

Omron LD Autonomous Mobile Robots

Collaborative mobile robotics taken to the next level in intelligence

The Omron logo is displayed in a bold, blue, sans-serif font in the top right corner of the slide.

OMRON mobile robots are autonomous mobile robots (AMRs) designed to dramatically increase productivity in manufacturing and logistics operations by increasing throughput, eliminating errors and improving material traceability.

Today, OMRON has the largest installed base of AMRs in manufacturing. Our mobile robots can be deployed in thousands of applications across multiple industries.

Omron LD Autonomous Mobile Robots

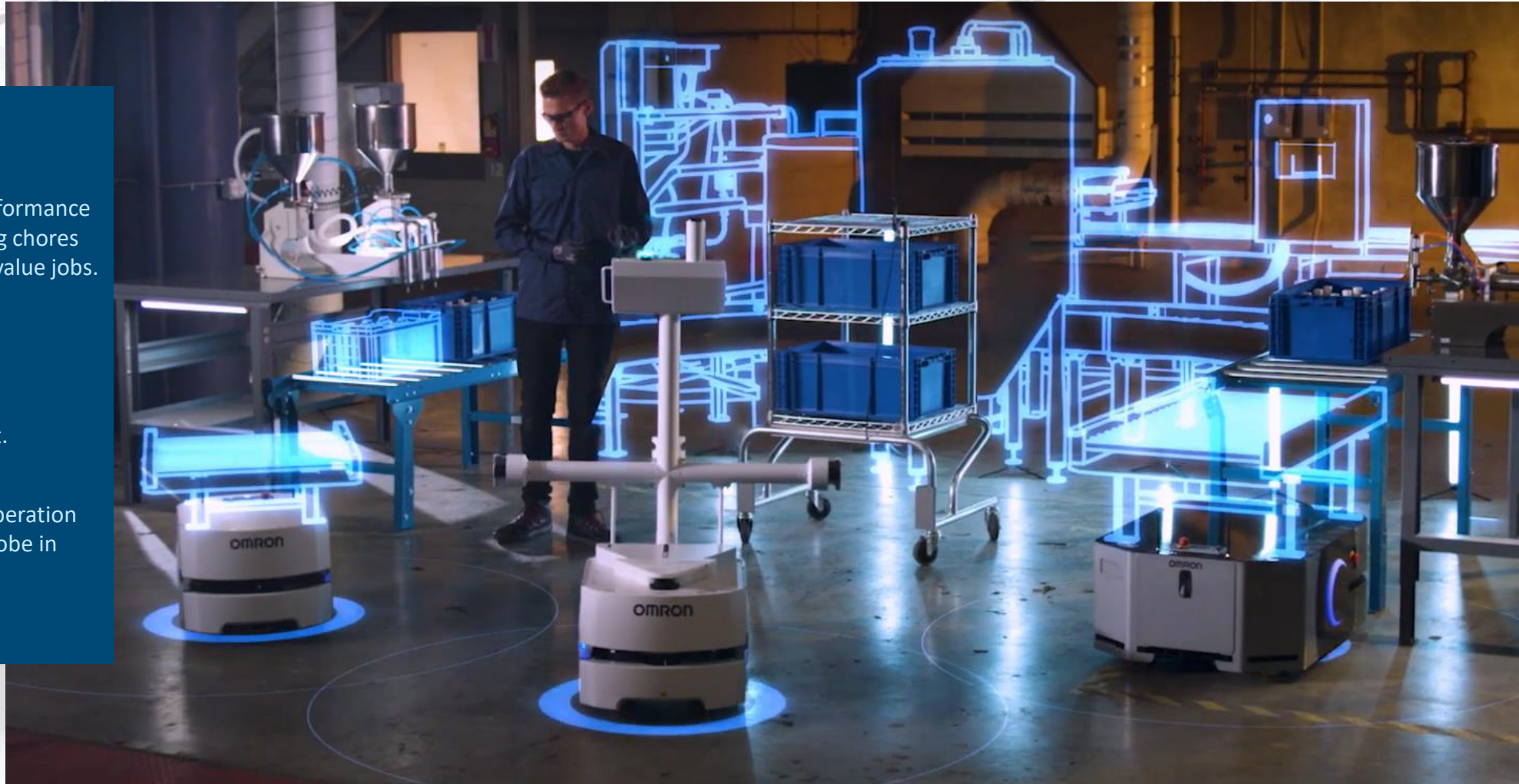
Collaborative mobile robotics taken to the next level in intelligence

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Robots are built for performance. OMRON's mobile robots handle the performance of simple transport, delivery, and routing chores so your employees can perform higher-value jobs.

Designed to meet the industry's latest requirements, our mobile robots interact with people to promote a collaborative, safe working environment.

Omron LD mobile robots have been in operation since 1997 with 1,000s of units across globe in 40+ countries.



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INTEGRATED | INTELLIGENT | INTERACTIVE

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Omron AMRs reduce costs while improving employee focus on value added activities that increase productivity



Central
Fleet
Manager



TRAFFIC CONTROL



COMMUNICATION WITH MES/WMS

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Omron LD AMR collaborative mobile robots have advantages that provide customer benefits in ease of set up and intelligent operation.

- Best in class navigation and safety
- Best in class fleet management
- Easy integration and scalability as your operations grow in collaborative automation manufacturing

Omron AMRs Best in class and customer tested navigation

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Omron AMRs easily navigate complex and high volume traffic areas with both people and other mobile vehicles



In collaborative work areas the Omron AMRs can safely adjust navigation and maintain map location



Even with moving people or equipment the Omron AMR's have advanced trajectory intelligence



Omron AMRs can interact with facility doors, elevators, and machine equipment



ŠKODA

The robot completes 120 trips per day and travels a total distance of 35 km on its route between the mechanical measuring center and the processing machines. The testing and pilot phases have already been completed; the robot is in regular use at the factory starting from June 2018

Omron AMRs Best in class and customer tested navigation

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OMRON's patented Acuity generates navigation markers from ceiling lights and objects, since these are more likely to remain fixed. Using these ceiling features, it generates an additional map to identify the fleet's position, no matter how frequently the environment on the floor changes.

Omron AMRs Best in class and customer tested navigation

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Omron AMRs offer two solutions for dependable and repeatable target positioning

Cell Alignment Positioning System (CAPS)

CAPS evaluates real-world features to effectively align robots for high accuracy drop-offs and pick-ups.

High Accuracy Positioning System (HAPS)

HAPS allows our mobile robots to move along fixed paths in applications that require tight tolerances.

Omron AMRs Best in class and customer tested safety

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Designed to meet the industry's latest requirements, our mobile robots interact with people to promote a collaborative, safe working environment. Safety lasers and sonar allow our robots to detect obstacles in their path and prevent collisions.

Safety Features:

- Avoids static and moving obstacles
- Additional E-stops are easily added
- Complies with ISO EN1525, JIS D6802 and ANSI B56.5 safety standards

REAR SONAR

Detect rear obstacles using sonar

LIGHT DISCS

Status indicator is located on both sides

FRONT BUMPER

Stops when in contact with obstacle.



SAFETY SCANNING LASER

Safety-rated laser used for SLAM (simultaneous localization and mapping) and safety functionality

LOW FRONT LASER

Obstacle sensor detects low-profile objects when moving forward

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INTEGRATED | INTELLIGENT | INTERACTIVE

Omron AMRs Best in class and customer tested safety

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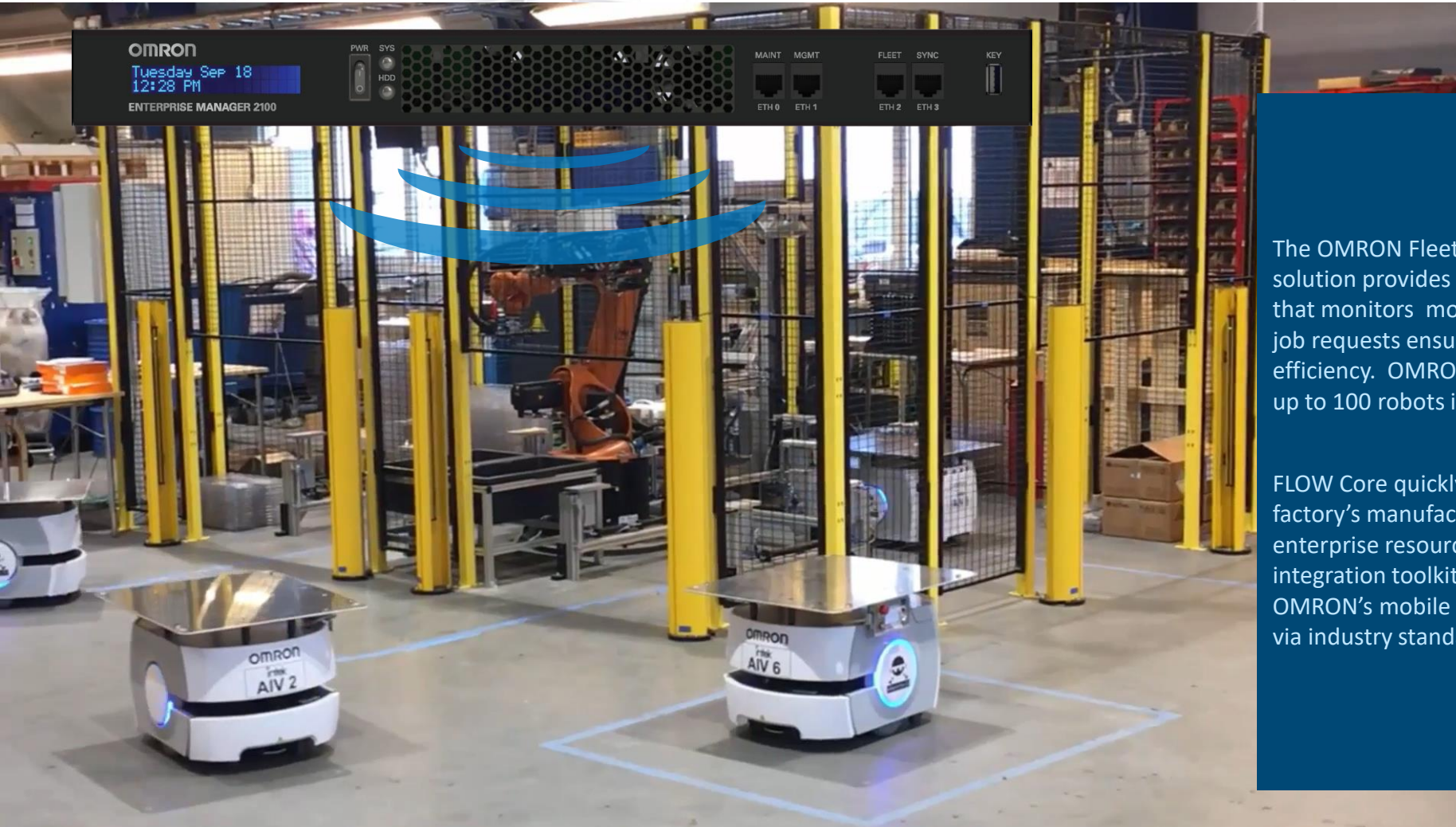


OMRON's patented side lasers offer safety to not only protect the robot but the load being carried and possible equipment or people that cannot be seen by floor level sensors.

Omron AMRs Best in class and customer tested fleet management

Collaborative mobile robotics taken to the next level in intelligence

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The OMRON Fleet Operations Workspace (FLOW) solution provides an intelligent fleet management system that monitors mobile robot locations, traffic flow, and job requests ensuring your factory operates at peak efficiency. OMRON Fleet Manager can manage fleets of up to 100 robots in any configuration

FLOW Core quickly and easily integrates with your factory's manufacturing execution system (MES) or enterprise resource planning (ERP) solution. The integration toolkit provided with FLOW Core connects OMRON's mobile robot fleet with any MES/ERP system via industry standard REST, SQL or MQ APIs.

Omron AMRs Best in class and customer tested fleet management

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The diagram illustrates the Intelligent Job Assignment feature. It shows a central robot with a task list of five jobs: JOB1, JOB2, JOB3, JOB4, and JOB5. JOB1 and JOB4 are marked with checkmarks, indicating they are completed. A 'NEXT' arrow points from the task list to a 'CURRENT' section, which shows JOB1 as the current task. The robot is positioned between two conveyor belts, each with a box icon and a checkmark, representing the start and end points of the assigned tasks.

Intelligent Job Assignment

Reduces wasted time and movement by continuously looking ahead to anticipate which robots will be best positioned for upcoming tasks.

The diagram illustrates the Managed Motion feature. It shows three robots moving along a path. The first robot is at a starting point, and the other two are further along the path. The path is represented by a series of connected lines, indicating the sequence of movement. The robots are shown in a way that suggests they are coordinating their movement to avoid collisions and optimize their path.

Managed Motion

Ensures smooth operations in busy environments by coordinating traffic flows and efficiently sequencing pick-up and drop-off at target locations.

The diagram illustrates the Traffic Control feature. It shows two robots moving along a path. The path is represented by a series of connected lines, indicating the sequence of movement. The robots are shown in a way that suggests they are coordinating their movement to avoid collisions and optimize their path. The path is shown in a way that suggests the robots are re-calculating their paths to avoid collisions.

Traffic Control

Notifies converging robots of their predicted paths, allowing them to re-calculate and avoid collision in the most efficient way.

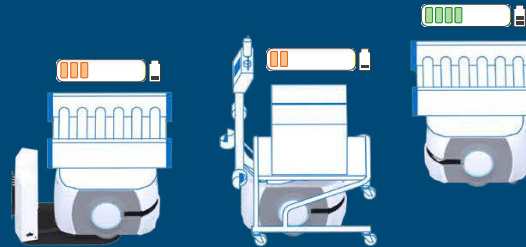
Omron AMRs Best in class and customer tested fleet management

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Automatic Updates

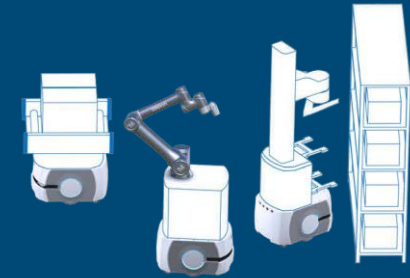
Performs map, navigation, and job updates automatically across the entire fleet



DOCKING STATION

Charge Management

Tracks battery power of the entire fleet, directing robots to their nearest available, or preferred, docking station on a schedule that ensures continuous fleet operation.



Skill Administration

Understands the capabilities of each vehicle in the fleet, and always makes sure that the right job is assigned to the right robot.

Omron AMRs Easily sets up in two steps

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Step 1 - Map



Step 2 – Set Goals

Ready to run –send jobs

OMRON mobile robots are easy to get up and running, requiring no construction such as the installation of magnets, and minimal programming. In addition, our software integrates with your other systems so you can get the solution up and running in minimal time.

- No construction required
- Autonomous navigation doesn't require preset routes, magnets, or beacons
- Easy integration with MES, ERP, and WMS
- Enhanced security to comply with IT systems

Omron MobilePlanner Tablet Edition

Collaborative mobile robotics taken to the next level in intelligence

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Omron's MobilePlanner Tablet Edition is an easy to use, portable, monitoring and control user interface tool for LD mobile robots.

Monitor Robots and Fleet Monitoring:

- View location and status of robots in color-coded map
- View alerts if robots need assistance
- View robots' coordinates, battery level and travel speed
- View job counts in current job queue

Easy-to-Use Troubleshooting and Control:

- View robots' laser readings
- Localize robots when needed
- Send robots to dock or other points on map
- Manually drive robots
- Initiate map-making process

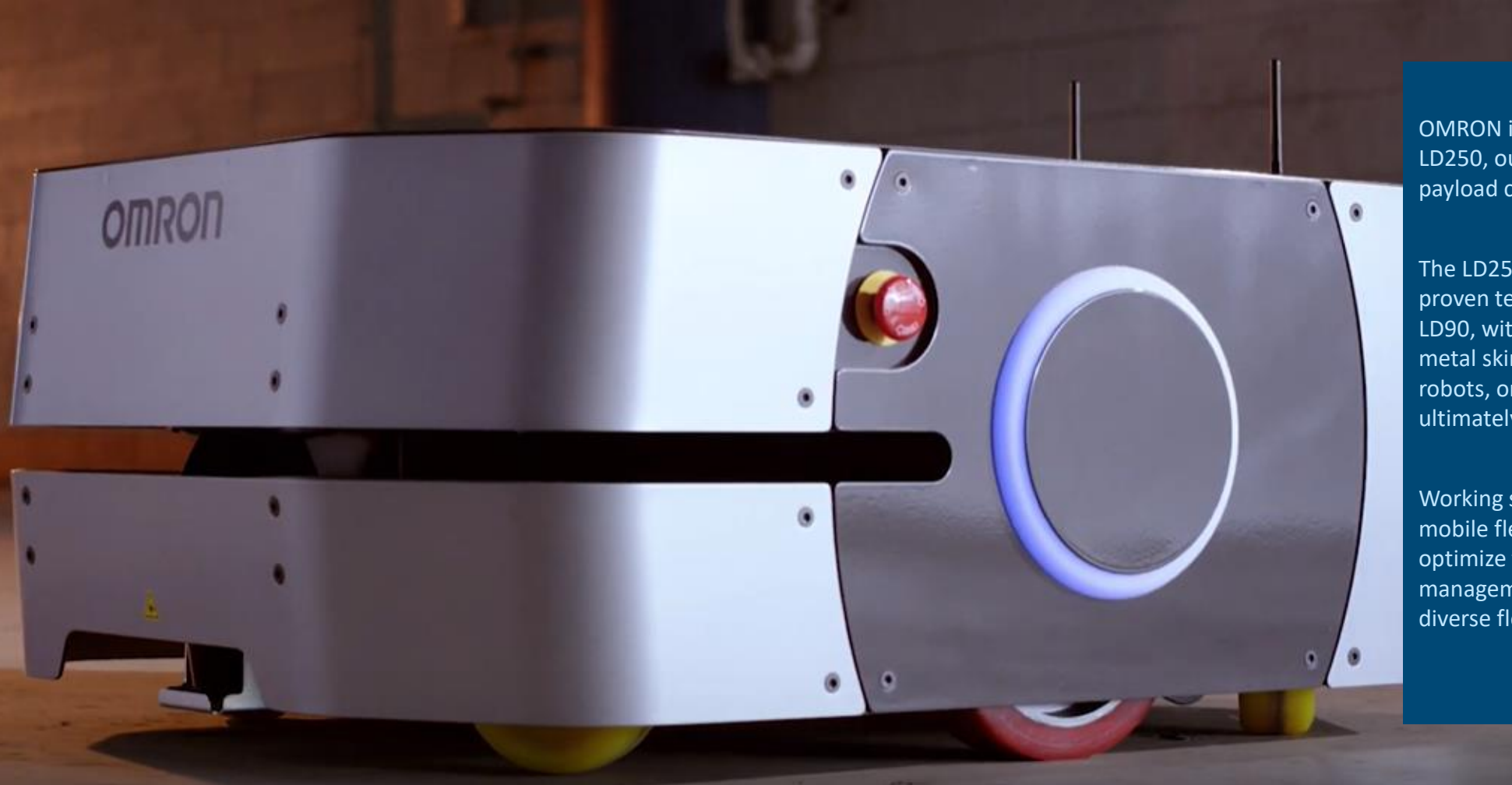
Flexible Access Control:

- Support user account and passwords
- Control access levels
- Control multiple LD mobile robots and Enterprise Managers

Omron LD250 Medium capacity mobile robot

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OMRON is proud to announce the release of the LD250, our latest automated mobile robot with a payload capacity of 250kg.

The LD250 is based on the same tested-and-proven technology used in the industry-leading LD90, with a higher payload capacity and tougher metal skins. Customers can now load more onto robots, or make fewer trips with heavier batches, ultimately doing more with less equipment.

Working seamlessly into an integrated OMRON mobile fleet, the LD250 can allow customers to optimize their traffic management, battery management, and routing of vehicles with a more diverse fleet.

Omron LD250 Medium capacity mobile robot

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Omron LD 250 AMR can safely navigate without the use of floor magnets or wall-mounted beacons. An AMR will first create a baseline map of a facility using built-in sensors, then will constantly detect its surroundings. When processes change, AMRs can easily change as well, creating networks of new routes or being reassigned to new tasks.

Product Data

Width	718 mm
Length	969 mm
Height	383 mm
Vehicle Weight	140 kg
Payload	250 kg
Speed	1.2 m/sec
Run Time	13 hours

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SAFETY SCANNING LASER

Safety-rated laser used for SLAM (simultaneous localization and mapping) and safety functionality

LOW FRONT LASER

Obstacle sensor detects low-profile objects when moving forward

Omron LD60/90 mobile robot

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The Omron AMR LD 60/ 90 includes Omron's proprietary self-navigation software ideal for use in crowded environments, tight hallways, and applications where a small automated vehicle is advantageous. The LD has a reliable drive system, an on-board power supply and automated self-charging.

Features:

- 60 / 90kg payload on flat floors
- Max speed: 1.3 / 0.9 m/s
- 12-hours of continuous run-time

Omron Mobile Manipulator Solution

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The OMRON Mobile Manipulator Solution is a robotics solution that automates not only transportation of goods but also complicated picking operations. By mounting an OMRON TM collaborative robotic arm onto an OMRON LD series autonomous mobile robot, the robotic arm is capable of picking up a product and placing it on the payload, as the mobile robot autonomously travels to various locations.

Omron Mobile Manipulator Solution

Collaborative mobile robotics taken to the next level in intelligence

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The Mobile Manipulator solution is Ideal for:

- Pick and place applications or
- Machine tending and inspection
- Material transportation
- Picking boxes of assembled parts to the inspection station
- Automobile inspections (e.g., cracks or paint on moving products)

While OMRON doesn't sell the fully integrated mobile manipulator as a product, we provide robotics that are designed to be easily integrated.

Integration guides and integrator partners are available to today for customer solutions:

TM5 + LD90

TM14 + LD250 (coming in 2020)

Omron AMR Success Story Omron electronics

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Omron's factory in Shanghai is creating an environment where people and robots work together, to meet challenges in manufacturing today, such as shortage in manpower and overall equipment effectiveness (OEE).



Omron AMR Success Story Skuda Auto

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The robot completes 120 trips per day and travels a total distance of 35 km on its route between the mechanical measuring center and the processing machines. The testing and pilot phases have already been completed; the robot is in regular use at the factory starting from June 2018.

The increasing production numbers at ŠKODA AUTO translate into higher utilized capacity for the plants and more traffic in the production areas. The autonomous robot contributes to the continuous improvement of work safety in Skuda Auto and helps to minimize work risks.

Omron AMR Success Story CresTek

Collaborative mobile robotics taken to the next level in intelligence



CesTek Automation completed a customer project with a total of eight fleet managed autonomous mobile robots as well as conveyors for product reception and delivery. The robots are capable of handling delivery of components as well as reception of finished products in a factory with a high bay warehouse and approximately 50 work stations.

The robots shown in this project are Omron LD-60 retrofitted with proprietary double conveyors on top. Each robot is capable handling a total payload of 60 kg with a top speed of 1.8 m/s. The conveyors on top can receive and deliver products at a speed of 0.5 m/s. In the given setup this gives the complete system a capacity of 250 boxes per hour.

Omron AMR Success Story Intek Engineering

Collaborative mobile robotics taken to the next level in intelligence

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Showcasing flexible production in real life, a new smart factory in Norway uses a variety of robots in a system developed and implemented by system integrator Intek Engineering. A dozen industrial robots, each in individual workstations or cells, perform different steps in the manufacturing process.

Omron AMR Success Story Europa Systems

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Europa Systems, Omron Solution Partner, developed and designed a dedicated solution with our LD mobile robot for a leading hearing aid manufacturer Sivantos' European Distribution Centre, creating a Smart Warehouse.

Omron AMR Success Story Mechatronic Solutions

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Mechatronic Solutions has been working with Omron for over 15 years, using systems and technology within their own developments. The companies have built up a close working relationship, which enables Mechatronic Solutions and Robopod to have partner access to Omron products to use within their own offerings, such as Podconnect®.

MECHATRONIC
SOLUTIONS

Omron AMR Success Story Sir Steward

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Sir Steward: The delivery robot experience

Your hotel has several floors. Your employees spend a lot of time walking to take care of the laundry, carry bathroom items, meals or other items to the rooms and have less time for customer service. What if a robot took care of the trips for you? That's exactly what the robot butler can do!

While your employees offer services to your customers or perform tasks requiring specific expertise and concentration, the delivery robot takes care of moving laundry and bringing meals to the rooms all by himself.

Omron AMR Success Story Certis Security, Cisco

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Security, patrol, and customer care mobile robot for airports, malls, public facilities.

Omron AMR – Support & Services

Collaborative mobile robotics taken to the next level in intelligence

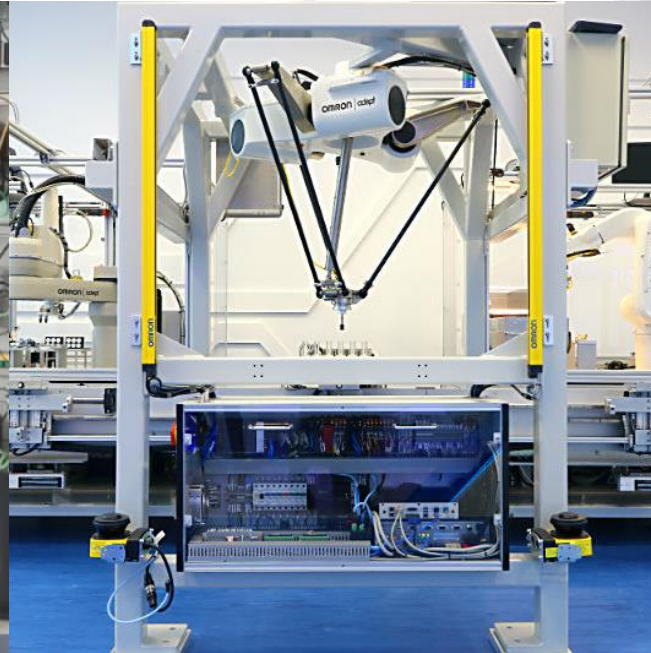
OMRON



Engineering, application, and proof of concept



Technical support and field engineering services



Safety product and services



Repair and field support services

Omron Engineering and Support services

Omron provides engineering and support for the complete customer journey from project development to product life cycle services. Omron Americas has region engineering centers and application engineers all across the north, central, and south America.