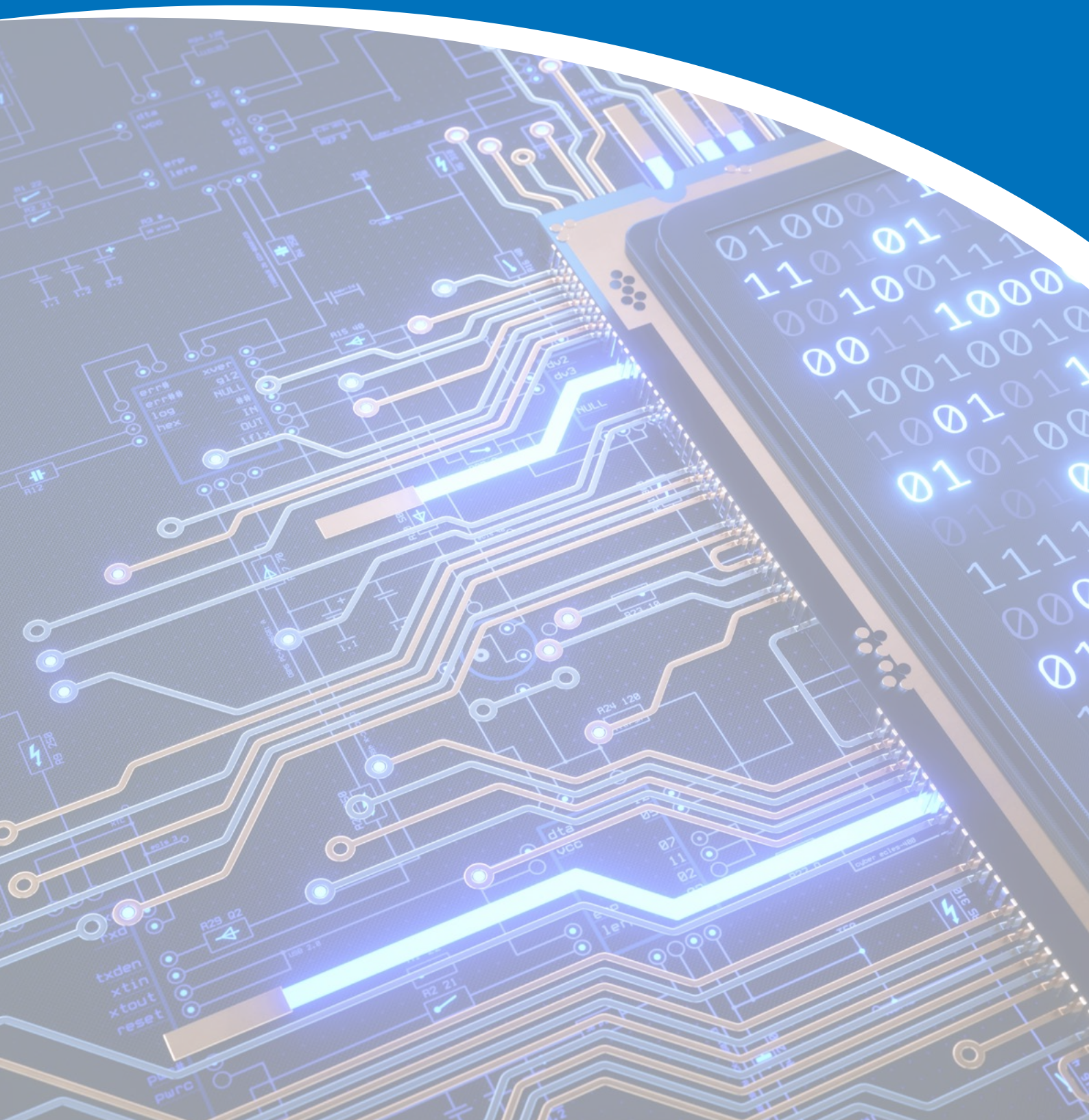
OMRON

Mobile Manipulator

in Semiconductor & Electronics



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01 CASE STUDY

Accelerating into the future with you. Combining the discrete technologies to create new ‘breed’ of robots with all the benefits.

GLOBAL FOUNDRIES

GlobalFoundries

Location:	Singapore
Industry:	Semiconductor
Products:	Semiconductor wafers
Date:	2013
Customer challenge:	Improve productivity by providing more predictable delivery times and reducing human errors. Optimize the workforce and redeploy workers to higher-value tasks.
Application:	60+ LD robots integrated with handlers used for intra-bay loading and inter-bay transfer. Robots carry pods from one machine tool to another and move works-in-progress to various process areas within the fab. They have been running 24/7 since 2013.
OMRON equipment:	OMRON LD-90 mobile robots.
Why OMRON was chosen:	Customer explored AGVs but preferred OMRON AMRs because of flexible navigation and ease of installation, as well as LD’s cleanroom rating.
Impact:	GlobalFoundries improved labor productivity by more than 5%, a big jump in Singapore’s productive semiconductor industry.

02 WHY MOBILE MANIPULATOR?

> Achieving consistent throughput, higher quality, stable workforce, and safer tasks mean assurance to your business.

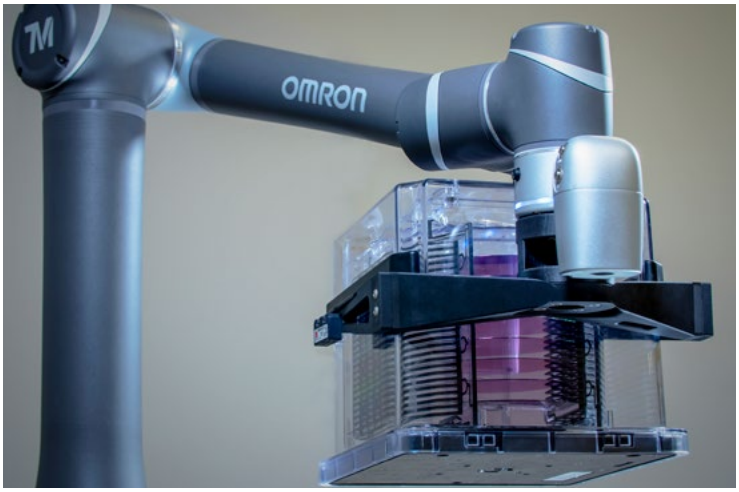
4 PRESSING ISSUES IN MODERN MANUFACTURING

1. CONSISTENCY IN PRODUCTION

Shift changes and break time are always key to throughput impact. Industry feedbacks that Mobile Manipulator help to improve up to 8% capacity gain.

2. ELIMINATION OF HUMAN ERROR

With human interference, errors are unavoidable and at best reduce through countermeasures. Wrong operations or materials results hefty impact on quality, production lost time, wastage and recall. OMRON powerful fleet management target for zero error with all computer driven task with traceable actions.



3. LABOUR ISSUES

Matured region is impacted by labour crunch situation and levy raises. In semiconductor segment, 30% of manufacturing cost comes from direct labour. In emerging region, steep rising of salary due to acceleration of industrialisation is expected to pressurise manufacturing cost1. Continuous direct labour training is also a factor to increasing cost. Workforce is also less favourable to low value and monotonous job.

4. CLEAN ENVIRONMENT

Human movement generate undesirable particles and ESD which is high risk in electronics or semiconductor manufacturing. Mobile Manipulator with constant moving speed, linear acceleration eliminates unnecessary generation of particles.

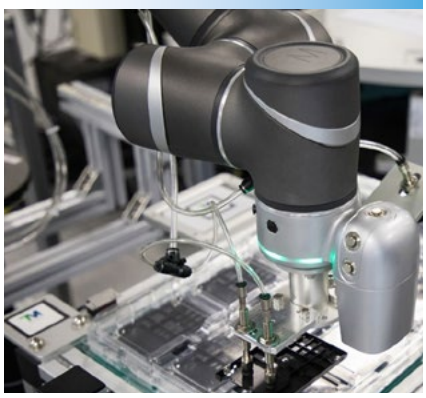
03 WHERE TO APPLY?

INNOVATION DRIVEN APPLICATIONS

Material Carrier Transfer

Example: Loading and Unloading Cassette, SMIF Pod, Trays, Bins from tooling.

Mobile Assembler

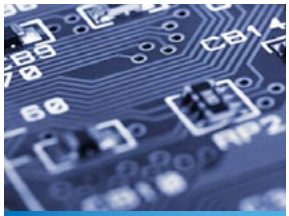


Example: Intelligent robot to perform assembly around multiple work station.

Mobile Machine Tending

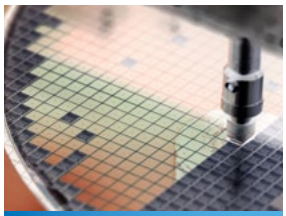
Example: Tending of parts, handling dangerous task like Mobile High Voltage Test, Pressure Leak test on assembled goods.

> "In OMRON we revolutionize our solution to meet customer needs, remove monotonous or unsafe work and at the same time creating collaborative space driving for Smart Manufacturing."



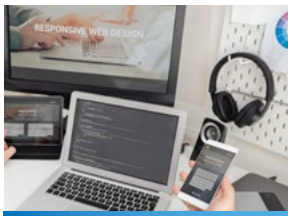
Printed Circuit Board

Hard Disk Drive



Semiconductor

Consumers Goods



Smart Devices

04 WHY OMRON MOBILE MANIPULATOR?

The mobile manipulator is capable of picking up a product and carrying it to different locations. It greatly reduces human-error associated with transporting high-value products, as well as human contamination products such as wafer SMIF or FOUP.

"With our proven field experiences, comprehensive solutions, with complete factory automation (ILOR+S) portfolio, and heavily invested automation centers, the whole manipulator can be built with OMRON products, with the best performance in the market."

FLEXIBILITY WITH POWERFUL FLEET MANAGEMENT

OMRON **FL**eet **O**perations **W**orkspace (FLOW) Core

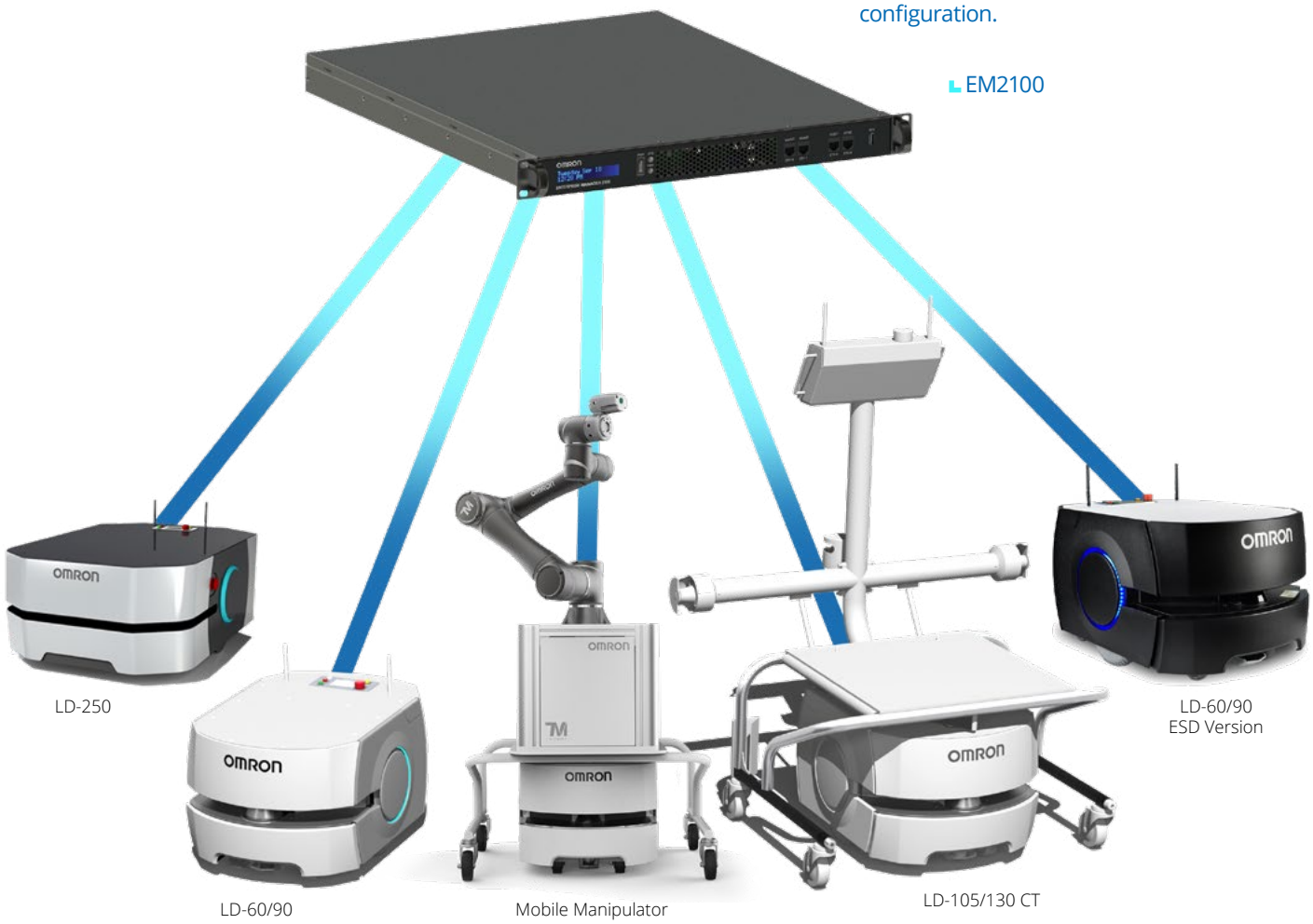
The OMRON Fleet Operations Workspace (FLOW) solution provides an intelligent fleet management system that monitors mobile robot locations, traffic flow, and job requests, ensuring your factory operates at peak efficiency.

- Displays robot location and status
- Displays job queue
- Prioritizes important job
- Select fastest routes based on human and robot traffic
- Identifies blocked paths and creates alternative routes
- Optimizes job assignments
- Optimizes battery charging

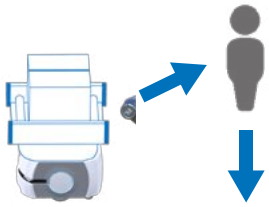
By automating robot tasks, our FLOW Core solution also reduces programming in your manufacturing execution system (MES) or enterprise resource planning (ERP) system.

The OMRON Fleet Manager, running with FLOW Core software, can manage fleets of up to 100 robots in any configuration.

EM2100

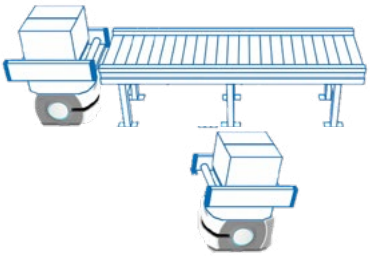


FLOW CORE FEATURES



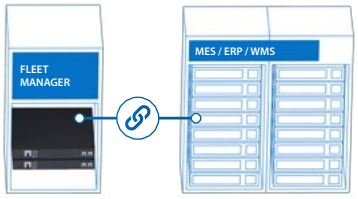
Dynamic Obstacle Avoidance

Intelligent decision making and path planning by tracking on objects motion.



Fleet Simulator

User can run simulations in virtual environment based on their real workspace with up to 10 robots



Fleet Integration Tool Kit

Decrease in integration cost with use of industry standards with option of Restful, SQL, Rabbit MQ & ARCL.

Hybrid Fleet Management

Greatly lower cost of installing fleets with diverse OMRON robot types. Increase fleet efficiency and job prioritization using more intelligent traffic rules.

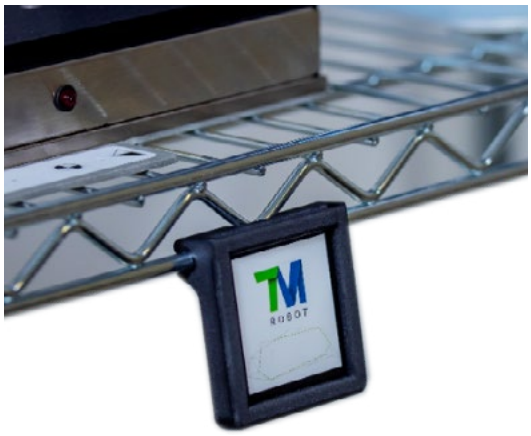
User Interface with PC and Tablet

Quick and simplify installation with robot call button functionality on Tablet. Integrator and customer can self program without additional cost incurred.

SEAMLESS INTERGRATION

With pattern recognition, object positioning and feature identification.

OMRON offers a wide variety of peripherals that quickly and easily integrate with our cobots. With the package of 'arm', 'eye' and 'leg' emulating human at work. The seamlessly integrated camera (the 'eye') in the arm is readily to use out of the box. With landmark detection, it provides close loop feedback for more precise handling. The 'arm and leg' are continuously coordinating just like a human.



The system is built with safety in mind to promote collaborative and safe working environment. It is equipped with Sonar, Time of Flight[1], Safety Laser Scanners to detect obstacles in their path to prevent collision.

1 For LD-250 model

SAFE BY DESIGN

Our software interface facilitates risk assessment

Force and speed monitoring are the defining abilities of collaborative robots. Our certified safety functions, including power limit and force limit, are always active and compliant with **ISO 13849-1** with Performance Level = d.

Our cobots also comply with the combined scope of ISO **10218-1:2011** and **ISO/TS-15066** for human-robot co-operational safety, allowing the robot to be programmed with both speed and force limits.

Our software provides Intuitive guidance and a proprietary interface to set up collaborative safety parameters

It is designed to promote a safer workplace.

OMRON mobile robots are fundamentally built to serve human workers.

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 bstacles
- Additional E-stops easily added
- Compiles with IOS EN1525, JIS D6902 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.

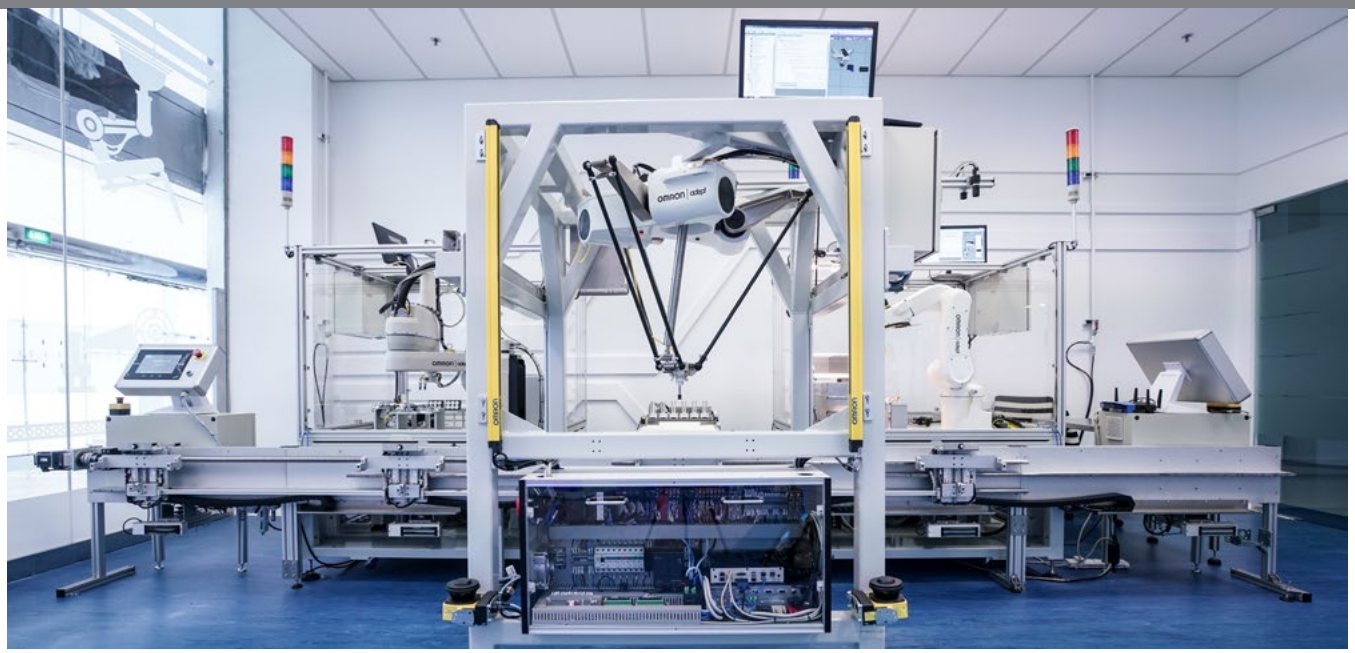
LOW FRONT LASER
Obstacle sensor detects low-profile objects when moving forward.

MADE FOR THIS INDUSTRY

"Designed to meet the latest industry requirement with various range of collaborative robot. It comes with certified SEMI model that comply to electronics and semiconductor requirements. ESD skins options are available on mobile robot platform. With IoT progressing fast, we offer options for Database/MES connectivity as well."

AUTOMATION CENTRE

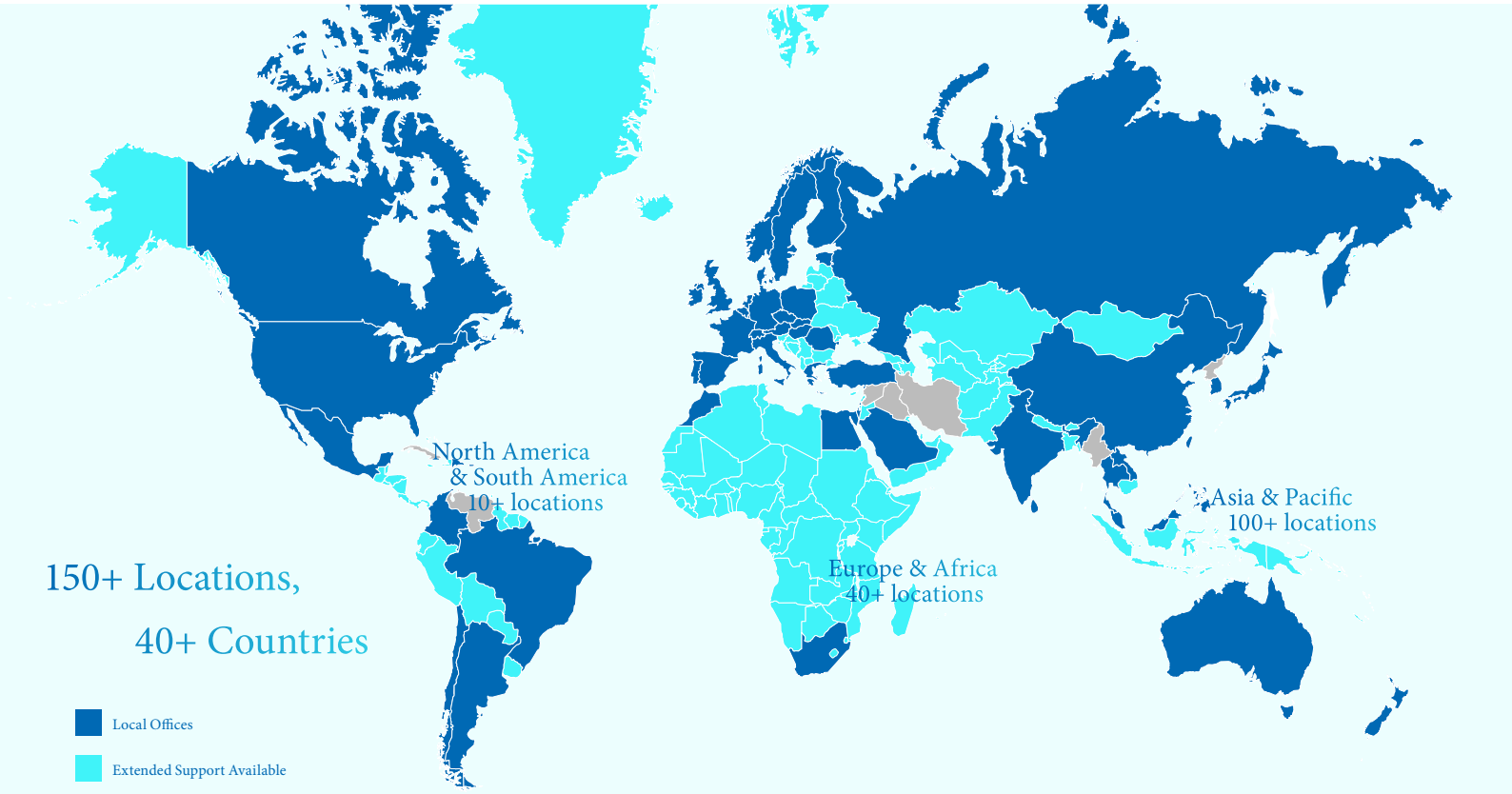
Get a glimpse into the future of manufacturing



OMRON Automation center (ATC) in Singapore is the first innovation showroom and R&D facility that's completely dedicated to exploring the use of advanced artificial intelligence (AI), the Internet of Things (IoT), and robotics technologies for manufacturing applications.

Our Robotics Showroom lets you experience manufacturing processes as they should be—connected, intelligent, and data-driven. Witness as well the seamless interaction between people and machines, as they revolutionise factory automation.

GLOBAL SERVICE AND SUPPORT



OMRON offers service and support for its mobile solutions almost anywhere in the world, ensuring our solutions will run with minimal unwanted downtime.

05 WHAT ARE THE BENEFITS?

In a highly driven Lean Six Sigma environment, implementing Mobile Manipulator address 5 wastages

Eliminate Errors with computer driven task list with traceability actions. This drive to remove defects like Reworks, Scraps and incorrect information.

Small lot inventory or work in progress movement with optimized movement in the process cut down waiting time for next step in a process.

Take the manual handling out of the formula to mitigate contamination.

Only necessary movement of material will be handled by Mobile Manipulator to WIP damage and defects, also eliminate human from exhaustion.

Deploy labour to value added task to better utilise shrinking workforce's talent skills and knowledge. An example is to read visualization chart to identify issue and carry primary maintenance.

MOBILE MANIPULATOR OVERVIEW

Specification

Manipulator Overview

Payload	: 4 - 14KG
Reach	: 700 - 1300mm
Power Supply	: 22-60VDC
Intergrated camera	: 5M pixel, colour
Optional	: SEMI certified

Designed to meet safety regulations ISO 10218-1 (including TS 15066) and ISO 13849-1.

Mobility Overview

Maximum Speed	760mm
Tire Composition	Non-marking Rubber
Suspension	Passive
Steering	Differential
Turning Radius	0
Traversable Gap	15mm (0.6 in)
Traversable Step	15mm (0.6 in)
Battery Votage	22-30 VDC
Battery Capacity	72 Ah (Battery cell nominal)
Run time	Approx 7-8 hours

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