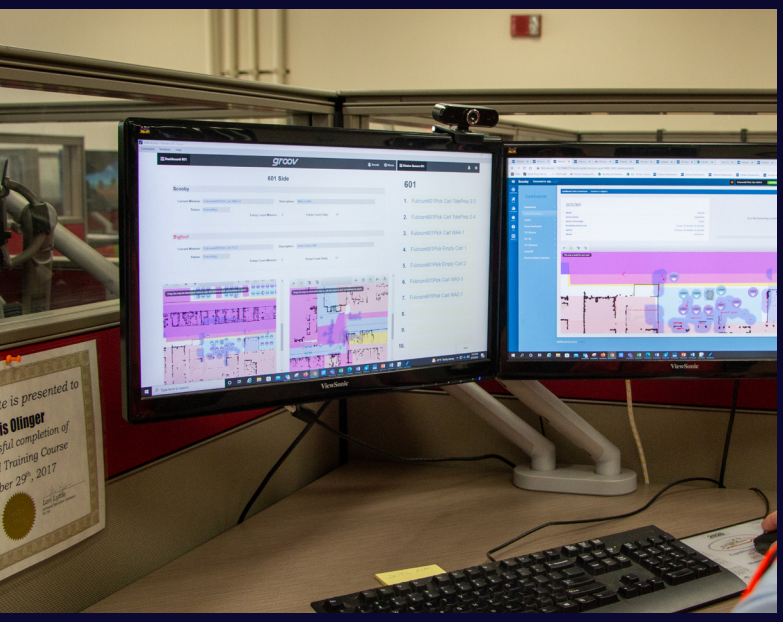
A popular AMR application is to pick-up carts and shelves from the floor and move them to a designated position. This can be done by mounting an anchoring device top module on the robot. Anchoring devices make it possible for the robot to lock to carts and shelves, move them and deliver them at an exact location.

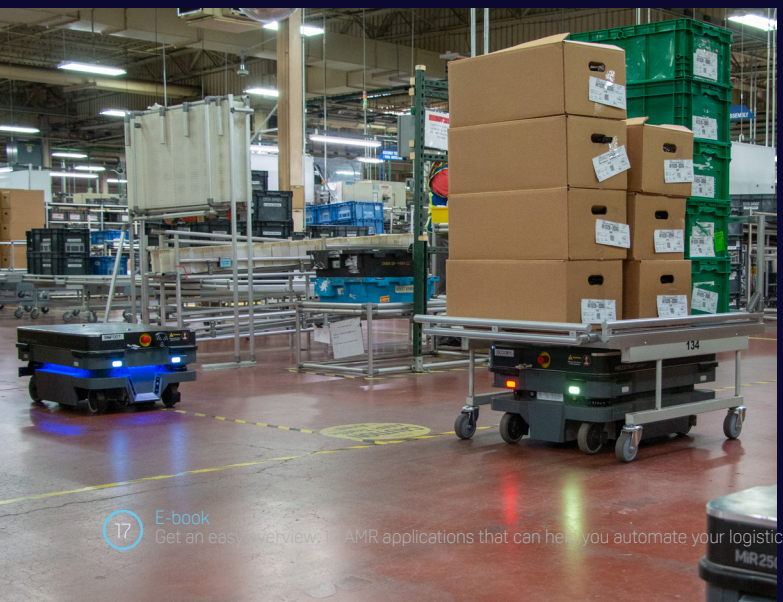
Compared to having shelves or racks mounted directly on the robot, this gives customers flexibility to move multiple carts with different products, while optimizing the robot usage for a faster ROI.

Example: Denso gets immediate and ongoing results with fast ROI for their fleet of MiR robots that moves carts more than 12 miles per day

Denso has deployed a fleet of MiR250 robots equipped with MiR Shelf Carriers 250. These have taken over the internal transportation from Denso's warehouse to production areas and bring components directly to line-side production. The robots pick up and transport carts throughout the facility in a highly automated process, controlled by MiR Fleet and where the robots are integrated to automatically open the door in and out of a clean-room area. With the implementation of this solution, Denso has redeployed 6 workers who used to walk up to 12 miles per day moving materials for higher-value activities.

Read DENSO case



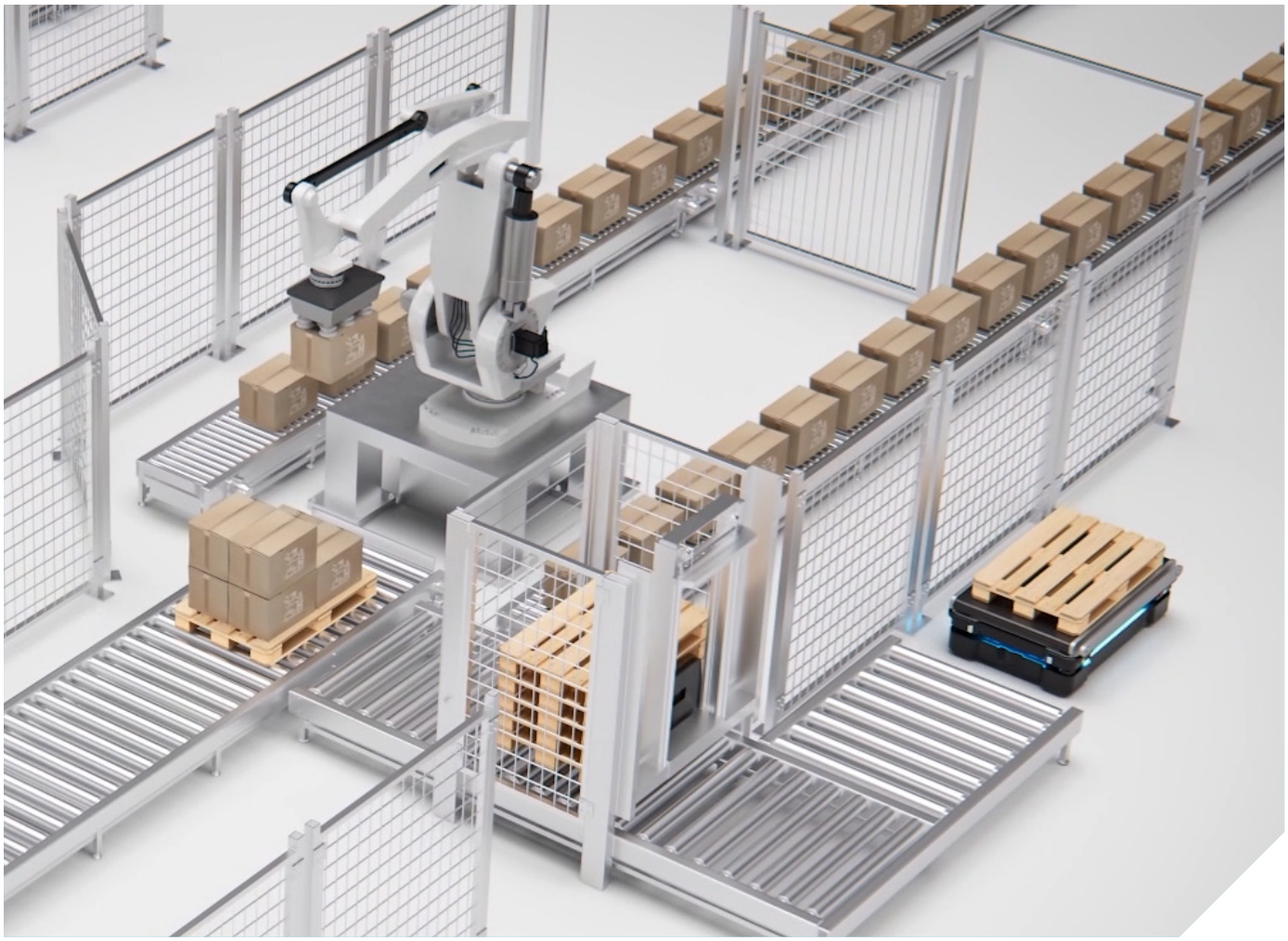


SOLUTION #8

Safe and autonomous finished-goods transport to end-of-line processes with heavy duty robots with conveyors

As companies increasingly recognize the advantages the of using AMRs in their production and packaging facilities, they are searching for ways to further expand their use of these technologies. One natural progression in the automation process is to broaden the use of AMRs to include pallet movement applications, such as transporting and delivering finished goods to end-of-line (EOL) warehouses.

Palletizers often present challenges due to limited space and a lot of human activity in the area. However, modern palletizing systems can seamlessly integrate with AMRs. AMRs equipped with conveyors can automatically connect to fixed conveyors in the palletizer, allowing them to safely and efficiently transport pallets to the palletizer. Subsequently, they can pick up the finished pallet and deliver it to the warehouse or logistics area.



The height of the conveyors placed on the AMR can often be customized, so the AMR can easily connect to the fixed system redeployed throughout the process.

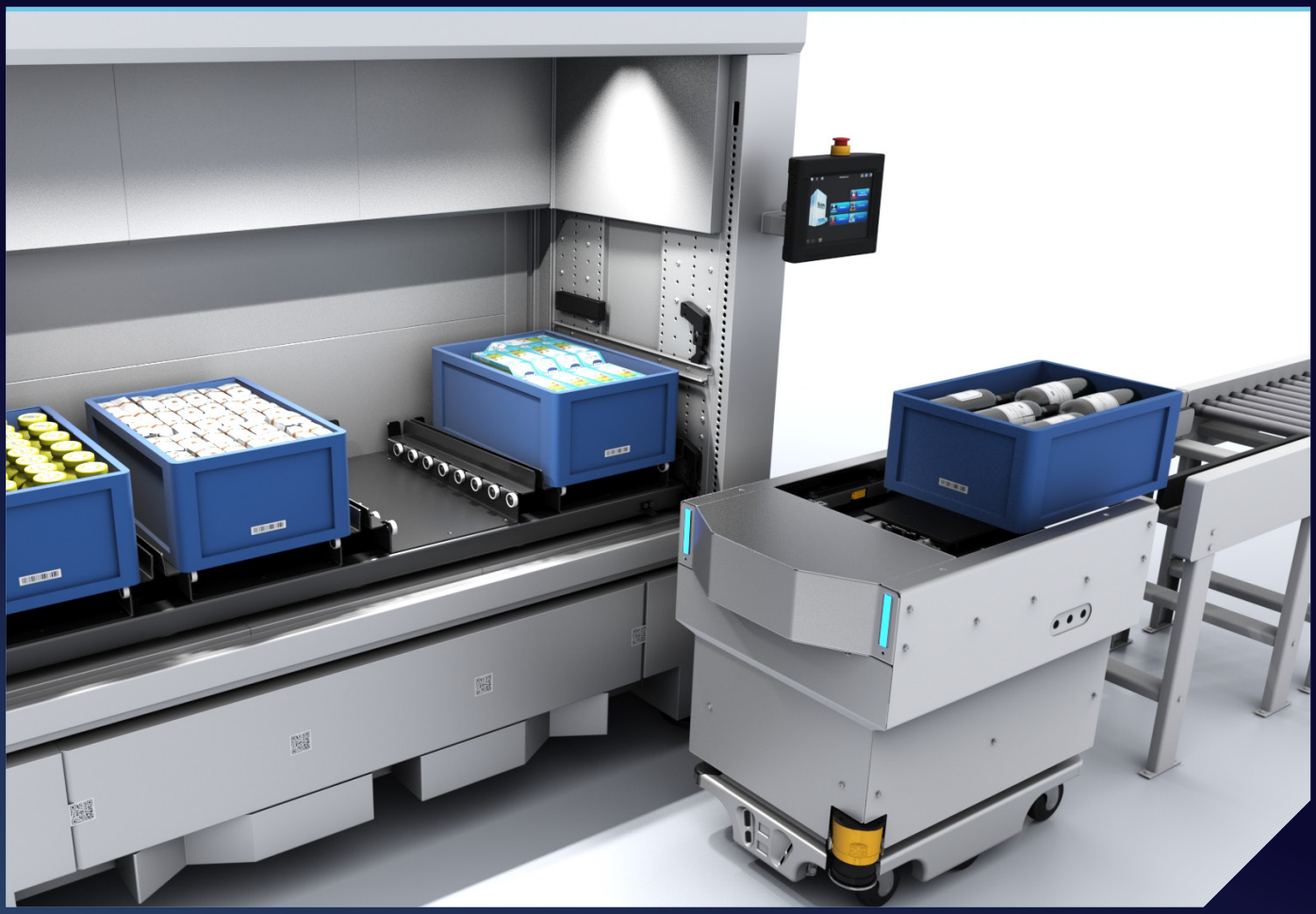
MiR

SOLUTION #9

AMRs integrated to vertical storage systems for completely automated storage and handling of goods

Vertical storage systems are automatic storage systems that takes full advantage of a building's height and thus has a limited footprint. Trays with semi-finished goods are delivered to the system, which moves and reposition the trays and is used as a buffer warehouse.

By connecting AMRs with specially designed top modules to automatic storage systems, companies can use a "goods to person" principle and deliver goods at the right time directly to the operator, improving picking operations and reducing the work and time required for order fulfillment significantly.



Example: Amer SpA has combined their vertical storage system with MiR robots and automated their entire material picking and placing phase to maximize productivity

Amer SpA has combined a vertical lift module (VLM) from Modula with a MiR robot equipped with a customized conveyor belt that can connect directly to the automated storage system. The VLM receive semi-finished goods from the MiR robot and stores them as long as needed, which can be from a few hours or a few days. Then another MiR robot retrieves the goods and carries them to another part of the factory to complete the work. This process was previously done manually but now no human intervention is required and operators can spend time on their actual work instead picking and delivering goods.

Read Amer case

SOLUTION #10

Fully automated box handling with lifts and gates

Throughout warehouses and manufacturing sites – and between the two, boxes of different sizes, shapes and payloads are being moved around, often manually.

With lift modules and designated gates, this process can easily be automated and more streamlined to increase productivity. Lift modules enables the AMRs to pick up and deliver items, while gate modules can receive and hold boxes, and also connect the mobile robots with production lines and storage systems.

Check our top modules

MiR's flexible AMR platforms help you maximize the efficiency of your logistics operations

The mobile robots from MiR are autonomous mobile robots (AMRs) designed to optimize productivity in logistics and manufacturing operations. The MiR AMRs make your employees more efficient by allowing them to focus on higher-value activities, while shortening lead time, reducing the risk of bottlenecks, and optimizing safety.

AMRs to transport small and medium-sized materials

MiR250

Payload: 250 kg / 551 lbs

Size: Length: 800 mm / 31.5 in
Width: 580 mm / 22.8 in
Height: 300 mm / 11.8 in

Speed: 2.0 m/s (7.2 km/h)
6.6 ft/s (4.5 mph)

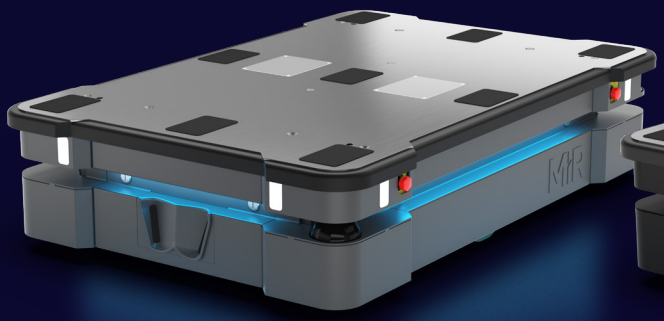
MiR100

Payload: 100 kg / 220 lbs

Size: Length: 890 mm / 35 in
Width: 580 mm / 22.8 in
Height: 352 mm / 13.9 in

Speed: Forwards: 1.5 m/s (5.4 km/t) / 3.6 ft/s (2.5 mph)
Backwards: 0.3 m/s (1 km/h) / 1.0 ft/s (0.7 mph)

AMRs to transport heavy loads and pallets

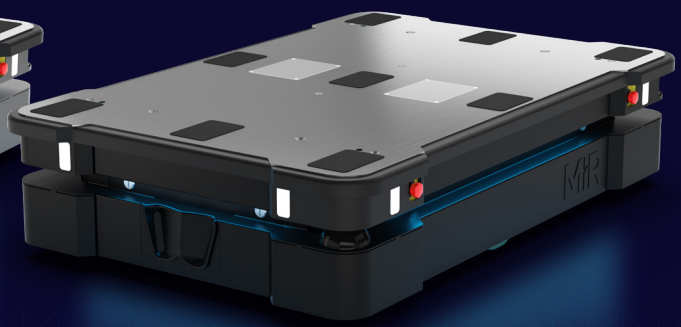


MiR600

Payload: 600 kg / 1320 lbs

Size: Length 1350 mm / 53.1 in
Width 910 mm / 35.8 in
Height 322 mm / 12.7 in

Speed: 2.0 m/s (7.2 km/h)



MiR1350

Payload: 1350 kg / 2976 lbs

Size: Length 1350 mm / 53.1 in
Width 910 mm / 35.8 in
Height 322 mm / 12.7 in

Speed: 1.2 m/s (4.3 km/h)

Find the solution you are looking for with MiR's own solution or 3rd party equipment from MiR Go

Out-of-the-box solutions from MiR include the MiR250 Hook, the MiR250 Shelf Carrier and, the MiR600 and MiR1350 Pallet Lifts and Shelf Lifts. These proven products ensure easy integration and scalability, from pilot programs to replicated systems that can be scaled across multiple sites

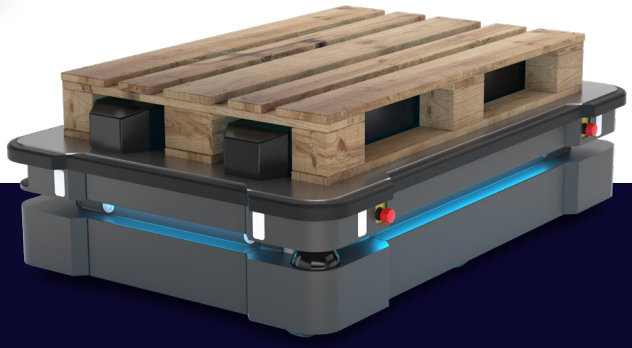
MiR250 Hook
Available for **MiR250**

MiR250 Cart Carrier
Available for **MiR250**

MiR Pallet Lift
Available for **MiR600** and **MiR1350**

MiR Shelf Lift
Available for **MiR600** and **MiR1350**

MiR EU Pallet Lift
Available for **MiR600** and **MiR1350**



MiR Go

The MiR robots are flexible platforms, ready for your application to be integrated. MiR Go is the world's largest eco system for third-party applications for AMRs. Via MiR Go you get access to +160 applications for your inspiration and contact details for the suppliers.

MiR Go Certified

In MiR Go you also find certified products. A certification from MiR is not just a stamp on a paper, it is a procedure where we test important features such as functionality and safety.

Find the MiR Go Certified products here:

mir-robots.com/mir-go-certified

Integrating AMRs into fully automated workflows requires powerful software

Depending on the level of integration you are looking for, you do not only need the right top modules to optimize your workflows. You most likely also need to connect your AMRs to your other systems.

MiR Fleet for integration into WMS

MiRs fleet management system, MiR Fleet, optimizes the robot traffic and ensures a fast and central configuration of a fleet of MiR robots. It can prioritize and select the robot which is best suited for a job, based on position and availability.
MiR Fleet has a full featured REST-API for WMS and ERP integration for fully automated logistics workflows.

Learn more about MiR Fleet

Want to learn more?

MiR has a team of application experts.

Get in touch today.