**Automating production processes**

**A modular solution for AMRs –
from standard design to bespoke construction**

**Autonomous mobile robots (AMRs) play a big part in automating production and intralogistics processes**. **item also works with AMRs, using them as lean production tools, primarily by combining the robot technology with components from the item Building Kit System. The pioneer in building kit systems for industrial applications has developed a standardised system for material transport that can be tailored to any requirements. As a result, it provides solutions that optimise intralogistics processes and considerably ease the strain on staff.**

AMRs are bang on trend. They move autonomously through warehouses and production areas, negotiate obstacles independently and – unlike automated guided vehicles (AGVs) – don’t have to rely on predetermined routes and tracks. When AMRs are used to move goods around, they can considerably improve the value-creation process. That was precisely why item chose to experiment with AMRs in its own warehouse, and developed special superstructures for them.

**Optimising transport processes**

The aim at item was to automate transport processes using autonomous mobile robots from Danish company Mobile Industrial Robots A/S, a leading manufacturer of collaborative, mobile robots. After all, staff at the Piepersberg European logistics centre were having to cover long distances several times a day to move small parts from A to B in small load carriers (SLCs), in mesh crates and on pallets. The logistics centre comprises eleven workshops and stretches a distance of 225 metres. Previously, goods were moved around using forklifts and pallet trucks that had to be operated by employees, meaning lots of staff had to set their work to one side while they transported components from one place to another. A solution was needed that could make the whole goods movement process more efficient. The company opted to use the MiR250 autonomous mobile robot, which has a small footprint measuring 580 mm x 800 mm, is 300 mm tall, weighs 250 kg and travels at a speed of 2 m/s. In the spirit of continuous improvement – a cornerstone of the lean philosophy – the item project team headed by product developer and innovation manager Przemyslaw Krzysztyniak developed a base carrier for this model of robot. It is made from aluminium profiles and fasteners from item and is mounted on wheels. The MiR250 simply docks with the base carrier and then moves it to the desired destination. The base carrier can be rapidly and easily loaded with pallets and mesh crates or, after a few swift moves, a standard rack can be attached to it so the robot can carry several SLCs.

**A standard design that can be customised**

The base carrier measures 1200 mm x 800 mm, making it the perfect fit for euro pallets, mesh boxes and item racks. Two Stacking Guides and Cover Profiles are located at each of the four corners to ensure pallets and mesh boxes can be rapidly and conveniently positioned. The containers can’t slip out of place, either, which ensures goods and components can be transported safely and securely. If several SLCs need to be moved around, the base carrier can be fitted with a rack that can be put straight to use once correctly positioned. No screw connections have to be fastened and there are no other installation steps to take. Depending on requirements, users can therefore quickly and conveniently switch back and forth between various containers and the rack. The standard rack is 1350 mm long, 950 mm wide and 1650 mm high. Two levels on the rack can be filled with up to eight SLCs and feature integrated roller conveyors for ease of placement. In its standard configuration, the top level of the rack is fitted with multiple Parts Containers. On other variants of the rack, the roller conveyors have been removed to make it easy to transport cardboard boxes. The roller conveyors can also be swapped for panels to make a regular rack frame. “This way, we’re providing a standard rack in three different designs but always with the same dimensions,” explains Krzysztyniak, a project manager and systems developer at item. “Customers can turn to these preconfigured systems to move most containers around quickly and easily.”

**Maximum flexibility thanks to the item Engineeringtool**

The base carriers and standard racks consist of components from the item Building Kit System, and the racks and other superstructures can be modified with outstanding flexibility due to their modular design. The [item Engineeringtool](https://item.engineering/DEde/tools/engineeringtool/57ca53a8d95b400484cc9a6dac814486) is the design platform for these solutions. To adapt the standard solutions, customers simply open the designs in this intuitive online tool and make whatever modifications or embellishments they require. This enables them to tailor these designs precisely to their needs. For example, users can swap out profiles to better accommodate the weight of the goods to be transported. Lightweight profiles are primarily suitable for moving around cardboard boxes and SLCs, while heavy-duty profiles are ideal for transporting mesh boxes with heavy loads. Additional roller conveyors and other components from the Building Kit System can also be incorporated. All this means customers have a range of options. They can order the standardised superstructures directly from item and take delivery of a versatile transport solution for their AMRs, or they can use the [standard solutions as a starting point](https://item.engineering/DEde/tools/engineeringtool/57ca53a8d95b400484cc9a6dac814486) for designing a customised construction that they create in the Engineeringtool. These custom solutions can also be ordered directly and delivered in just a few days.

**Automated transport lightens the load on staff**

What exactly does item achieve by using an AMR combined with standardised superstructures? This approach means intralogistics processes can be partially automated and takes a great deal of strain off staff. Workers now load the various levels of the mobile rack at specially configured transfer stations where every aspect has been ergonomically optimised. The MiR250 then drives under the rack, docks with it and transports the base carrier and its materials to the intended park position, which is 280 m away. On reaching its destination, it uncouples from the base carrier and drives to another station to pick up an empty rack and take it back to the starting point to be filled. The AMR is also responsible for moving packages around that are destined for dispatch. These are moved from A to B in mesh boxes or on pallets. “These transport processes previously would have tied up several staff members who had to drive the forklifts and pallet trucks almost as a kind of second job. Now, the AMR takes care of all the transport tasks,” Krzysztyniak points out. “This partial automation is saving us a lot of time. For example, a single journey from one workshop to another in a forklift previously took a good ten minutes – and these journeys had to be made several times a day. Now, the MiR250 handles all the transport tasks and staff can focus on their actual jobs.”

**Lowering costs and boosting process efficiency**

A whole range of transport tasks can be completed by a single AMR. The robot is extremely versatile and can rapidly adapt to new environments and production requirements. Another advantage is that using an AMR helps save costs. If you look at the total cost of ownership for a forklift, the actual purchase price only makes up 10 percent. Approximately 80 percent of that total cost is accounted for by staffing costs. These are completely eliminated by using an AMR. The energy costs for an AMR are comparatively low, too. All in all, using an AMR combined with item superstructures offers a whole host of benefits. By contrast, manual material transport is often inefficient and – given the worsening situation on the labour market – will no longer be an option in the future anyway. Krzysztyniak’s team is currently working on a simple solution for automating transport sequences with shooters and an ergonomic solution for filling mesh crates. “We develop our products in a cyclical process,” explains the systems developer. “CIP methods and other lean tools help us to continuously improve intralogistics processes so that market requirements can be met to the highest possible standard.”

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**Caption 1:** item has designed a base carrier made from aluminium profiles and matching fasteners for the MiR250 autonomous mobile robot. The carrier can be quickly and easily loaded with pallets, for example.

**Caption 2:** Mesh boxes can also be transported easily. The base carrier measures 1200 mm x 800 mm and has two Stacking Guides and Cover Profiles at each of its four corners to ensure goods can be transported safely and securely.

**Caption 3:** The MiR250 simply docks with the base carrier and then moves it to the desired destination. If several SLCs need to be transported, the base carrier is fitted with a rack.

**Caption 4:** The standard rack can be loaded with up to eight SLCs, but is also available in different versions and can be custom modified.

**Caption 5:** The base carriers and standard racks can be adapted with excellent flexibility thanks to their modular design. The item Engineeringtool is the design platform for these solutions.

**Caption 6:** By using the AMR in combination with standardised superstructures, item has been able to partially automate its intralogistics process and considerably ease the strain on staff.

**About item**

item Industrietechnik GmbH is the pioneer in building kit systems for industrial applications and a partner of the manufacturing industry across the entire globe. Today, the item product portfolio comprises more than 4,000 high-quality components designed for use in machine bases, work benches, automation solutions and lean production applications. The company has received a string of awards for products with ground-breaking industrial design and end-to-end ergonomics.

item is spearheading digital engineering by driving forward the digitalisation of processes with software tools developed in-house. The item Academy offers training at various levels, with on-demand training and online courses available in multiple languages.

Headquartered in Solingen, Germany, item has subsidiaries in various countries. Some 900 employees worldwide harness their know-how and passion to develop innovative solutions and services. Twelve sites make sure the company is always close to customers in Germany, with a global logistics chain ensuring swift delivery times for all components.

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