# Mushiny

# LOGISTICS ROBOTICS & INTELLIGENT SYSTEMS

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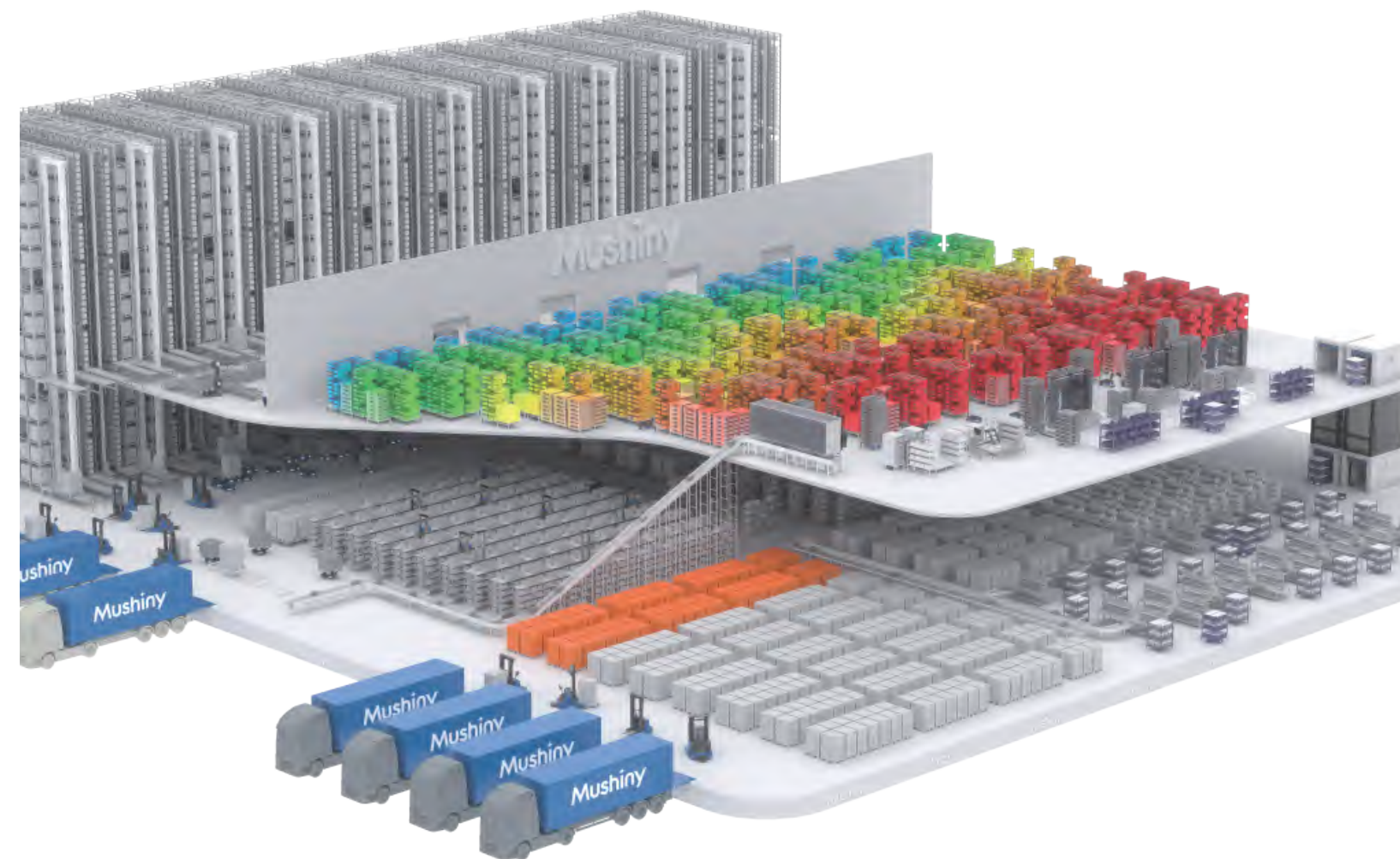
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# Logistics Robotics & Intelligent Systems

Founded in 2016, Mushiny is the world's leading tech company specialising in intelligent logistics robotic systems. Currently Mushiny has 200 employees, and its business covers more than 20 developed countries and regions with 50% of its business in countries other than its Chinese domestic market.

Mushiny is committed to promoting the application of robots worldwide based on its strong planning capabilities, proprietary system of logistics robots, and open robot software systems. Teaming up with partners dedicated to delivering a more efficient and productive world, the company is engineering ways to save people from monotonous, repetitive, and tedious tasks, so they can instead focus on constructive and creative activities that make the world a wonderful place.

· Founded in 2016
· Headquartered in China
· Over 500 customers and 200 employees
· Extensive global deployment capabilities

**Competence Centers:**

★ Suzhou
★ Huzhou
★ Nanjing
  Nantong
  Korea
  Japan
  Australia
  Germany
  USA

**100+** Above 100 patents

**20+** Covering more than 20 developed countries and regions around the world

**500+** Global customers

**1000+** Excellent Robot Management Systems which can run 1,000+ AMRs

# Business Mode



Mushiny's optimised intelligent robot centric solutions are suitable for a wide range of factory and warehouse applications.

**Intelligent Warehousing-Mushiny:**

With the Mushiny team's insights in warehousing operations, this business unit ensures rapid delivery of robotic logistics solutions for end users and system integrators using Mushiny's proprietary, modular and configurable robot-enabled iRES.
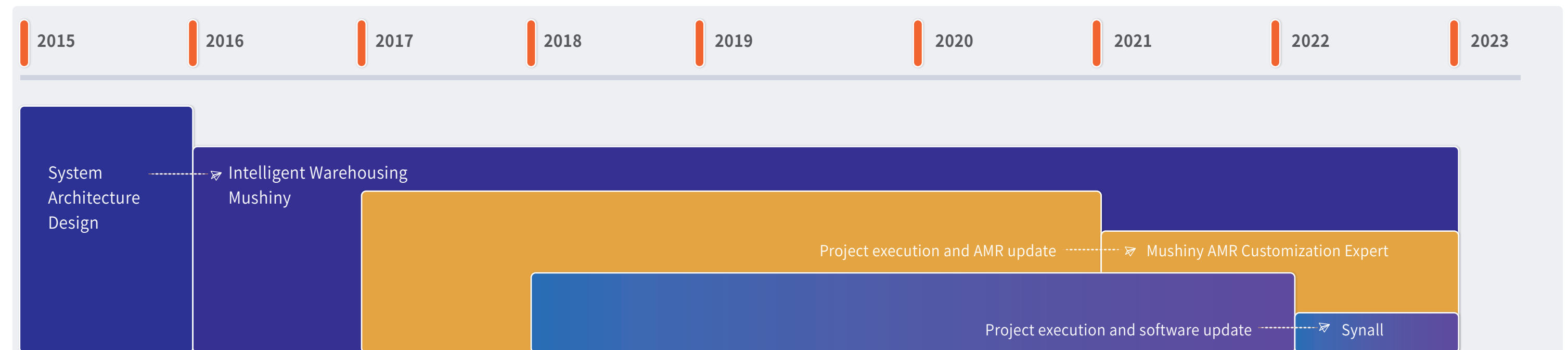
**Logistic Robots - Mushiny AMR Customization Expert:**

Thanks to the team's extensive knowledge of internal logistics and project implementation, this business unit offers reliable and robust warehousing robot solutions to global counterparts of logistics robots, integrators, automation enterprises, suppliers of Manufacturing Execution Systems (MES), and customers with development capabilities, based on the open protocol interface and extensive logistics robot platform and management system.

**Robotic Management system -Synall:**

Mushiny has developed an innovative technology platform to empower end users to take control of their automation requirements. The fully open hybrid robot scheduling system is easy to deploy and intuitive to operate and can seamlessly connect to a range of software systems, robots of different brands, and traditional automation equipment.

| 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |

System Architecture Design

⇥ Intelligent Warehousing Mushiny

Project execution and AMR update ⇥ Mushiny AMR Customization Expert

Project execution and software update ⇥ Synall

# Evolution over time

# Content

2023

CONTENT

# 01 Mushiny
# LOGISTICS ROBOTICS & INTELLIGENT SYSTEMS

Based on the team's insights to the warehouse scenarios, and the proprietary, modular and configurable intelligent robot execution system (iRES) of Mushiny, it is able to ensure rapid delivery for end users and logistics integrators. The logistics robot warehousing solutions are employed to achieve the rapid deployment and project commercialization within 60 days.
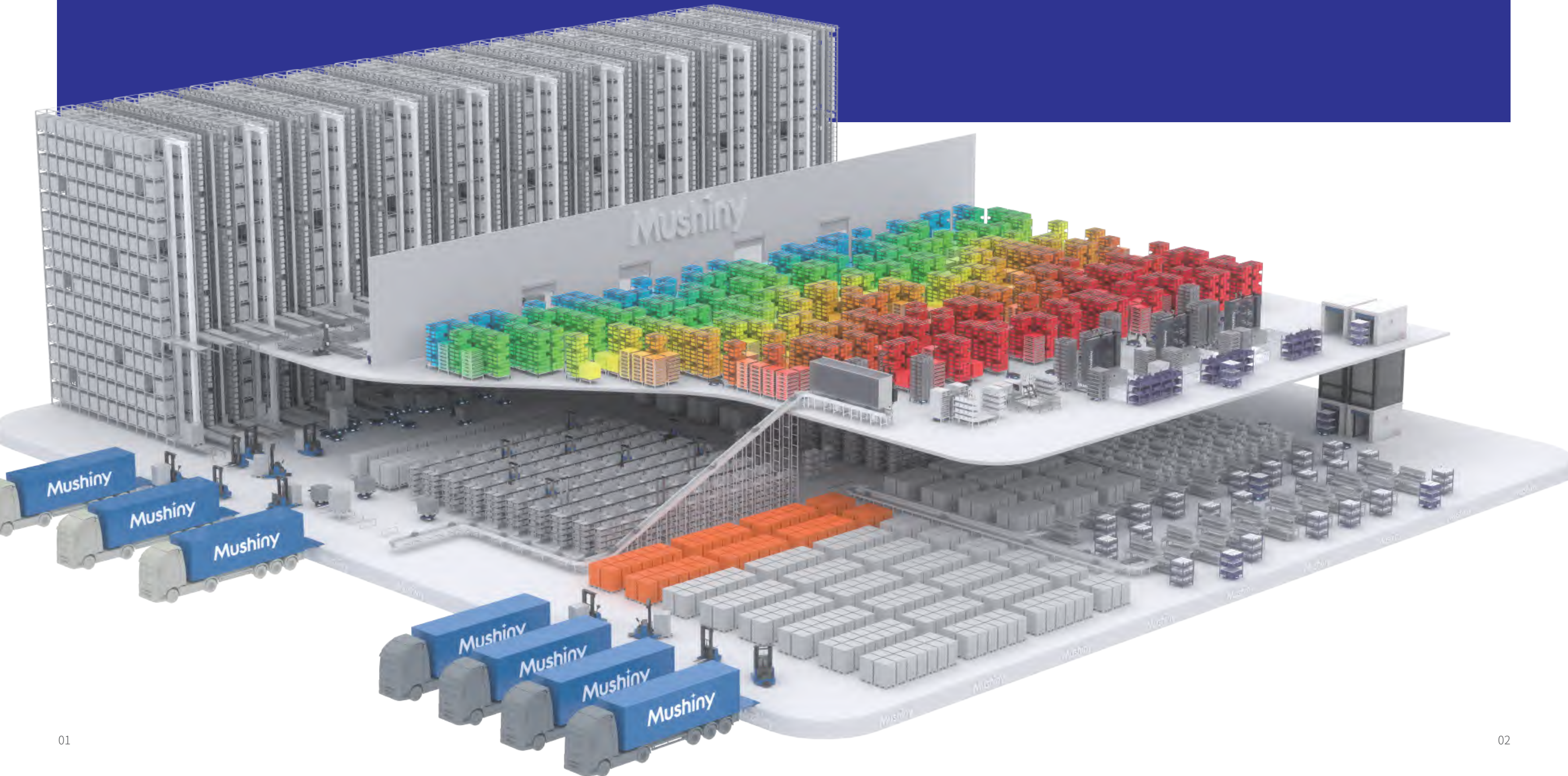
# Full Range of Logistics Robot Solutions

Empower warehousing logistics in an all-around manner

**Shelfs-to-person solutions**

Reduce operator working distance
Reduce work intensity and increase efficiency

**Totes-to-person solutions**

Reduce work intensity
Improve picking efficiency

**Intelligent sorting solutions**

Order/parcel sorting for easy and flexible expansion

**Intelligent Sorting Solution**

Forward/reverse product sorting to comprehensively improve picking and sorting efficiency

**MIX integrated solutions**

Improve storage space and minimize AMR units

## 2024

### 2023

· Establishment of Australian Branch
· 3D Sorter launch
· MIX3.0 launch

### 2022

· Entered the U.S. market
· Released a new-generation execution system, iRES, integrating warehouse management and scheduling
· Release of all-in-one goods-to-person solution MIX

### 2021

· Release of modular RMS software.
· Release of R-WMS 2.0 Plus.
· Multi-type AMR business scenarios fully compatible.
· Commence of R-WMS 3.0 research and development

### 2020

· Entered Vietnamese and Japanese markets
· Launched modular RMS software standardisation
· Release of modular R-WMS 2.0
· Adopted a new technical architecture
· Provided more advanced and efficient AI optimisation algorithms

### 2019

· Commenced strategic cooperation with Shinsegae, South Korea
· Awarded the Australian Post project

### 2018

· Won the first smart warehouse order from e-commerce player: Suning
· R-WMS 1.2 Suning project officially debuted

### 2017

· R-WMS 1.0 standard product successfully developed

R-WMS's first year
Intelligence warehouse management system architecture design completed

## 2016

# Intelligent Warehousing Solutions



| Tote | Dimension(l*w*h) | 600*400*300mm (23.62*15.75*11.81 in) |
|---|---|---|
| Shelf | Dimension(l*w*h) | 1,365*1,245*3,718mm(53.74*49.02*146.38 in)(customizable) |
| | Maximum tote load capacity | 30kg(66.14lb) |
| | Qutity of totes stored on a shelf | 60 totes(customizable) |
| Work Station | Dimension(l*w*h) | 3,805*2,655*4,295 mm 149.80*104.53*168.09 in |
| | Minimum reach height | 300mm(11.81in) |
| | Maximum lifting height | 3,420mm(134.65in) |
| | Cache storage location | 36 |
| | Throughput | 300 totes / station/hour |
| | X-axis maximum speed | 2.8 m/s (6.26 mph) |
| | X-axis acceleration | 2 m/s²(6.56 ft/s²) |
| | Y-axis maximum speed | 2.8 m/s(6.26 mph) |
| | Y-axis acceleration | 2 m/s²(6.56 ft/s²) |

## Shelfs-to-person

Through the application of iRES in conjunction with Mushiny T-series robots, the GTP solutions allows the PODS/pallets required for orders to be conveyed to operator for the picking purpose. This has revolutionized the conventional "person-to-goods" warehousing mode, enabled a "goods-to-person" intelligent operation, decreased the intensity of labor, and doubled the picking efficiency. Meanwhile, the picking workstations are employed with the POD height of up to 2.7m(8.86ft), thus making full use of warehouse space, and raising the storage capacity by more than 20%.

iRES + Shelf AMR + Automatic charging pile + PODs with multiple storage shelvesand pallets + Multifunctional Workstation + Distribution device

## MIX all-in-one goods-to-person

The totes are stored on movable pods and transported to workstations by T Series AMRs, which automatically identify and grab the totes through Mushiny unique algorithm, and then transport them to pickers to complete the new picking process of tote picking. With the Mushiny iRES system, it supports both the conventional AMR pallets and PODs, so as to fulfill a comprehensive solution for the storage and sorting of all categories in the same scenario. The maximum height of the POD may be 3.7m (12.14ft). High-density storage, increasing storage density by 400% The configuration caches used for storage of hot-selling items may reduce the handling task by 5%. Night time consolidation, achieving single POD hit rate of >10 totes, increasing pick efficiency by 4~5 times.

iRES + Shelf AMR + Automatic charging pile + MIX totes and PODs + MIX Workstation + Distribution device

# Intelligent Warehousing Solutions





## Totes-to-person

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In conjunction with the Mushiny Z-series robots, iRES enables rapid storage and retrieval of totes from static racking. This extends the storage scope to fully utilise the warehouse height. Together with a picking workstation, this increases the storage density by more than 30% and the picking efficiency by over two-fold.
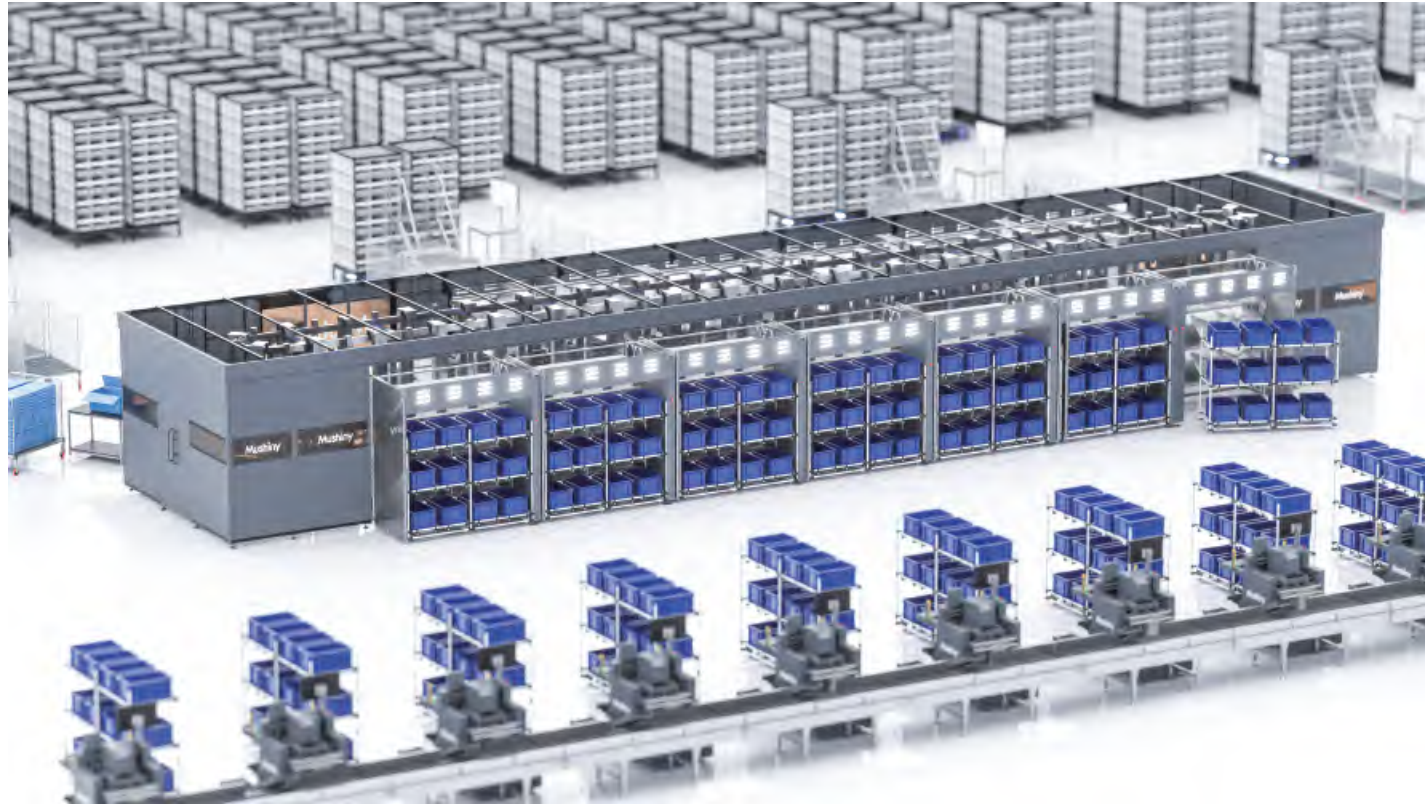
## Intelligent sorting

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The F-series sorting robots enable the interfacing with customer systems and conveyor lines, etc. in a flexible manner, and other operations such as parcel sorting and order transportation. According to the customer's business development, the storage space may be flexibly adjusted and expanded. The operation efficiency of robots may be enhanced in an all-round manner, using the dual-belt design, the large parcel transported in a single package, the small parcels conveyed in the dual packs.

iRES  +  Shuttle AMR  +  Automatic charging pile  +  Totes and PODs  +  Multifunctional Workstation  +  Distribution device

iRES  +  Sortation AMR  +  Automatic charging pile  +  Put wall-based cage trolleys

# Intelligent Warehousing Solutions

## Intelligent sorting

● ● ● ● ●

3D Sorter uses an innovative automatic put order solution, fully utilized 3D space, the flexible layout of the destination container location is adopted, and it can be applied in various logistics solutions such as forward logistics and reverse logistics. For multi-order put order, return sorting, material group set sorting and other processes have extremely high sorting flexibility, sorting accuracy and efficiency, the maximum sorting efficiency can reach more than 10,000 pieces per hour. In a variety of operation processes such as put order and picking order, the efficiency has been significantly improved, and the work intensity has also been significantly reduced, improving ROI for customers.
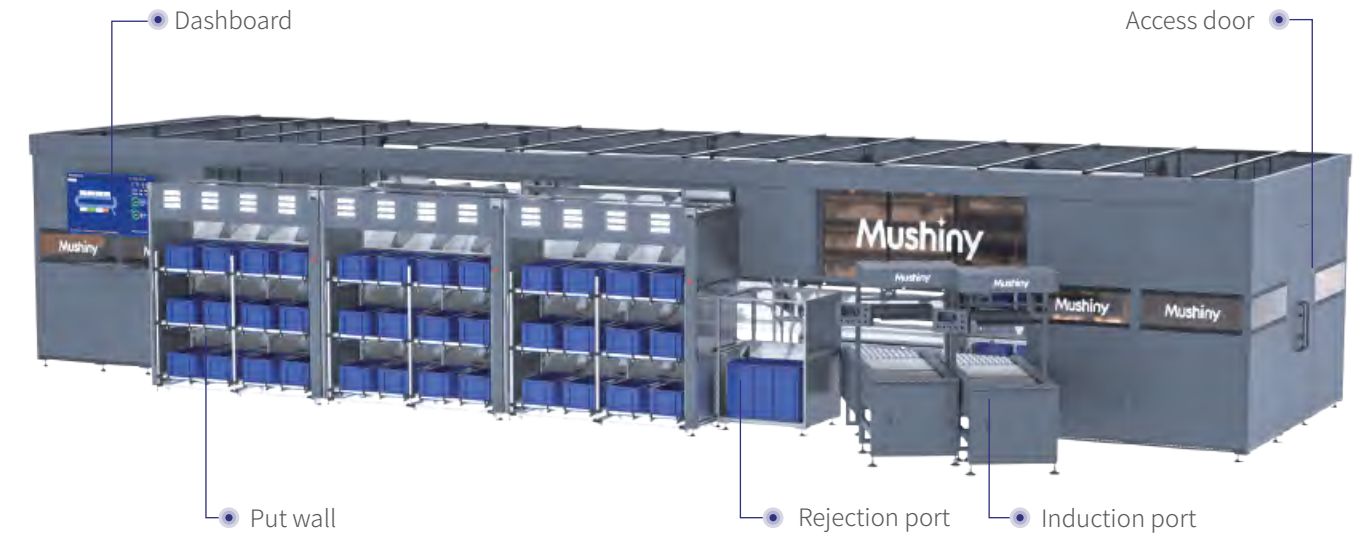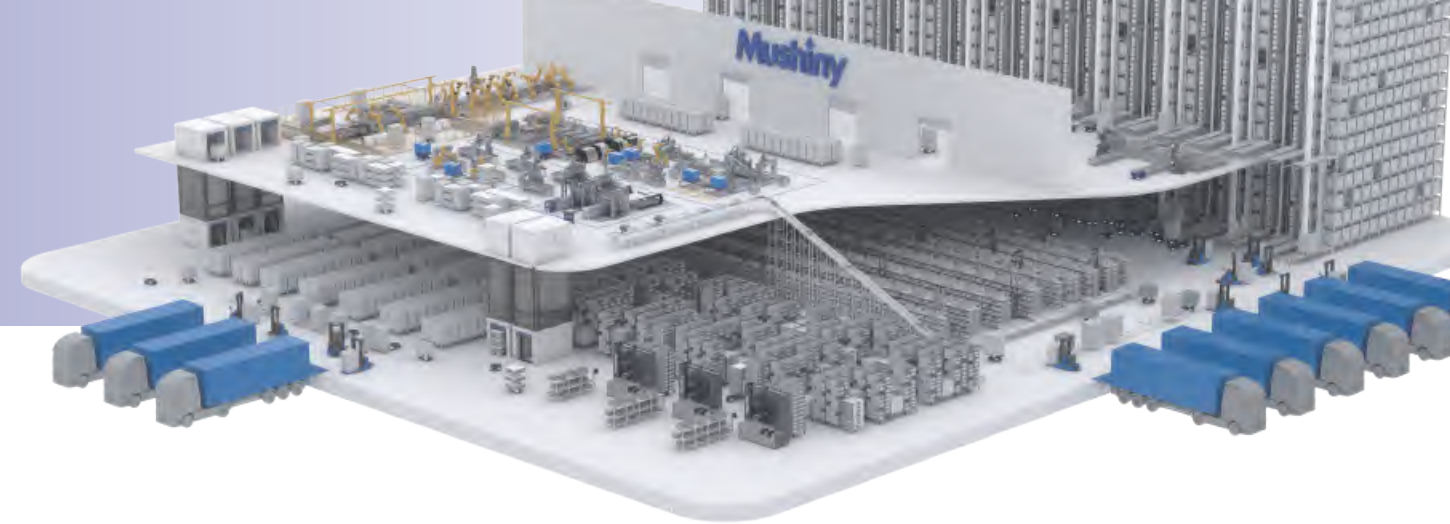
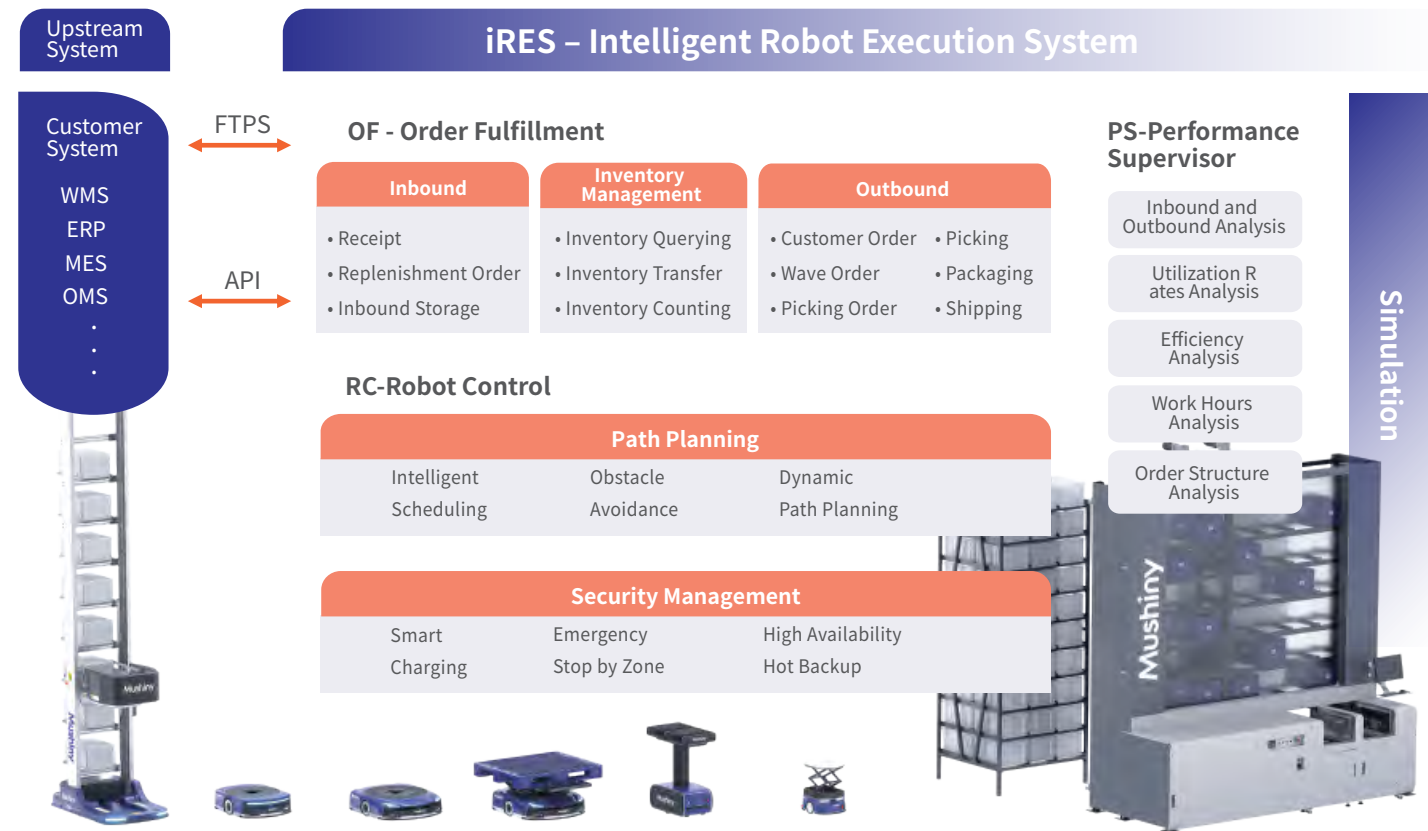**SMS**  +  **3D Sorter**  +  **Distribution Device**

## Product overview

- Dashboard
- Access door
- Put wall
- Rejection port
- Induction port

## Product parameters

| | | |
|---|---|---|
| **3D Sorter** | **Product size (L, W, H)** | L10,050~66,000mm, W3,820mm, H2,700mm(L395.67~2,598.43in, W150.39in, H106.30in), (Length, height and size can be customized) |
| | **Size of sorted goods (L, W, H)** | L50~450mm, W50~320mm, H1~320mm(L1.97~17.72in, W1.97~12.60in, H0.04~12.60in) |
| | **Weight of sorted goods** | 0.02~7kg(0.04~15.43 lb) |
| | **Number of Induction ports** | 1~10 (Configurable) |
| | **Number of destination** | Quantity customized according to actual needs |
| | **Maximum throughput** | 14,400pph |
| **Induction port** | **Scanning method** | Top scan/Top scan+scanner |
| | **Conveyor inner width** | 540mm(21.26in) |
| | **Conveyer length** | 2,450mm(96.46in) |

# iRES

## Intelligent Robot Execution System



## Modularity, high cohesion, low coupling, high reliability

### iRES – Intelligent Robot Execution System

**Upstream System**

**Customer System**
- WMS
- ERP
- MES
- OMS
- ·
- ·
- ·

FTPS

API

**OF - Order Fulfillment**

| Inbound | Inventory Management | Outbound | |
| --- | --- | --- | --- |
| • Receipt | • Inventory Querying | • Customer Order | • Picking |
| • Replenishment Order | • Inventory Transfer | • Wave Order | • Packaging |
| • Inbound Storage | • Inventory Counting | • Picking Order | • Shipping |

**RC-Robot Control**

**Path Planning**

| Intelligent Scheduling | Obstacle Avoidance | Dynamic Path Planning |
| --- | --- | --- |

**Security Management**

| Smart Charging | Emergency Stop by Zone | High Availability Hot Backup |
| --- | --- | --- |

**PS-Performance Supervisor**
- Inbound and Outbound Analysis
- Utilization Rates Analysis
- Efficiency Analysis
- Work Hours Analysis
- Order Structure Analysis

**Simulation**

### Highly Adaptable to Varying Scenarios
Supporting multiple types of robots

### Simulation
Convenient 1:1 operating scenario simulation and output of high-value decision data

### High Accuracy Permission Control
Completely flexible and comprehensive iRES permission control

### Emergency Stop by Zone
Customised emergency stop zone and no-passing zone settings, equipped with fire-fighting systems and automatic safe obstacle avoidance

### High Flexibility Configuration Strategy
Flexibly meet requirements for inbound/outbound/inventory strategy of warehousing operations

### Efficient Scheduling
Scheduling 1000+ AMRs in one map, intelligent algorithm, dynamic path planning and comprehensively improving AMR operating efficiency

### Strong System of Operation Reports
Sufficient data of operation reports for improvement of on-site management efficiency in all respects

### Smart Charging Strategy
Smart charging strategy ensues efficient operational performance Smart charging under AI temperature control ensures the safety of high-temperature operations
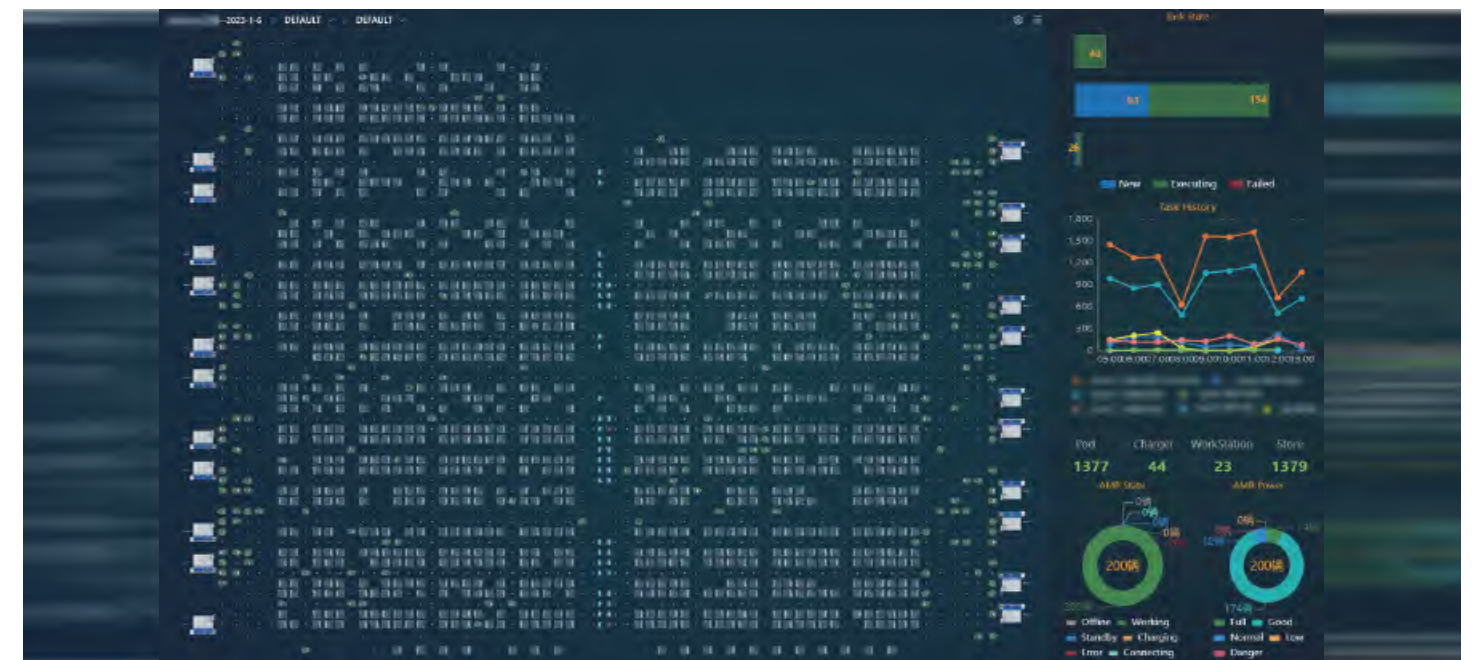
# Successful Stories

## E-commerce Apparel Industry
### Well-known Korean E-commerce Apparel Concern – E·LAND

The E·LAND Group is South Korea's leading apparel manufacturer. The Tianan Logistics Center supports online and offline sales for various brands and accommodates around 800,000 items and over 100,000 SKUs.

Location: Korea

Industry: Apparel and footwear

Area: 4,000 ㎡ (43,055 ft²)

SKU: 100,000

Number of robots: 93 sets

Total inventory: 800,000 pieces

## ✦ Advantages

**AMR transformation and implementation within the existing warehouse completed in three months**
Despite the adverse impact of COVID-19 in 2020 the intelligent remote support function of Mushiny was able to complete the inventory transfer covering an area of 6,100㎡ (65,660ft²) and the AMR warehouse implementation in just three months. The actual storage capacity exceeded 750,000 items, and the peak storage capacity in excess of 800,000 items with over 100,000 actual SKUs in storage.

**The accuracy of inventory counting up to 99.99%.**
The Intelligent Robot Execution System (iRES) ensures that the system operation is synchronised with the physical operation at the time of picking and storing goods. Through the iRES's storage rules configuration, manual operational decisions governing complexity such as a large variety of SKUs, inventory or order profile are automated. It is also possible to historically interrogate processes and retrieve associated data to provide complete traceability.

**Reduce the number of operators by 40%**
After the AMR system goes live, the number of routine operators is reduced from 24 per day to 16 per day (including the on-site management team) for the same quantity of orders.

**Save 32% of storage area**
Design scheme with eight different PODs/totes are employed. Taking into account two dimensions, the size and weight of goods, the all-new "Buge PODs," "Suspending Totes," and "Four-sided PODs" are introduced. This can achieve a POD filling rate of over 60% and reduce the storage area from 6,100㎡ (65,660ft²) to less than 4,100㎡ (44,132ft²).

**Flexible design**
All the fixed workstations employ the functional design, and types of tasks can be adjusted at any time in light of on-site requirements. Accordingly, the PDA storage workstations that can be added or deleted at any time are reserved and configured. This enables the on-site team to select the most appropriate operation strategy based on the type of inbound goods. These efforts aim to facilitate the consistency of offline and online businesses.

# All Categories of E-commerce Industry
YH Global Supply Chain Warehouse



Founded in March 2012, Shenzhen YH Global Supply Chain Co., Ltd. is a collaborative enterprise dedicated to integrated supply chain services, cloud warehouse management solutions, vendor-managed inventories solutions and other related services. The company is also engaged in freight forwarding, import and expert service. The YH Global logistics center has a warehousing area of 55,000㎡ (592,015ft$^2$) in aggregate, with more than 20,000 SKUs. The center has an aggregate capacity of around 6 million parcels, a daily delivery volume of 200,000 units, and the delivery volume peaks to 650,000 units for the "Double 11" online shopping festival.

A central element of the warehouse is the AMR system that covers 8,000 ㎡ (86,111 ft$^2$). YH Global and Mushiny jointly addressed the planning, design, deployment, and operation that included the delivery of 230,000 of the most complex orders. The average stock keeping units (SKU) per order is 3.64, and the number of units per customer order is 4.72 . The shipment is processed at the minimum cost by having AMRs deal with the most complex orders and workers manually handling simple orders only.

- Location: Zhejiang, China
- Industry: general merchandise – e-commerce
- Area: 8,000㎡ (86,111 ft$^2$)
- SKU: 20,000
- Number of robots: 310 sets
- Total inventory: 400,000 pieces



## ✦ Advantages

**Ultra-short duration of 27 days**
On September 9, 2021, Mushiny was given access to the site to commence implementation. On October 5, 2021, under the control of Mushiny, incoming goods began to be stored in the PODs within the AMR area of 8,000 ㎡ (86,111 ft$^2$) and outbound tasks were completed on the same day. This has established a new benchmark of the ability to launch a logistics robot warehouse in the all-time shortest duration of 27 days from commencing on site to the project going live.

**Successfully managed the "Double 11" shipment challenge**
Twenty-five days after the project was kicked off, the "Double 11" volume peak arrived on November 1, 2021, when 70,000 parcels were delivered and 40,000 parcels were dispatched per shift. During the "Double 11" event, Mushiny managed to deliver 230,000 parcels and help the customer successfully tackle the challenge of increased shipments from the festival.

**100% Increase in Pick Efficiency**
After the AMR system went live, the average picking efficiency doubled compared with the manual picking efficiency; an increase of 100%.

**Scheme design concept of "Manual Mode plus AMR Mode"**
To address the pronounced peak and valley profile of e-commerce sales volume, Mushiny devised a scheme of "Manual Mode plus AMR Mode" for customers. Popular products with high sales volume are picked manually while the complex mixed orders are stored and picked in the AMR area. The shipments are processed at the minimum cost by having AMRs deal with the most complex orders and workers manually handling simple orders only.

# Third-party Logistics

## 3PL Well-known E-commerce Company in Australia

Australia Post is the largest logistics and warehousing enterprise in Australia. There are over 36,000 employees in the delivery, logistics, retail, and e-commerce networks of Australia Post, which annually delivers more than 4 billion parcels in around 1,150 outlets of parcel delivery across the country.

The Australia Post project, carried out by a local Integrator in Melbourne, is the first AMR robot project in Australia and represents an important milestone in the Australian AMR automation industry. The project has improved the operating performance of Australia Post's flagship distribution center in Tullamarine, enhanced the accuracy of fulfilment, and raised operation efficiency and service quality.

Location: Melbourne, Australia

Area: 1,200 ㎡ (12,917 ft²)

Number of robots: 45 sets

Industry: apparel and footwear

SKU: 4,000

Total inventory: 200,000 pieces

## ✦ Advantages

**Increasing Pick Efficiency by 300%**
The first phase of the clothing warehouse project of Australia Post has been equipped with the Mushiny Tianma series of AMR robots and the multi-functional workstation that supports the picking algorithm of the process. The test data from the first week after the transformation and upgrade indicate that the order accuracy has increased to 99.999%, and the picking efficiency has grown by 300%.

**Flexible to Relocate**
In 2021, thanks to the remote assistance of the Mushiny team, Australia Post completed the process of launching the original project offline within three days; the on-site packaging and transportation enabled by equipment; as well as the new warehouse going live and starting stable operations. During the process, no goods were removed from PODs; thus, the sales impact on customers was minimized.
The new warehouse is adjacent to the core office of Australia Post. The number of PODs in the warehouse has grown by 40%, and the number of workstations has doubled. The operation area of AMR was adjusted and optimized according to the new warehouse, which increases the efficiency per square meter by 15%.

# Lamps and Lanterns Industry

## LEDVANCE Intelligent Warehouse Unmanned Handling Project (USA).



LEDVANCE is one of the global leaders in the lighting industry. It aspires to redefine the role of lights in the world of the internet and to provide customers with creative and intelligent lighting solutions and electronic components.

The AMR and its iRES system offer intelligent warehousing and unmanned handling solutions. They can interface with the customer's SAP system to meet the demand for different types of B2B and B2C orders. Meanwhile, over 5,000 SKUs and 880,000 items are stored.

Location: Kentucky, USA

Area: 5,000 ㎡ (53,820 ft²)

Number of robots: 80 sets

Industry:
lamps and lanterns

SKU: 5,000

Total inventory: 880,000 pieces



## ✦ Advantages

**SAP system interfacing**
Mushiny's iRES system interfaced with the ERP without requiring customisation, enabling the WMS to integrate effortlessly with the robot control system.

**Two-way Replenishment**
The combination of proactive and passive replenishment is able to fulfill the warehouse demand for replenishment.

**Picking Sequence**
SKUs in the order are sorted by weight and size, so that the large and heavy ones are picked first, and the small and light ones are picked later. This ensures that the packing operation is optimised and secondary stacking is avoided.

**Conversion of the unit of measurement (UoM)**
It is possible to automatically select the UoM regarding the quantity in all operations. When the UoM is tote, it will be automatically converted to "item" and documented by the system.

**Visible Inventory + Invisible Inventory**
Both the visible and invisible inventory counting methods are utilized to enhance the efficiency of inventory counting and ensure the accuracy of warehouse inventory.

# Apparel and Footwear

## Leading Australian
## Footwear Retails & E-commerce

The project is located at the newly constructed central warehouse in Melbourne, Australia. It is primarily designed to meet the growing requirements of business, the online business in particular, and to address recruitment difficulties in an increasingly challenging labour market.

The total area of the project is more than 30,000㎡ (322,917ft$^2$), of which approximately 20,000㎡ (215,278ft$^2$) will serve as the working area of AMR robots. The area accommodates 92,000 SKUs and an inventory of more than 1 million items.

The AMR and its iRES system are harnessed to provide solutions of intelligent warehousing and unmanned handling to meet customer requirements for retail, wholesale, and online orders. Meanwhile, over 92,000 types of SKUs and 1 million items are stored.

Location:
Melbourne, Australia

Area: 20,000 ㎡(215,278 ft$^2$)

Number of robots: 205 sets

Industry: footwear

SKU: 100,000

Total inventory: 1,000,000 pieces

## ✦ Advantages

**One of the biggest AMR goods-to-person projects in the southern hemisphere**
This project includes more than 205 Mushiny T6 AMR robots, Mushiny iRES, PODs, and other peripheral equipment. It went live in 2022 as one of the biggest projects of AMR goods-to-person system in the southern hemisphere.

**Continuous Put Wall**
The continuous put wall is controlled by the iRES system, which intelligently analyses the demand order pool and assigns customers to pods and pods in turn to the workstation. This automatic interface solves the staffing waste issue caused by imbalances in the picking and packaging activity and saves manpower managing the assignment of orders to the put wall. Further, the iRES intelligently optimises the operation by minimising AMR tasks whilst maxmising picks per sku and the subsequent system throughput and productivity.

**High-density Storage**
The project area is 20,000㎡ (215,278ft$^2$) with 6,255 storage locations of which 1,530 are high-density resulting in an overall high-density ratio of 24%.

**Emergency Stop by Zone**
In case of any abnormal situation in the warehouse, operators may press the button to stop all AMR operations. Lights of three colors are installed outside the area and indicate the operating status of the area. The lights operate in synchronization with the warehouse-specific fire alarm system. When the fire alarm is triggered, the execution of AMR tasks is stopped locally, and no new task is issued until the alarm is cleared. Then, the system automatically resumes operation, which ensures the safety and visualization of on-site operations.

# Stationery Industry

## Leading Australian Office Supplies E-commerce Winc

Winc is a company that supports the operation of workplaces in Australia and provides office supplies, furniture, security equipment, and IT solutions. The company focuses on all kinds of services required by the workplace for enterprises and on support for teachers, nurses, and employees in enterprises, governments, and educational and health care sectors.

The AMR and its iRES system are harnessed to provide solutions of intelligent warehousing and unmanned handling. Doing so can meet customer order demand for different types of soft and hard packs and accommodate over 12,000 types of SKUs and 920,000 items at once.

Location: Sydney, Australia

Area: 6,000 ㎡ (64,583 ft²)

Number of robots: 108 sets

Industry: office supplies

SKU: 12,000

Total inventory: 920,000 pieces

## ✦ Advantages

**Continuous Put Wall**
The continuous put wall is controlled by the iRES system, which intelligently analyses the demand order pool and assigns customers to pods and pods to the workstation. This automatic interface solves the staffing waste issue caused by imbalances in the picking and packaging activity and saves manpower managing the assignment of orders to the put wall. Further, the iRES intelligently optimises the operation by minimising AMR tasks whilst maxmising picks per sku and the subsequent system throughput and productivity.

**Match orders with appropriate workstations according to the packaging requirements**
According to the customer's requirements for attributes of packaging boxes and carriers, B2B and B2C orders are matched with appropriate workstations. This eliminates secondary sorting and increases the productivity of packing and dispatch processes.

**Order Priority**
Order processing is cognisant of delivery rosters and shipping times so that outbound customer and freight requirements are rigorously adhered to.

**Emergency Stop by Zone**
In case of any abnormal situation in the warehouse, operators may press the button to stop all AMR operations. Lights of three colors are installed outside the area and indicate the operating status of the area. The lights operate in synchronization with the warehouse-specific fire alarm system. When the fire alarm is triggered, the execution of AMR tasks is stopped locally, and no new task is issued until the alarm is cleared. Then, the system automatically resumes operation, which ensures the safety and visualisation of on-site operations.

# Manufacturing industry

## YAMAHA

Chongqing Jianshe Yamaha Motorcycle Co., Ltd. is a large-scale motorcycle company jointly funded by Chongqing Jianshe Mechanical and Electrical Co., Ltd. and Japan's Yamaha Engine Co., Ltd. It was established in November 1992 with the approval of the Chongqing Municipal People's Government , which officially put into production in 1994.

The project is located in Chongqing, China, The total working area of AMR robots is 1,500 ㎡(16,145 ft²). The 24 units of AMRS with payload at 1,200kg(2,646lb) and Mushiny iRES system are harnessed to upgrade the exiting traditional warehouse to intelligent Goods-to-Person warehousing.

- Location: Chongqing, China
- Area: 1,500 ㎡ (16,145 ft²)
- Number of robots: 24 sets
- Industry: manufacturing industry
- SKU: 5,000
- Total inventory: 5,000,000 pieces

## ✦ Advantages

**Stable and Reliable T Series Shelf AMR**

The T-series shelf AMR at the payload of 1,200kg (2,646lb), is proved by its stability and reliability. It can be automatically charged and has a battery life of up to 8 hours, which is apt to carry heavy-duty components of about 1,000kg (2,205lb) and greatly reduce the labor intensity of the workers.

**Modular Intelligent Robot Execution System iRES**

iRES adopts a modular-designed architecture, and its multiple functions are possible to be commissioned via placing various buttons. With this remarkable possibility, the software customization development is minimized. It is easy and flexible to configure iRES according to the actual operational needs of each customer and hence realize warehouse processes such as material inbounding and outrounding, inventory management, returns of materials, and inventory freezing, as well as realize lifecycle management and traceability of key and high valuable components.

**Flexible Solution to Support Expansion in Several Phases**

Phase I: 18 units of T-series shelf AMR were installed and Phase II, 6 units of new shelf AMR of the same type were easily added according to the business needs.

**Excellent System Stability**

Three year's trouble-free running record once again proves the stability of Mushiny Shelf-to-Person Solution including smoothly handling 800,000 shelves and successfully delivering 286 million parts, as well as significantly improving operational efficiency.

# Other Successful Stories

## Manufacturing Industry
Coca-Cola

· Location: Australian
· SKU: 2,000
· Area: 600㎡(6,458 ft²)
· Total inventory: 15,000pieces
· Number of robots: 12 sets

## Retail Industry
The Top Department Store in the World – Saks OFF 5TH

· Location: USA
· Area: 2,800 ㎡ (30,138 ft²)
· Number of robots: 10 sets

## E-commerce cosmetics industry
Korean e-commerce cosmetics

· Location: Korea
· SKU: 20,000
· Area: 4,000 ㎡ (43,055 ft²)
· Total inventory: 1,400,000 pieces
· Number of robots: 101 sets

## Manufacturing industry
Chinese maternity and child product manufacturers

· Location: Jiangxi, China
· SKU: 3,000+
· Area: 12,500 ㎡ (134,548 ft²)
· Total inventory: 800,000 pieces
· Number of robots: 75 sets

## Cold Chain Warehousing Industry
Australia's famous food company

· Location: Australian
· SKU: 700
· Area: 2,800㎡(30,139 ft²)
· Total inventory: 35,000 pieces
· Number of robots: 47 sets

## Pharmaceutical industry
Japan Pharmaceutical 3PL

· Location: Japan
· SKU: 5,000
· Area: 1,300 ㎡ (13,993 ft²)
· Total inventory: 150,000 pieces
· Number of robots: 20 sets
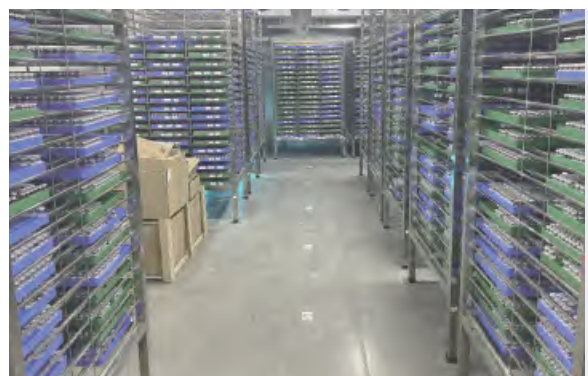
## Cold Chain Warehousing Industry
Chinese pharmaceutical cold chain enterprises

· Location: Beijing China
· SKU: 100
· Area: 80 ㎡ (861 ft²)
· Total inventory: 10,000 pieces
· Number of robots: 4 sets

## 3PL
Well-known China Home Appliance Brand Warehouse

· Location: Guangdong, China
· Area: 3,200 ㎡ (34,445 ft²)
· Number of robots: 44 sets

# Global Service Capability

Working together to create brilliance
Mushiny's after-sales and support team aims to
provide customers with the highest quality service

**10 minutes**
Online response

**24**
Round-the-clock support

**OTA Remote Upgrade**
Service enhancement

**Regional Competence Centers**
Worry-free spare parts

# 02

## Mushiny
## AMR Customization Expert

Mushiny AMR Customization Expert employs an open strategy, platform-based products as its main offering, a modular structure as its base, and continuous innovation as its soul. We are always committed to creating value for partners, facilitating industry progress, and becoming the premium technology and service provider for our partners. The business model features openness, cooperation, and a win-win approach is adopted to empower greater partner participation.

**Products:** various standard logistics robots, universal chassis with open underlying protocols, and customized ODM robots.

**Collaboration:** enable partners to serve end users by providing standardised robot hardware and software products with stable and reliable quality, competitiveness, openness, and expansion.
**Marketing:** provide global customers with logistics robot platforms and management systems featuring robust and reliable quality, competitive prices, and fully open and extendable interfaces.

# About Mushiny AMR customization expert

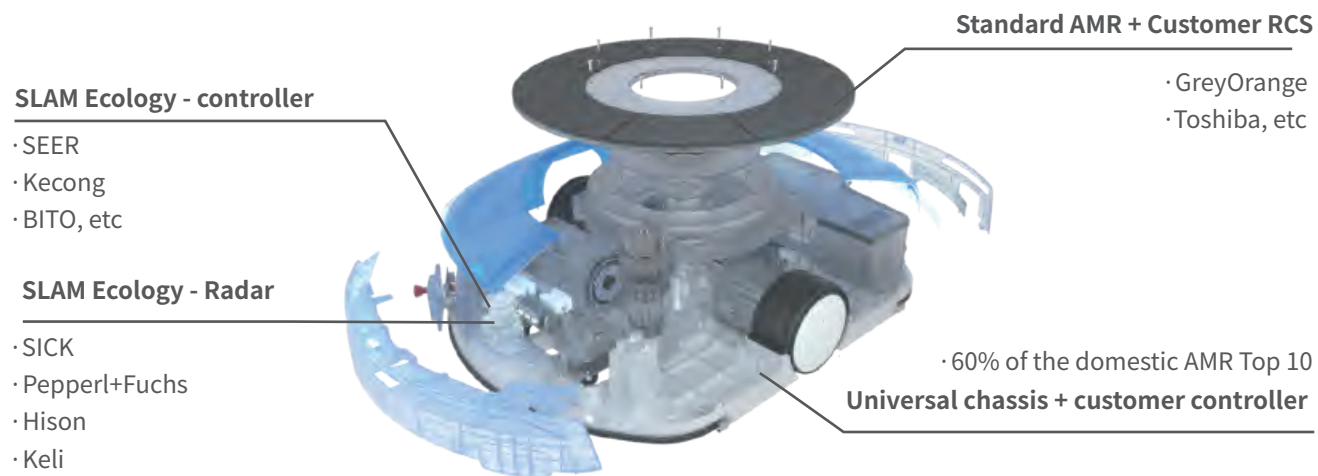## Innovate the Ecology-based Cooperation

**Non-standard Automation Enterprises**

Enable the AMR customization and modification, provide multiple modification interfaces, and open the scheduling protocols

**MES/ERP Enterprises**

Supporting customer to free schedule the AMR and opening the system protocol for customization.

**AMR Enterprises**

Enable the AMR customization and modification, provide multiple modification interfaces, and open the scheduling protocols

**Logistics SI Enterprises**

Supporting customer to free schedule the AMR and opening the system protocol for customization, docking with other logistis equipment and systems.
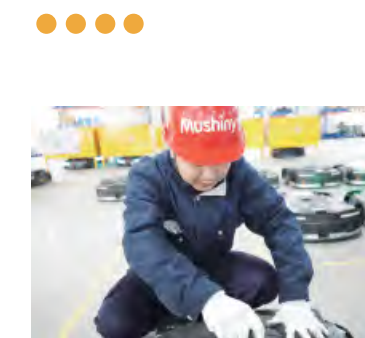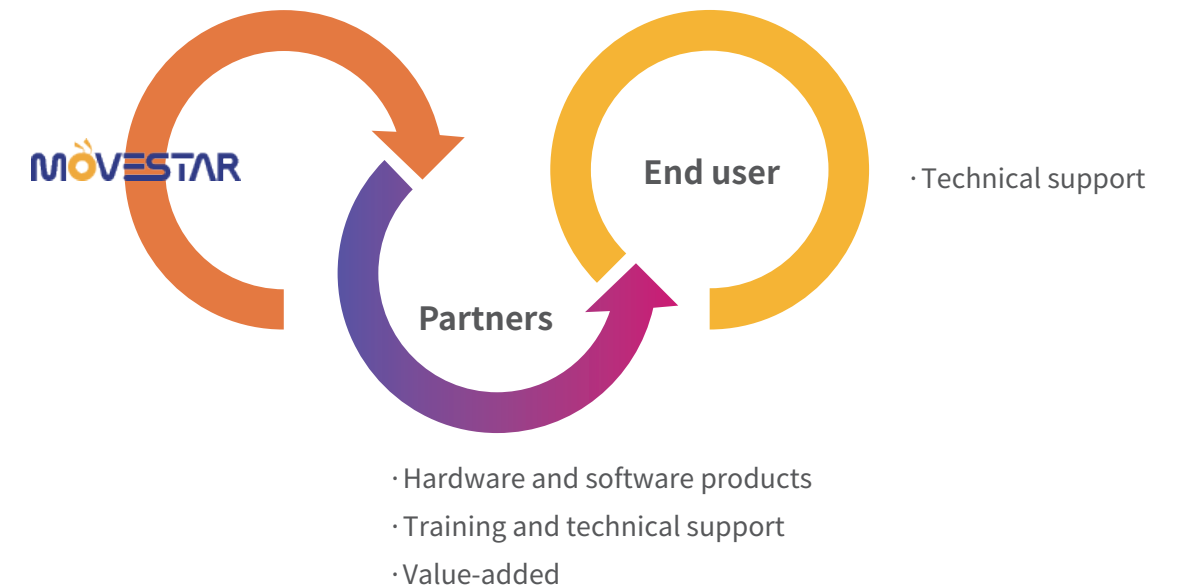
### ●●●● Open component-level underlying protocol

**Universal chassis + customer controller**

**Standard AMR + Customer RCS**

· GreyOrange
· Toshiba, etc

**SLAM Ecology - controller**

· SEER
· Kecong
· BITO, etc

**SLAM Ecology - Radar**

· SICK
· Pepperl+Fuchs
· Hison
· Keli

· 60% of the domestic AMR Top 10

**Universal chassis + customer controller**

### ●●●● Open standard robot control protocol

**Provide standard mobile robots & customers could make AMR top transformation with flexibility**

SLAM navigation

Robot arm          Pallet lift          Roller top
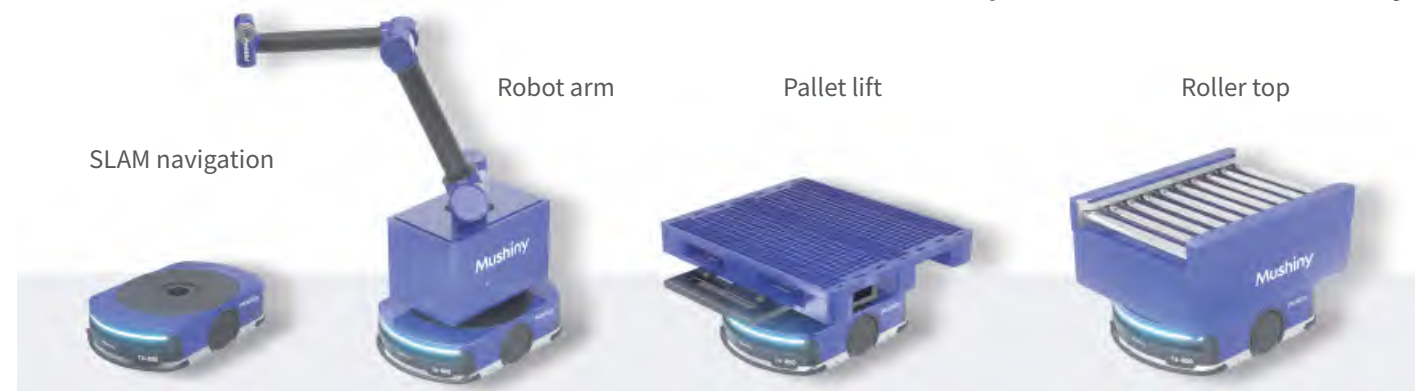
### ●●●● Productization strategy:
provide AMR/ODM/OEM/RMS products and empower partners

MOVESTAR          End user          · Technical support

Partners

· Hardware and software products
· Training and technical support
· Value-added

●●●●

**24/7 technical support**

24/7/365 support to quickly respond to your service requests.

**Remote technical support**

The OTA function enables remote upgrade, troubleshooting, maintenance and problem solving, which can minimize system interruptions.
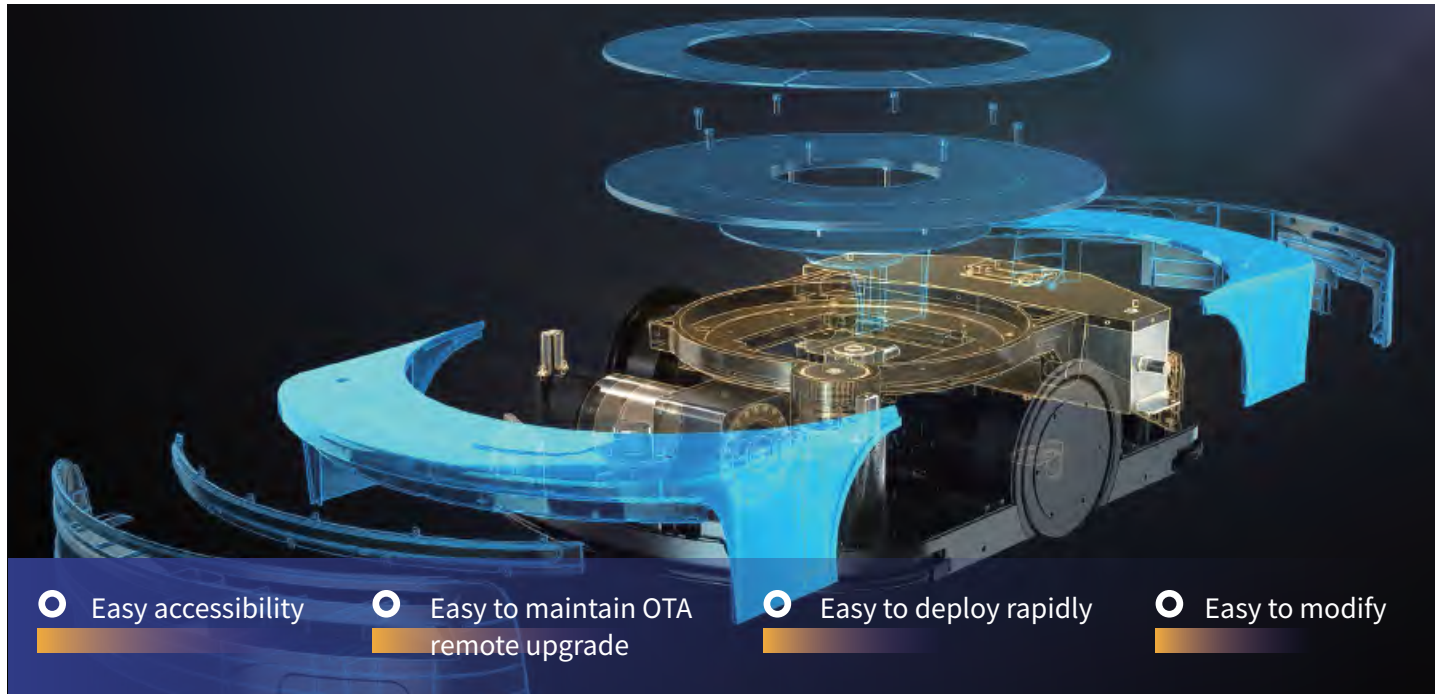
**System maintenance and upgrades**

We provide routine system maintenance and upgrades to enhance the system performance.

# About Mushiny AMR customization expert

## Multiple patents, 360° security



- Easy accessibility
- Easy to maintain OTA remote upgrade
- Easy to deploy rapidly
- Easy to modify

· **Fire-retardant:** American Standard UL94-V0 grade fire-retardant material
· **Battery management:** European Standard IEC62619 and American Standard UL2271
· **Battery cells:** Automotive-grade LFP battery
· **Ultra long battery life:** Comprehensive battery life to 12 h
· **Wide temperature design:** Operates in a wide range of temperatures -20°C~50°C(-4°F~122°F)
· **Abnormality monitoring:** Temperature and smoke sensors
· **Charging contacts:** Charging action in two steps; charging station and AMR are not charged separately
· **Multiple collision avoidance:** Obstacle Detection LiDar, front and rear dual electronic safety edge protection
· **Multiple alarms:** With sound and light alarm

## Professional Certification and Quality Assurance
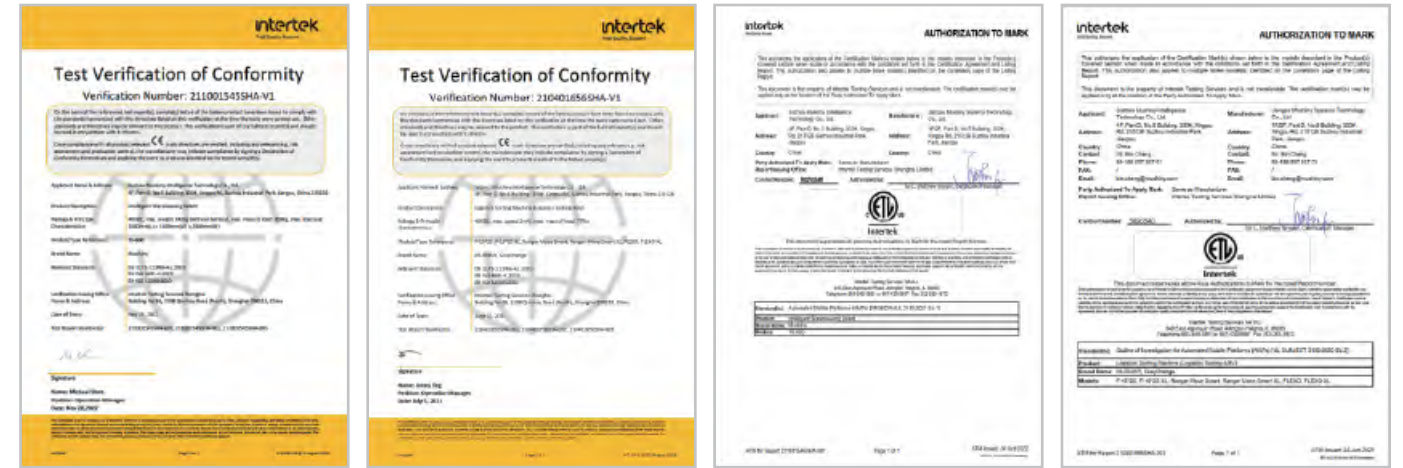


## ISO9001Quality Management Certification

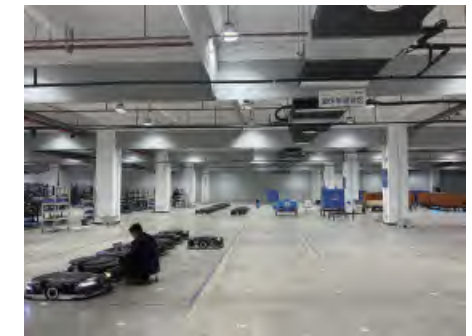Professional production team, standard process, strict quality control, traceable whole production process
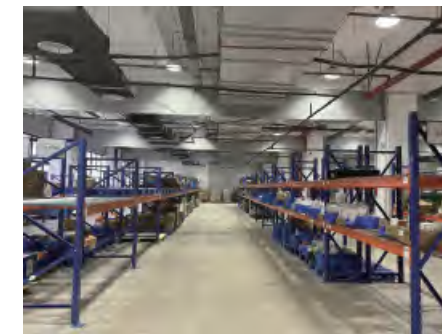


| AMR assembly | Functional test area | Burn-in test area |
| Raw material test | Raw material storage | Manufacturing management report |

# Shelf AMR

## Shelf AMR
## T6-800

**High Speed**
2.2m/s (4.92mph)

**High Environmental Tolerance**
Battery operating temperature:
-20℃~50℃ (-4°F~122°F)

**Highly Optimised Design**
All-aluminum mechanical structure
Two harmonic reducers, two external rotor
motors, segmented chassis, stronger
obstacle crossing ability.

**High Load/Dimension Ratio**
Load/dimension ratio:
4,900 kg/m³ (305.87 lb/ft³)

**Small Size and Small Rotating Diameter**
Rotating diameter 980mm（38.58in）,
height 245mm（9.65in）

## Shelf AMR
## T6-1200/1500

**Safe and Reliable**
Obstacle avoidance,
fireproof, anti-collision
as well as sound and
light alarms

**Superior Performance**
Fast moving and lifting
speed, with high precision

**Flexible Extension**
Supporting various
assemblies, such as
robotic arms, rollers
and pallet tooling

**Modular Structure**
Stable, reliable and
easy to maintain

**Open Protocol**
Open AMR protocol
and scheduling protocol

**Adaptatable to Multiple
Environments**
Adapable to various
ground conditions and
a wide temperature range

**Easy Accessibility**
Rapid learning and
deployment

**High Environmental
Tolerance**
Support customisation
of cold storage version

### T6-800 Product Parameters

| | | | |
|---|---|---|---|
| Dimensions | 980*680*245 mm (38.58*26.77*9.65 in) | Navigation method | 2D code/SLAM + Inertial |
| Empty load rotating diameter | 980mm (38.58in) | Obstacle avoidance | Lidar obstacle avoidance |
| Lifting height | 60mm (2.36 in) | Safety | Traffic control, lidar obstacle avoidance, safety edge |
| AMR weight | 160 kg (352.74 lb) | Charging method | Automatic/manual |
| Maximum load | 800 kg (1,763.70lb) | Battery parameters | 48V27AH Lithium Iron Phosphate |
| Maximum speed | 2.2m/s, SLAM AMR 1.8m/s (4.92mph, SLAM AMR 4.03mph) | Fully charged time | 1.5h |
| Straight-ahead tunnel width (empty/full load) | 800mm (31.50in)/carrier +150mm (5.91in) | Comprehensive battery life | 8h |
| Positioning accuracy | ±10mm（±0.39 in) | Full charge/discharge cycle life | 80% DOD 2,000 times |
| Operating temperature | 0~50℃, -20℃（optional) 32~122°F, -4°F (optional) | Ground bearing requirement (full load) | 1,200 kg/㎡ (245.78 lb/ft²) |
| Communication method | WiFi 2.4G, WiFi 5G, Cellular 5G (optional), infrared (optional) | Climbing capacity (H/L) | 5% |

### T6-1200/1500 Product Parameters

| | | | |
|---|---|---|---|
| Dimensions | 1,160*860*245mm (45.67*33.86*9.65in) | Navigation method | 2D code/SLAM + Inertial |
| Empty load rotating diameter | 1,160mm (45.67in) | Obstacle avoidance | Lidar obstacle avoidance |
| Lifting height | 60mm (2.36 in) | Safety | Traffic control, lidar obstacle avoidance, safety edge |
| AMR weight | 220kg (485.02lb) | Charging method | Automatic/manual |
| Maximum load | 1,200 kg/1,500 kg (2,645.55lb/3,306.93lb) | Battery parameters | 48V54AH Lithium Iron Phosphate |
| Maximum speed | 1.8m/s, SLAM AMR 1.5m/s (4.03mph, SLAM AMR 3.36mph) | Fully charged time | 2h |
| Straight-ahead tunnel width (empty/full load) | 980mm (38.58in)/carrier+150mm (5.91in) | Comprehensive battery life | 12h |
| Positioning accuracy | ±10mm（±0.39in) | Full charge/discharge cycle life | 80% DOD 2,000 times |
| Operating temperature | 0~50℃, -20℃（optional) 32~122°F, -4°F (optional) | Ground bearing requirement (full load) | 1,600 kg/㎡ (327.71lb/ft²) |
| Communication method | WiFi 2.4G, WiFi 5G,Cellular 5G (optional), infrared (optional) | Climbing capacity (H/L) | 3% |

# Shelf AMR

## Shelf AMR
## M6-300



**Flexible and Compact**
Weight of 90kg（198.42lb）,
with a load up to 300kg（661.39lb）

**Highly Optimised Design**
All-aluminum mechanical structure

**360° Safety Protection**
Dual-radar configuration which ensures the human-machine safety

## Shelf AMR
## M6-600

**Superior Performance**
Fast moving and lifting speed, with high precision

**Open Protocol**
Open AMR protocol and scheduling protocol

**Adaptable to Multiple Environments**
Adapable to various ground conditions and a wide temperature range

**360° Safety Protection**
Dual-radar setup, secure obstacle-avoidance, audible and visual alarm

### M6-300 Product Parameters

| | | | |
|---|---|---|---|
| Dimensions | 860*560*245 mm (33.86*22.05*9.65 in) | Navigation method | 2D code/SLAM+ Inertial |
| Empty load rotating diameter | 980mm(38.58in) | Obstacle avoidance | Lidar obstacle avoidance |
| Lifting height | N/A | Safety | Traffic control, lidar obstacle avoidance, safety edge |
| AMR weight | 90kg(198.42lb) | Charging method | Automatic/manual |
| Maximum load | 300kg(661.39lb) | Battery parameters | 48V26AH Lithium Iron Phosphate |
| Maximum speed | 1.8m/s, SLAM AMR 1.5m/s (4.03mph, SLAM AMR 3.36mph) | Fully charged time | 2h |
| Straight-ahead tunnel width (empty/full load) | 660mm (25.98 in)/carrier+150mm (5.91 in) | Comprehensive battery life | 8h |
| Positioning accuracy | ±10mm (±0.39 in) | Full charge/discharge cycle life | 80% DOD 2,000 times |
| Stopping angular accuracy | ±1° | Ground bearing requirement (full load) | 1,000kg/m² (204.82lb/ft²) |
| Communication method | WiFi 2.4G, WiFi 5G,Cellular 5G (optional), infrared (optional) | Climbing capacity (H/L) | 5% |



### M6-600 Product Parameters

| | | | |
|---|---|---|---|
| Dimensions | 1,040*747*245mm (40.94*29.41* 9.65in) | Navigation method | 2D code/SLAM + Inertial |
| Empty load rotating diameter | 1,200mm (47.24 in) | Obstacle avoidance | Lidar obstacle avoidance |
| Lifting height | 60mm (2.36 in) | Safety | Traffic control, lidar obstacle avoidance, safety edge |
| AMR weight | 175kg (385.81lb) | Charging method | Automatic/manual |
| Maximum load | 600kg (1,322.77lb) | Battery parameters | 48V27AH Lithium Iron Phosphate |
| Maximum speed | 1.8m/s, SLAM AMR 1.5m/s (4.03mph, SLAM AMR 3.36mph) | Fully charged time | 1.5h |
| Straight-ahead tunnel width (empty/full load) | 870mm (34.25 in)/carrier+150mm (5.91 in) | Comprehensive battery life | 8h |
| Positioning accuracy | ±10 mm (±0.39 in) | Full charge/discharge cycle life | 80% DOD 2,000 times |
| Stopping angular accuracy | ±1° | Ground bearing requirement (full load) | 1,200kg/m² (245.78 lb/ft²) |
| Communication method | WiFi 2.4G, WiFi 5G,Cellular 5G (optional), infrared (optional) | Climbing capacity (H/L) | 5% |

# Sortation AMR

## Sortation AMR F50A



**Flexible and Compact**
Flexible movement in a narrow lane space

**Optimised Design**
Assemblies may be flexibly matched in light of business scenarios.

## Sortation AMR F15*2/F15*2XL



**High Flexibility**
Double roller design
Single and double roller action support

**High Speed**
Empty/full load: 2.0m/s(4.47mph)

**Highly Optimised Design**
High-strength SMC material,
four-wheel spring floating, stronger
obstacle crossing ability and high load

**High Load**
15 kg*2 or 35 kg*1(33.07lb*2or77.16lb*1 )

### F50A Product Parameters

| | | | |
|---|---|---|---|
| Dimensions | 637*467*310mm (25.08*18.39*12.20in) | Navigation method | 2D code/SLAM+ Inertial |
| Empty load rotating diameter | 637mm(25.08in) | Obstacle avoidance | Lidar obstacle avoidance |
| Lifting height | 310mm (12.20in) | Safety | Traffic control, lidar obstacle avoidance, safety edge |
| AMR weight | 68kg (149.91lb) | Charging method | Automatic/manual |
| Maximum load | 50kg (110.23lb) | Battery parameters | 48V9AH Lithium Iron Phosphate |
| Maximum speed | 3m/s (6.71mph) | Fully charged time | 1.2h |
| Straight-ahead tunnel width (empty/full load) | 637mm(25.08 in)/carrier+60mm (2.36 in) | Comprehensive battery life | 5h |
| Positioning accuracy | ±10mm (±0.39 in) | Full charge/discharge cycle life | 80% DOD 2,000 times |
| Stopping angular accuracy | ±1° | Ground bearing requirement (full load) | 1,000kg/m² (204.82lb/ft²) |
| Communication method | WiFi 2.4G, WiFi 5G,Cellular 5G (optional) | Climbing capacity (H/L) | 5% |

### F15*2/F15*2XL Product Parameters

| | | | |
|---|---|---|---|
| Dimensions | 772*480*600~1,000mm (30.39*18.90*23.62~39.37 in) / 970*630*600~1,000mm (38.19*24.80*23.62~39.37 in) | Navigation method | 2D code + Inertial |
| Empty load rotating diameter | 900mm (35.40 in)/1,148mm (45.20 in) | Obstacle avoidance | Laser + ultrasonic obstacle avoidance |
| Lifting height | N/A | Safety | Traffic control, lidar obstacle avoidance, safety edge |
| AMR weight | 120 kg/136 kg (264.55lb/299.83lb) | Charging method | Automatic/manual |
| Maximum load | 15 kg*2 or 35 kg*1 (33.07lb*2or77.16lb*1) | Battery parameters | 48V16.5AH Lithium Iron Phosphate |
| Maximum speed | 2.0m/s (4.47mph) | Fully charged time | 1.5h |
| Straight-ahead tunnel width (empty/full load) | 560mm (22.05 in)/740mm (29.13 in) | Comprehensive battery life | 5h |
| Positioning accuracy | ±10mm (±0.39 in) | Full charge/discharge cycle life | 80% DOD 2,000 times |
| Stopping angular accuracy | ±1° | Ground bearing requirement (full load) | 300kg/m² (61.45lb/ft²) |
| Communication method | WiFi 2.4G, WiFi 5G,Cellular 5G (optional) | Climbing capacity (H/L) | 5% |

# Shuttle AMR

## Shuttle AMR Z50-S

**High POD Utilisation Rate**
Available for small spacing and headroom

**Highly Reliable Mechanism**
Chain lifting structure

**Highly Optimised Design**
Extruded aluminum profile door frame

**Low Structural Redundancy**
High effective lifting height

## Shuttle AMR Z50-SF

**High Flexibility**
Variable width forks, double deep position, gripping action compatible with cartons

**Highly Reliable Mechanism**
Chain lifting structure

**Highly Optimised Design**
Extruded aluminum profile door frame

**Low Structural Redundancy**
High effective lifting height

### Z50-S Product Parameters

| | | | |
|---|---|---|---|
| Dimensions | 1,560*880*Max 6,000mm (61.42*34.65*max 236.22in) | Navigation method | 2D code + Inertial |
| Empty load rotating diameter | 1,620mm (63.78 in) | Obstacle avoidance | Lidar obstacle avoidance |
| Lifting height | 200~5,700mm (7.87~224.41in) | Safety | Traffic control, lidar obstacle avoidance, safety edge |
| AMR weight | 500kg (1,102.31lb) | Charging method | Automatic/Manual |
| Maximum load | 300kg (661.39lb) | Battery parameters | 48V54AH Lithium Iron Phosphate |
| Maximum speed | 1.6m/s (3.58mph) | Fully charged time | 2h |
| Straight-ahead tunnel width (empty/full load) | 1,000mm (39.37 in) | Comprehensive battery life | 6h |
| Positioning accuracy | ±10mm (±0.39 in) | Full charge/discharge cycle life | 80% DOD 2,000 times |
| Stopping angular accuracy | ±1° | Ground bearing requirement (full load) | 800kg/m² (163.85lb/ft²) |
| Communication method | WiFi 2.4G, WiFi 5G,Cellular 5G (optional), infrared (optional) | Climbing capacity (H/L) | 3% |

### Z50-SF Product Parameters

| | | | |
|---|---|---|---|
| Dimensions | 1,560*880*Max 6,000mm (61.42*34.65*max 236.22in) | Navigation method | 2D code + Inertial |
| Empty load rotating diameter | 1,620mm (63.78 in) | Obstacle avoidance | Lidar obstacle avoidance |
| Lifting height | 220~5,720mm (8.66~225.20in) | Safety | Traffic control, lidar obstacle avoidance, safety edge |
| AMR weight | 520kg (1,146.40lb) | Charging method | Automatic/Manual |
| Maximum load | 300kg (661.39lb) | Battery parameters | 48V54AH Lithium Iron Phosphate |
| Maximum speed | 1.6m/s (3.58mph) | Fully charged time | 2h |
| Straight-ahead tunnel width (empty/full load) | 1,000mm (39.37 in) | Comprehensive battery life | 6h |
| Positioning accuracy | ±10mm (±0.39 in) | Full charge/discharge cycle life | 80%DOD 2,000 times |
| Stopping angular accuracy | ±1° | Ground bearing requirement (full load) | 800kg/m² (163.85lb/ft²) |
| Communication method | WiFi 2.4G, WiFi 5G,Cellular 5G (optional), infrared (optional) | Climbing capacity (H/L) | 3% |

# Product Parameters

| Product | Shelf AMR | | | | Sortation AMR | | Shuttle AMR | |
|---|---|---|---|---|---|---|---|---|
| Type | T6-800 | T6-1200/1500 | M6-300 | M6-600 | F50A | F-15*2/F-15*2 XL | Z50-S | Z50-SF (adjustable clamping-type) |
| Appearance | | | | | | | Supports double depth extension | Supports double depth extension |
| Dimensions | 980*680*245mm (38.58*26.77*9.65 in) | 1,160*860*245mm (45.67*33.86*9.65 in) | 860*560*245mm (33.86*22.05*9.65 in) | 1,040*747*245mm (40.94*29.41*9.65 in) | 637*467*310mm (25.08*18.39*12.20in) | 772*480*600~1,000mm(30.39*18.90*23.62~39.37 in)/ 970*630*600~1,000mm (38.19*24.80*23.62~39.37*in) | 1,560*880*Max6,000mm (61.42*34.65*Max 236.22in) | 1,560*880*Max 6,000mm (61.42*34.65*Max 236.22in) |
| Empty load rotating diameter | 980mm(38.58 in) | 1,160mm(45.67 in) | 980mm(38.39in) | 1,200mm(47.24 in) | 637mm(25.08in) | 900mm(35.40 in)/1,148mm(45.20 in) | 1,620mm(63.78 in) | 1,620mm(63.78 in) |
| Lifting height | 60mm(2.36 in) | 60mm(2.36 in) | N/A | 60mm(2.36 in) | 310mm(12.20in) | N/A | 200~5,700mm(7.87~224.41in) | 220~5,720mm(8.66~225.20in) |
| AMR weight | 160kg(352.74 lb) | 220kg(485.02lb) | 90kg(198.42lb) | 175kg(385.81lb) | 68kg (149.91lb) | 120kg(264.55lb)/136kg(299.83lb) | 500kg(1,102.31lb) | 520kg(1,146.40lb) |
| Maximum load | 800kg(1,763.70lb) | 1,200 kg/1,500 kg (2,645.55lb/3,306.93lb) | 300kg(661.39lb) | 600kg(1,322.77lb) | 50kg(110.23lb) | 15kg(33.07lb)*2 or 35kg(77.16lb)*1 | 300kg(661.39lb) | 300kg(661.39lb) |
| Maximum speed | 2.2m/s(4.92mph),SLAM AMR 1.8m/s(4.03mph) | 1.8m/s(4.03mph), SLAM AMR 1.5m/s(3.36mph) | 1.8m/s(4.03mph), SLAM AMR 1.5m/s(3.36mph) | 1.8m/s(4.03mph), SLAM AMR 1.5m/s(3.36mph) | 3m/s(6.71mph) | 2.0m/s(4.47mph) | 1.6m/s(3.58mph) | 1.6m/s(3.58mph) |
| Straight-ahead tunnel width (empty/full load) | 800mm(31.50 in)/carrier +150mm(5.91 in) | 980mm(38.58 in)/carrier +150mm(5.91 in) | 660mm(25.98 in)/carrier +150mm(5.91 in) | 870mm(34.25 in)/carrier +150mm(5.91 in) | 637mm(25.08 in)/carrier +60mm(2.36 in) | 560mm(22.05 in)/740mm(29.13 in) | 1,000mm(39.37 in) | 1,000mm(39.37 in) |
| Positioning accuracy | ±10mm(±0.39 in) | ±10mm(±0.39 in) | ±10mm(±0.39 in) | ±10mm(±0.39 in) | ±10mm(±0.39 in) | ±10mm(±0.39 in) | ±10mm(±0.39 in) | ±10mm(±0.39 in) |
| Communication method | WiFi 2.4G, WiFi 5G,Cellular 5G (optional), infrared (optional) | | | | WiFi 2.4G, WiFi 5G,Cellular 5G (optional) | | WiFi 2.4G, WiFi 5G,Cellular 5G (optional), infrared (optional) | |
| Navigation method | 2D code/SLAM + Inertial | 2D code/SLAM + Inertial | 2D code/SLAM + Inertial | 2D code/SLAM + Inertial | 2D code/SLAM + Inertial | 2D code + Inertial | 2D code + Inertial | 2D code + Inertial |
| Obstacle avoidance | Lidar obstacle avoidance | Lidar obstacle avoidance | Lidar obstacle avoidance | Lidar obstacle avoidance | Lidar obstacle avoidance | Laser + ultrasonic obstacle avoidance | Lidar obstacle avoidance | Lidar obstacle avoidance |
| Safety | Traffic control, radar obstacle avoidance, safety edge | Traffic control, radar obstacle avoidance, safety edge | Traffic control, radar obstacle avoidance, safety edge | Traffic control, radar obstacle avoidance, safety edge | Traffic control, radar obstacle avoidance, safety edge | Traffic control, radar obstacle avoidance, safety edge | Traffic control, radar obstacle avoidance, safety edge | Traffic control, radar obstacle avoidance, safety edge |
| Charging method | Automatic/manual | Automatic/manual | Automatic/manual | Automatic/manual | Automatic/manual | Automatic/manual | Automatic/manual | Automatic/manual |
| Battery parameters | 48V27AH Lithium Iron Phosphate | 48V54AH Lithium Iron Phosphate | 48V26AH Lithium Iron Phosphate | 48V27AH Lithium Iron Phosphate | 48V9AH Lithium Iron Phosphate | 48V16.5AH Lithium Iron Phosphate | 48V54AH Lithium Iron Phosphate | 48V54AH Lithium Iron Phosphate |
| Fully charged time | 1.5h | 2h | 2h | 1.5h | 1.2h | 1.5h | 2h | 2h |
| Comprehensive battery life | 8h | 12h | 8h | 8h | 5h | 5h | 6h | 6h |
| Full charge/discharge cycle life | 80%DOD 2,000 times | 80%DOD 2,000 times | 80%DOD 2,000 times | 80%DOD 2,000 times | 80% DOD 2,000 times | 80% DOD 2,000 times | 80% DOD 2,000 times | 80% DOD 2,000 times |
| Ground bearing requirement (full load) | 1,200kg/m²(245.78 lb/ft²) | 1,600kg/m²(327.71lb/ft²) | 1,000kg/m²(204.82lb/ft²) | 1,200kg/m²(245.78 lb/ft²) | 1,000kg/m²(204.82lb/ft²) | 300kg/m²(61.45lb/ft²) | 800kg/m²(163.85lb/ft²) | 800kg/m²(163.85lb/ft²) |
| Climbing capacity (H/L) | 5% | 3% | 5% | 5% | 5% | 5% | 3% | 3% |
| Others | The operating temperature can be customized -20℃ ~ 0℃(-4°F~32°F) | The operating temperature can be customized -20℃ ~ 0℃(-4°F~32°F) | | | | | Tote Size 600*400*(120~370)mm (23.62*15.75*4.72~14.57in) | Tote Size length：400~600mm(15.75~23.62in) width：200~400mm(7.87~15.75in) height：120~370mm(4.72~14.57in) |

# Success Stories

### Non-standard Automation Customer

An automation company that mainly provides the customization service for industry, it uses AMR robots of Mushiny for manufactory internal logistics in garment factory project, completing the picking and shipping with pallet, helping the customer to achieve full intelligence from production to packaging to inbound and outbound process in warehouse.

### Logistics Robot Customer

Mushiny provides the ODM service for an AMR Robot Company, customized a SLAM AMR for packing material storing and feeding in a project.

### Software Development Enterprise

A MES enterprise who focuses on industry cooperated with Mushiny in an aviation industry project, using the AMR & roller model to significantly improve production efficiency.

### Leading System Integrator

A well-known domestic logistics automation system enterprise uses the AMR robots and RMS of Mushiny for a large logistics project to realize the intelligent factory internal logistic.

## Goods-to-person Picking Scenario

### Well-known Korean E-commerce Cosmetics

AMR robots can easily help this cross-border beauty e-commercial company complete order picking based on real-time data updates from the system, with an average picking efficiency of over 2,000 pieces/h for B2B orders.

## Handling Scenario

### Famous 3PL Company

In the highly automated logistics conveying project, AMR robots reduce the work intensity of operators and increase the work capacity by 45%, realizing the automatic handling of smart factories.

## Totes-to-person Scenario

### Well-known Electronic Components Company

In the factory specialized in the manufacture of various types of electronic components the intelligent logistics robots which systematically complete the entire process of inbound and outbound operation, sorting, handling, and distribution. They may increase the utilization rate of warehouses by over 15%.

## Sortation Scenario

### Internationally Renowned SI

In this project, customer used hundreds of sortation AMRs customized by Mushiny for flexible sorting requirements. Robot-assisted operation effectively improved operating efficiency by 2~5 times , guaranteed higher throughput; multiple detection systems always ensure the on-site safety.

## Manufacturing Industry Scenario

### Internationally Renowned Motorcycle Manufacturers

The T6-800 model enables the green electric vehicle manufacturing base covering an area of 53,000 square meters, helping the country's largest electric vehicle assembly workshop sprint to the goal of daily production of 10,000 units.  Intelligent and efficient, easy to use and reliable, to accelerate the rapid landing of multi-phase projects.

# 03

## Synall
## Expert of Robot Management System

**Contribute to build your own Mobile Robot Solutions**
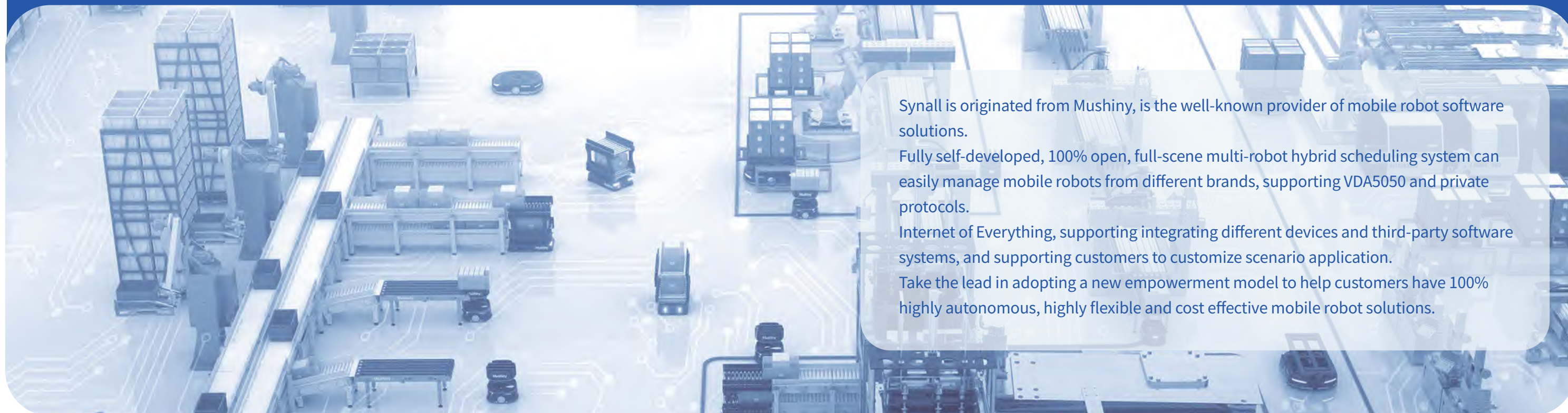
Synall is originated from Mushiny, is the well-known provider of mobile robot software solutions.

Fully self-developed, 100% open, full-scene multi-robot hybrid scheduling system can easily manage mobile robots from different brands, supporting VDA5050 and private protocols.

Internet of Everything, supporting integrating different devices and third-party software systems, and supporting customers to customize scenario application.

Take the lead in adopting a new empowerment model to help customers have 100% highly autonomous, highly flexible and cost effective mobile robot solutions.

The first generation of SYNALL iRMS came out;support 1000+ AGV scheduling

**2018**

Large-scale application and deployment in South Korea &Australia, etc.

**2019**

The second generation of iRMS supports the hybrid scheduling of multiple types of mobile robots such as latent, CTU, sorting, etc.

**2020**

The third generation of iRMS supports multi-scenario hybrid applications such as delivery, handling, sorting, etc.

**2021**

The fifth generation of iRMS supports mixed scheduling of mobile robots from different brands

**2022**

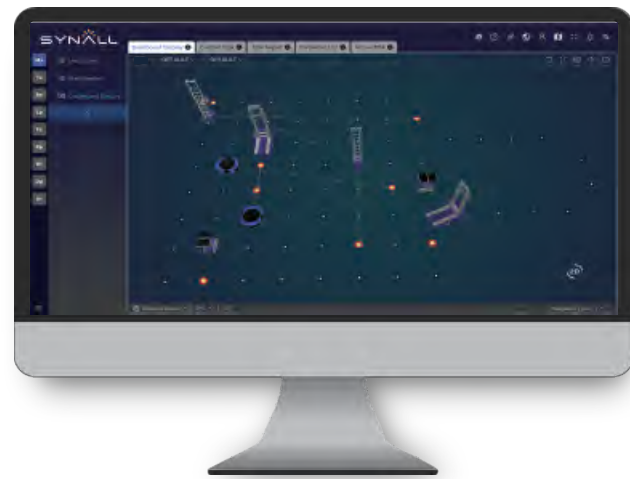SYNALL, adhering to the concept of openness, cooperation and win-win to empower customers
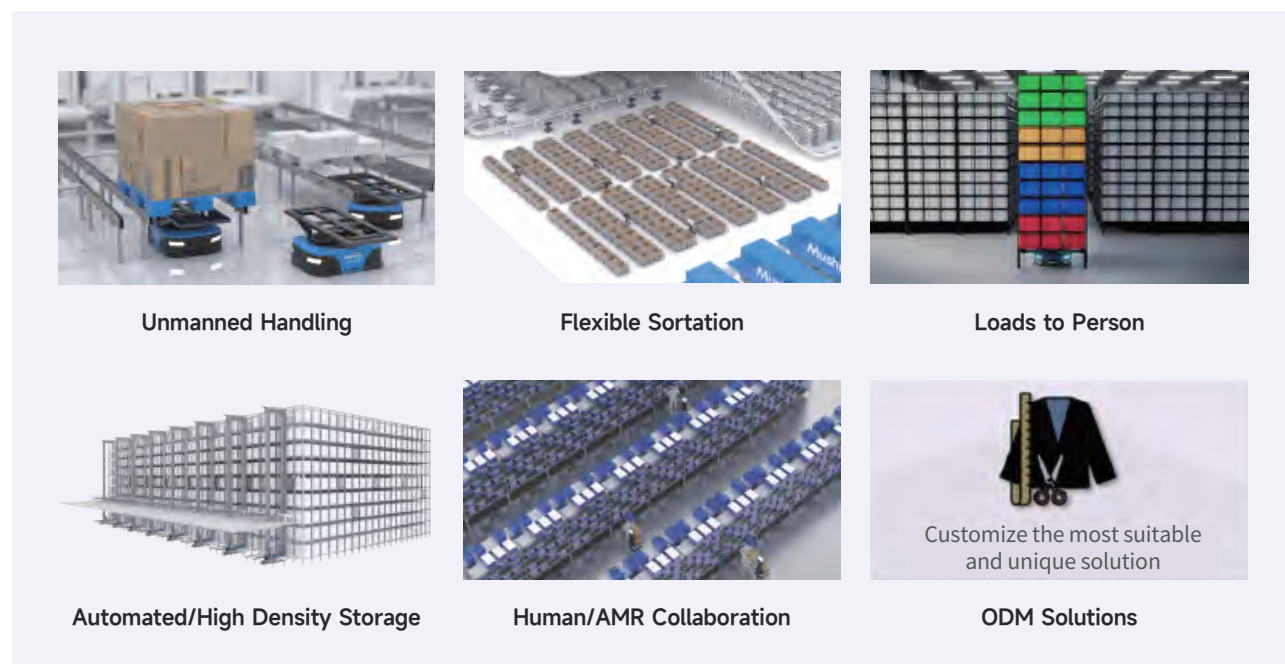
**2023**

# About Synall

## Products



### ●● iRMS
**Intelligent Robot Management System**
- 100% open platform
- Create your own robot scheduling system
- Integrate mobile robots from any vendors
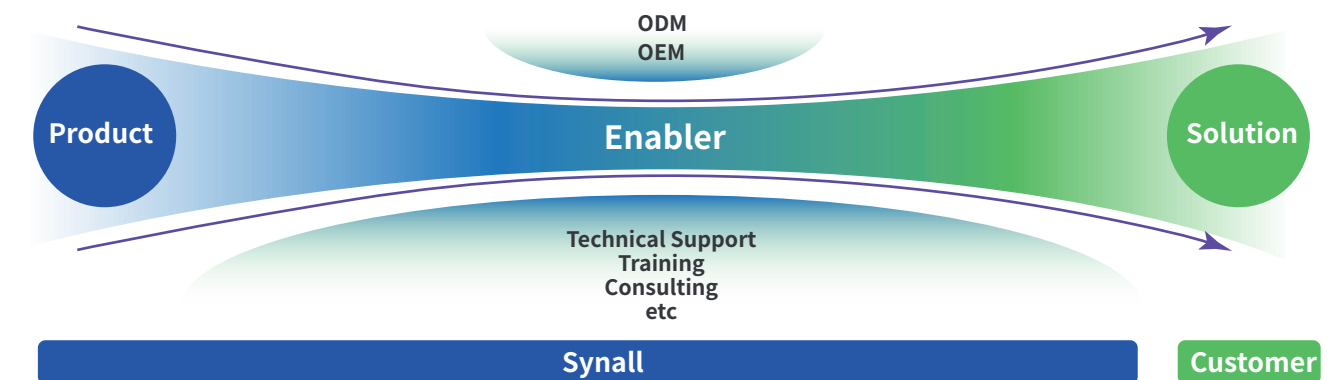
### ●● iSimulator (SaaS)
- iRMS and iSimulator are complementary
- Accurate simulation, real display
- Quick verification, precise decision

## Solutions



Unmanned Handling

Flexible Sortation

Loads to Person



Automated/High Density Storage

Human/AMR Collaboration

Customize the most suitable and unique solution

ODM Solutions

## Innovative cooperation
Product & Service



ODM
OEM

Product

Enabler

Solution

Technical Support
Training
Consulting
etc

Synall

Customer

## Our Advantages

**Gain Full Control of Your Entire Mobile Robot in One Platform**
- Freely select different brands of mobile robots
- Same user experience. Unified traffic control, path planning, smart task allocation and charging/parking strategy

**Seamlessly Integrate with Third-Party Systems**
- Well designed modern API for easy integrating with (ERP,WMS,MES, …) system

**Support Decision-making with Simulation and Real-time Analysis**
- 1:1 Simulator for decision-making, and multi-dimension report and dashboard for real-time analysis

**Easy to use, rapid deployment**
- Intuitive UI with online doc
- Docker-based one-stop deployment for all OS. No code platform for flexible process changing

**Safe, Stable and Efficient**
- Fully consider the safety of human-machine mixed operation
- High available to guarantee system stability and robustness
- AI algorithm to improve the efficiency

**High autonomous, cost-effective**
- Help customer to build their own solutions with XRS products
- Provide professional training and support
- No need to build from scratch, gain rich knowhow and start the business form now on

# About iRMS

All-in-one platform capable of handling mobile robots from different vendors

iRMS is an easy-to-use,open protocol robot management system.It can integrate different vehicles and can make them run collaboratively in the same field.
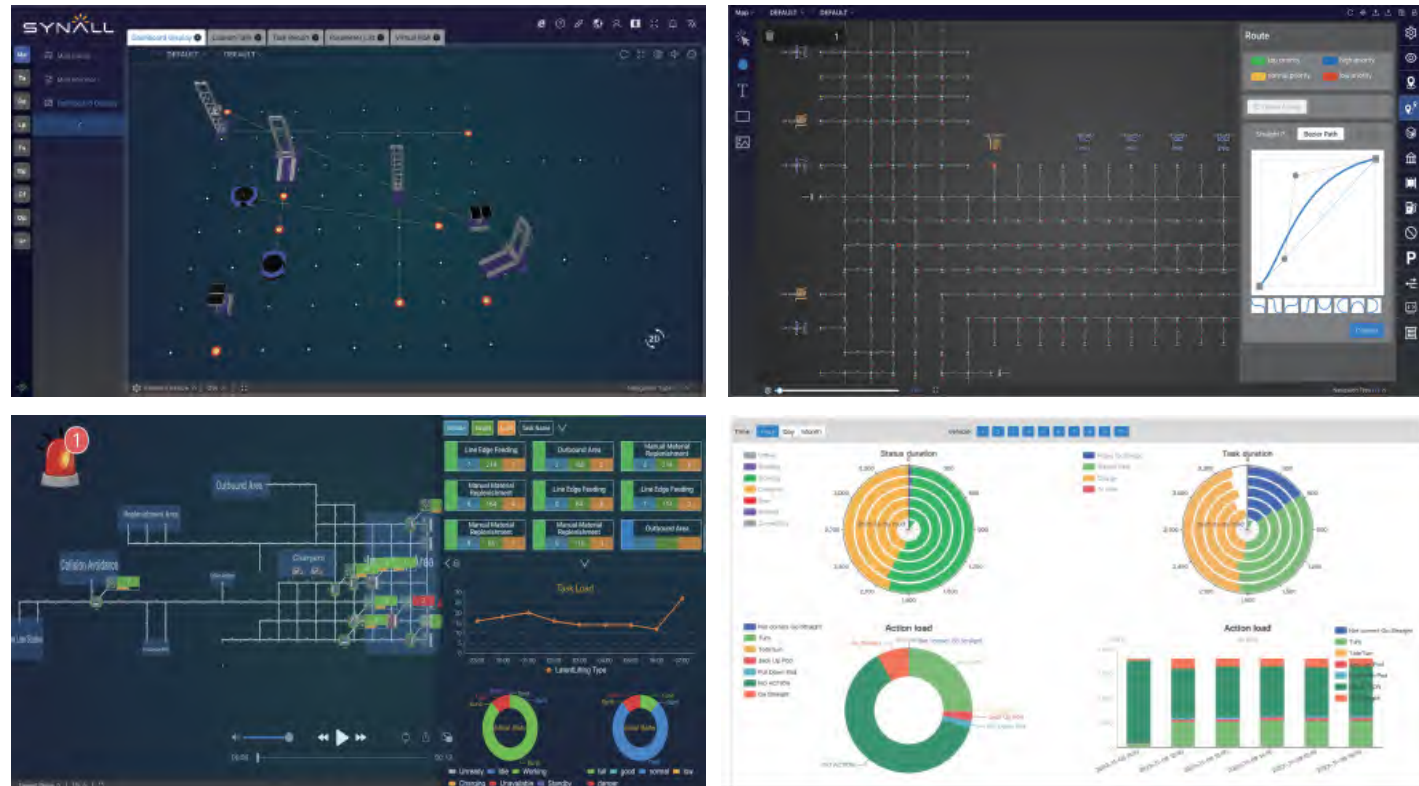


## Empowerment

| Let our iRMS be yours | Let our team be yours | Let our knowhow be yours |

## iRMS Advantages

**"Out of box" & Cost-effective**
Let iRMS be "yours". Immediately have mobile robot scheduling capabilities. And the cost is much lower than building from the scratch, not mentioned the yearly R&D team budget.

**Strong autonomy & ROI improving**
Freely choose the most suitable vehicle type and solution, optimize and reduce the quantity of AMRs used, and improve ROI.

**Quickly gain rich knowhow**
Let our team be "yours". Instantly"own" an experienced scheduling software team, get professional support and service.

**One-time integration and keep expanding the solutions**
One-time integration with existing information systems (ERP, WMS, MES, etc.) , then you can easily expand automation device, mobile robots and business scenarios.

**100% Open platform**
100% mastery of the system by customers, easy to learn, easy to use, and easy to deploy

## Integration

- Well-designed API interface to facilitate upstream system integration
- Public (VDA5050) protocol and customizable private protocol to connect with different brands of Vehicles
- Common standard protocol integrate with various automation device
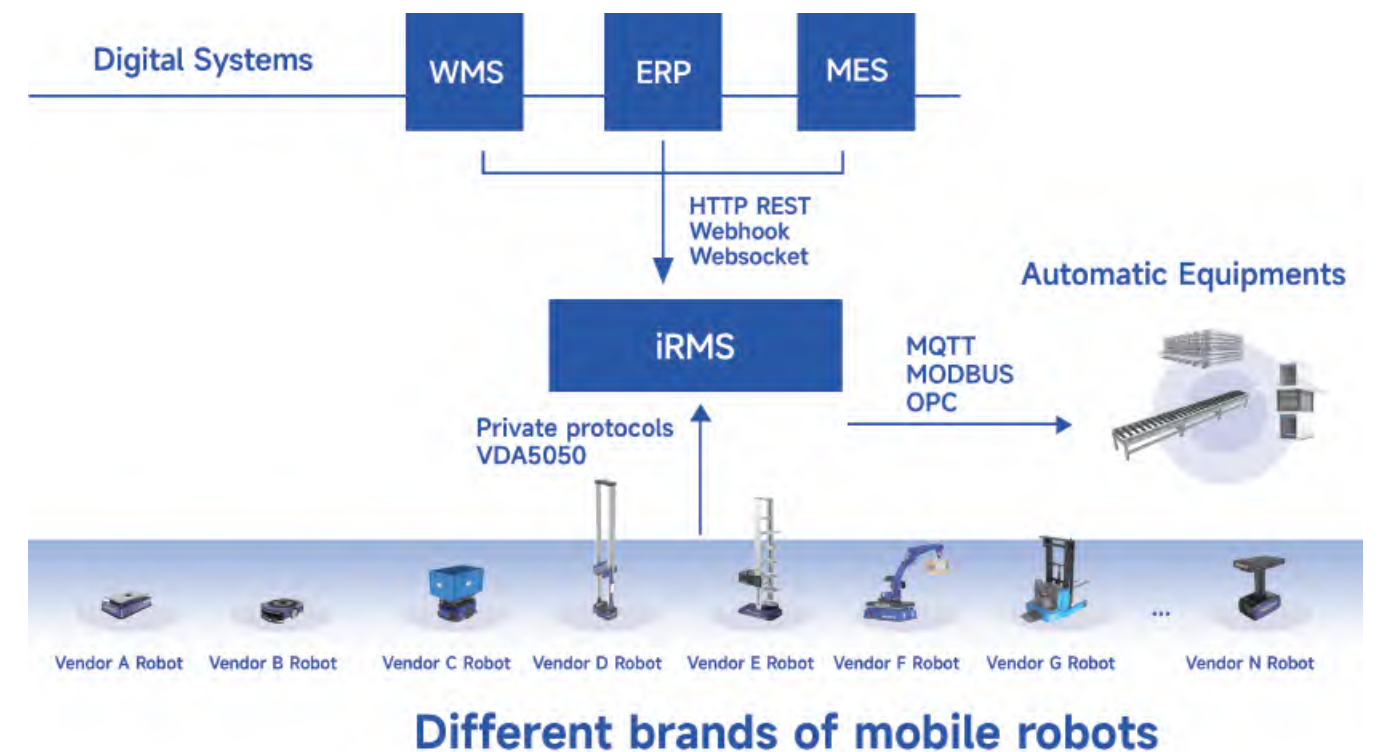
# About iRMS

All-in-one platform capable of handling mobile robots from different vendors

## All-in-one scheduling

### ●● All-in-one

- Hybrid of various solutions (Sortation, Unmanned-handling, Goods-to-person, High-density storage, Human-AMR collaboration, etc.)
- Mixed running of various AMRs (different brands, different navigation types, different AMR types)
- Various automation device connections (elevators, automatic doors, lights, buttons, conveyor lines, packaging machines, robotic arms, etc.)

### ●● Advantage

- Combine the optimal solutions, reduce costs and increase efficiency
- One-time Integration, continuous expansion
  iRMS provide flexible, extensible and scalable capabilities for your businesses
- Easy to study
  Unified user experience, easy-to-use operation and maintenance
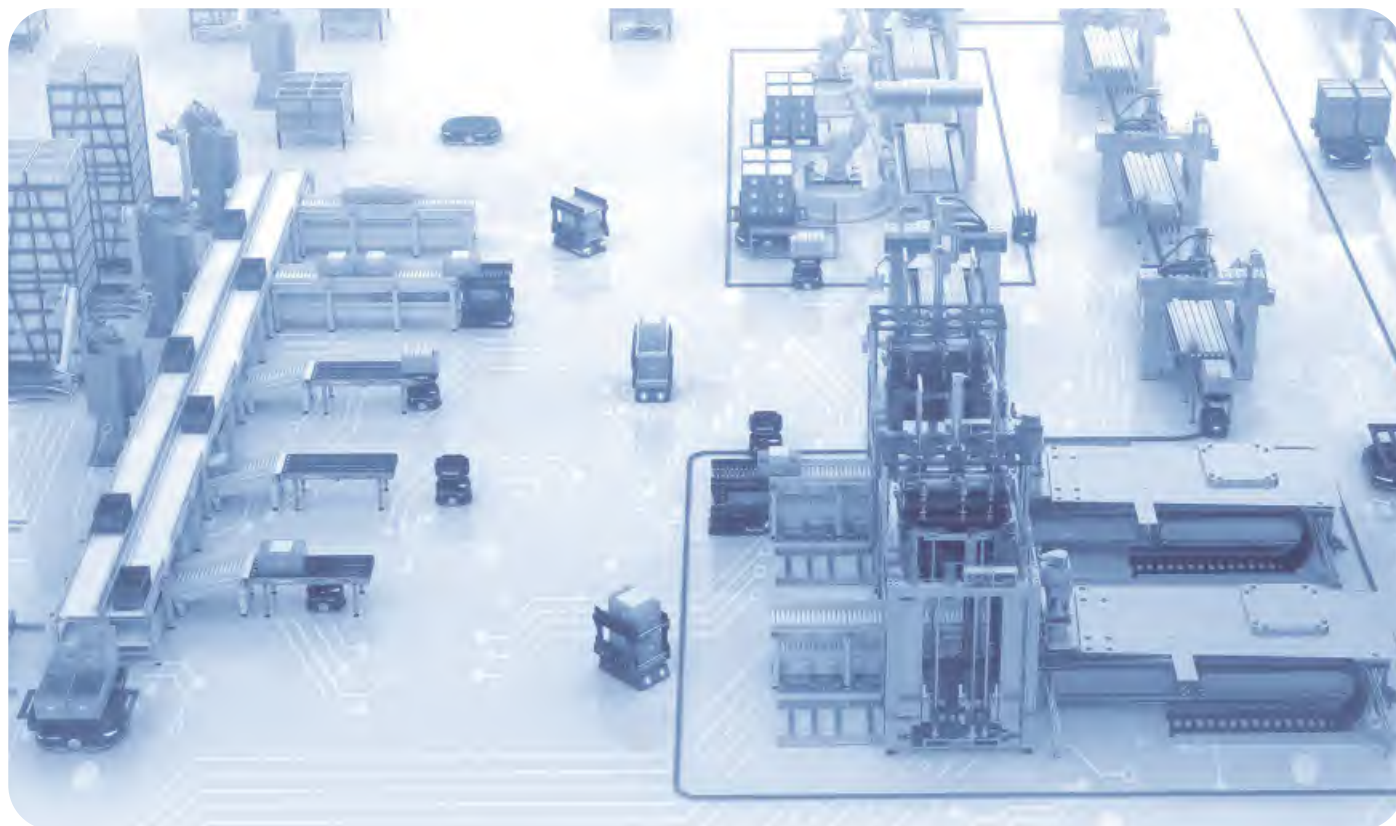


## "Plug and Play" Architecture

**iRMS realizes the possibility of large-scale system by adopting plug-in mode**

-high plasticity; high customization capability
-plenty of plugins are available on demand
-independent secondary development; high adaptability
-partial plug-in replacement; high stability



Standard System

Vehicle Adapter Plugin — AGV AMR …

Device Adapter Plugin — Elevator Auto Door …

Function Plugin — Loads to Person Flex Sortation Order to Person Industrial Handling …
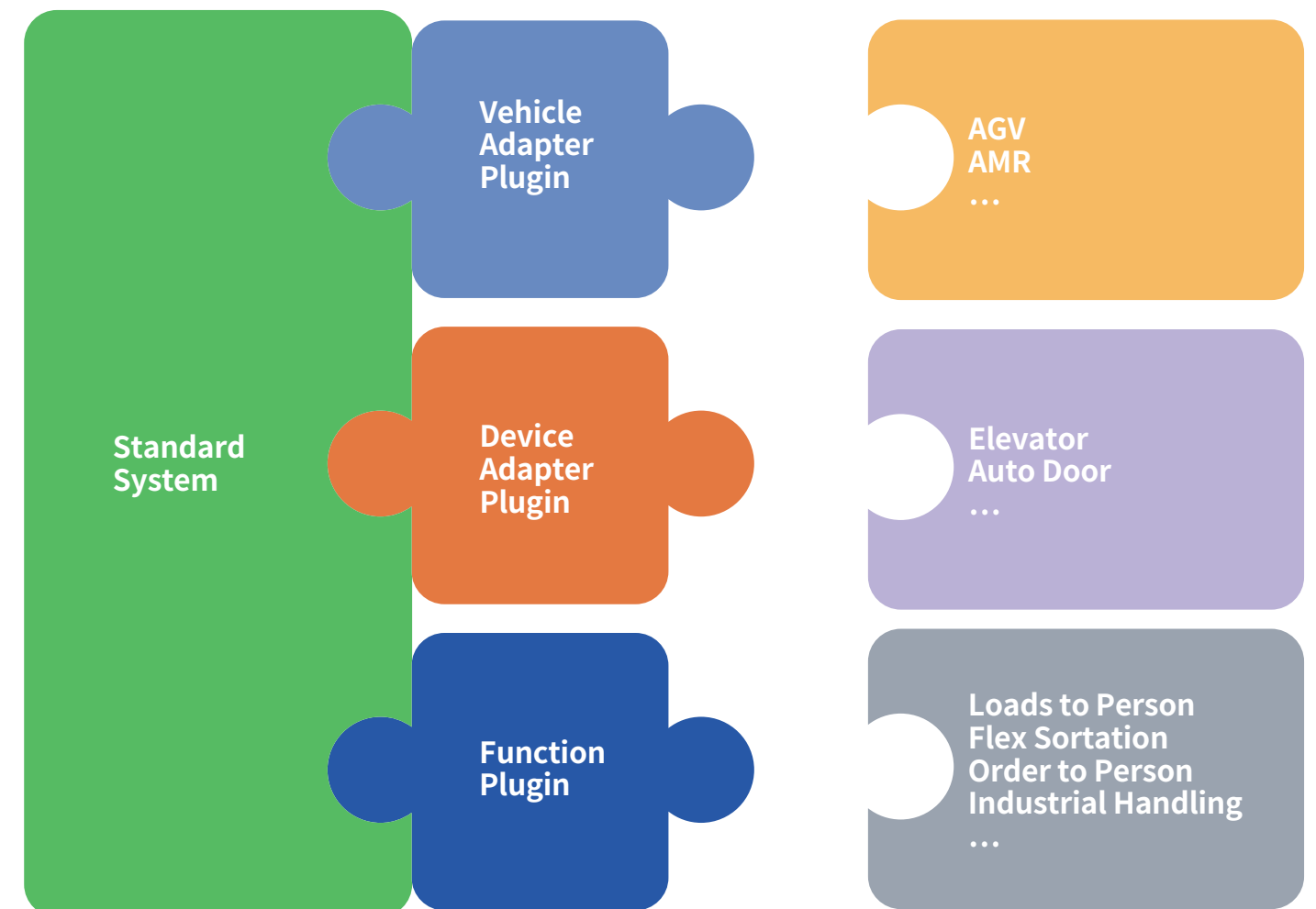
# About iRMS

All-in-one platform capable of handling mobile robots from different vendors

## Central Platform Scheduling System

**20+** Advanced scenario suite

**50+** General function module

**100+** Vehicle/device adapter

**300+** API

**1000+** Scheduling performance



## Smart Charging

Intelligent curve current according to temperature, configurable charging strategy, vehicle group charging



## Device Integration

Support using MODBUS, OPC, MQTT protocols to integrate with different automation device.



## Digital Display System

Full-terminal digital display, with omnipotent control



## No Code PDA

Dispense with the need for code development, enable flexible configuration to meet different business requirements



## KPI Report

Multi-dimensional business report system, empower customers gain insight into the overall situation and control the whole field.



## Traffic Management

Multiple AI algorithms prevent and remove traffic jamsand deadlocks effectively, maximizing path utilization and ensuring traffic smoothly.
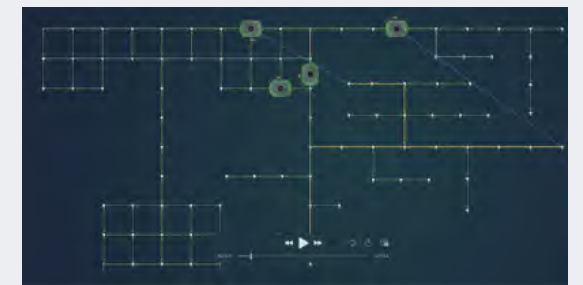


## No Code Task Engine

Drag-and-drop configuration, versatile combination, Change-and-Utilize, efficient and stable
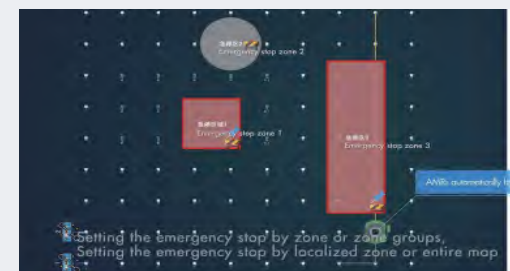


## Map Tools

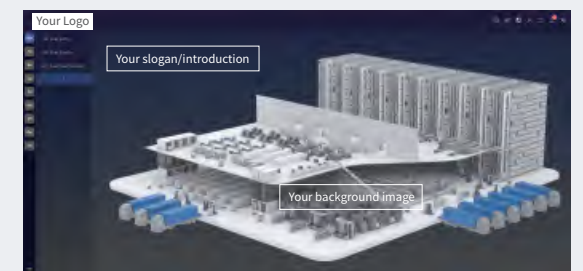One-stop map editing and monitoring tool.



## Safety Module

Support the global/regional emergency stop function,ensuring the safety of the site and personnel.



## OEM

Empowerment helps customers immediately have their own scheduling system.

# About iRMS

All-in-one platform capable of handling mobile robots from different vendors

## Standard Function

### Traffic Control

Vehicle traffic control, including collision prevention, intelligent anti-conflict, channel control (single-plank bridge, dead end), effectively prevents and removes traffic jams and deadlocks, maximizing the efficiency of vehicle collaboration.

### Map Monitor

Real-time display of vehicle running information, basic operation and maintenance operations, hiding and displaying of map elements, and delivery of system default tasks

### Resource Allocation

Resource group management, resource groups are bound to each other, resources such as: vehicles, tasks, vehicles, routes, storage locations, etc.

### Map Editor

Editing of basic elements such as logical areas, points, lines, charging piles, parking areas, elevators, special function points, passages, etc.

### Alarm Center

Alarm notification, problem handling

### Storage Management

Basic storage data maintenance

### Fault Management

Fault information management of vehicles and charging piles

### Load Management

Load specification definition, basic data maintenance, load circulation records

### Charging Management

Intelligent curve current according to temperature, configurable charging strategy, vehicle group charging

### Parking Management

Customized parking area, parking by vehicle type, group parking

### Operation Tool

Practical operation and maintenance tools include operation logs, interface request libraries, etc.

### Security Module

The vehicle with a high temperature battery drove back to the safe area

### Fleet Management

Including vehicle registration management, vehicle batch upgrade, log download, etc.

### Configuration Center

Support charging strategy configuration, system integration configuration (webhook)

### Log Module

Support log viewing and downloading through the system page

### Report Center

Multi-dimensional business report system, including task load, AMR load, health report

### Message Notification

Message channel management (support system page, Ding Talk, email), message subscription function

### User Center

User account management, authority management, area management, user login history

### Online Upgrade

Front-end and back-end online upgrade, historical version query

### Integration API

Restful HTTP、webhook、websocket，Task delivery dynamic API

### Dynamic Path Planning

Dynamic path planning algorithm supports intelligent conflict resolution, congestion detection and avoidance.

### Smart Task Scheduling

Sort the tasks according to their priority, type, waiting time, etc., and dynamically allocate them to the optimal vehicle.
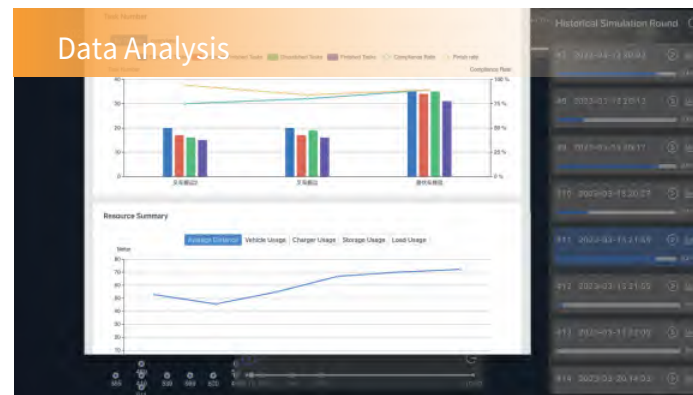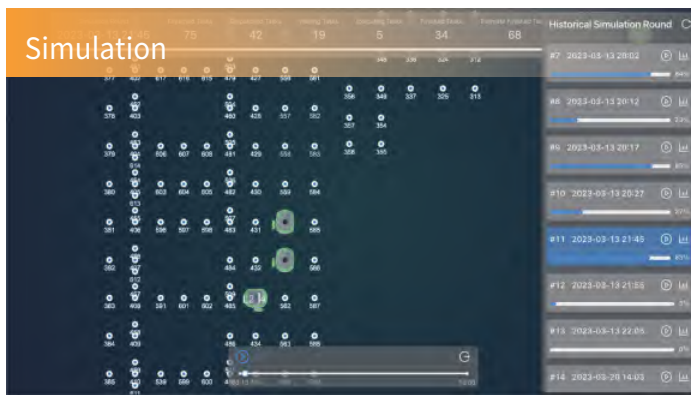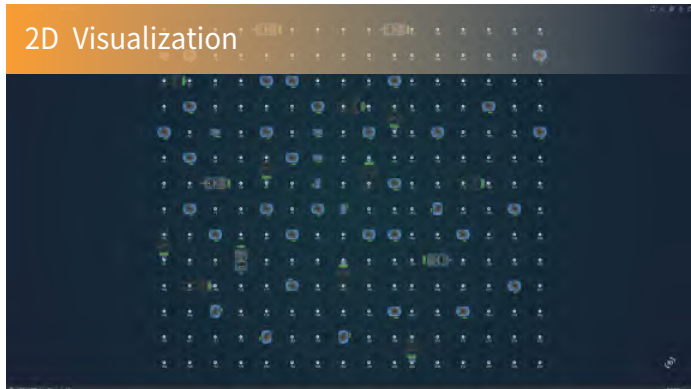
### Flexible Task Engine

The task management system supports the optimization of task scheduling based on task type, task batch, task priority, etc., combined with the dynamic adjustment of vehicle allocation algorithms to improve overall efficiency

# About iSimulator
## Intelligent Logistics Simulator, SaaS

iSimulator support real business workflow simulation of different scenarios. Support importing the map, customizing the parameters of mobile robots, configuring real business workflow, providing valuable data to support fast project design iteration and optimization.


2D Visualization


3D Visualization


Simulation


Data Analysis

## Advantage

- **Accurate simulation**
  1:1 vehicle parameter configuration, through the algorithm to obtain accurate vehicle number and throughput of each station.

- **Fast verification**
  Support up to 10x speed, quickly try multiple rounds of simulation in different configurations.
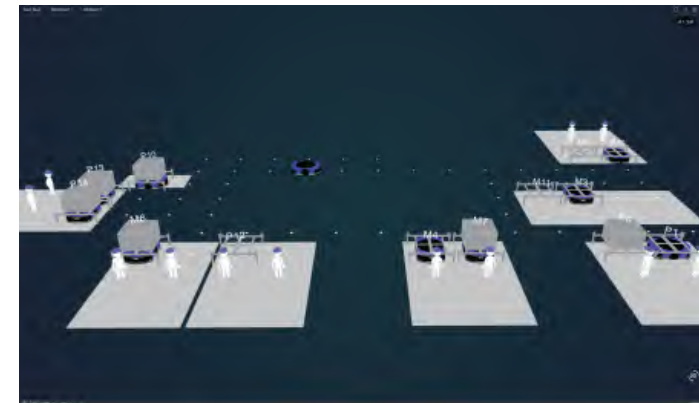
- **Real time display**
  Provide 2D and 3D visualizations with CAD backgrounds, supporting playback of simulation processes.

- **Precise decision**
  Predict system bottleneck, get the best solution by constantly adjusting the configuration of maps, processes, etc., recommend suitable vehicles to achieve the best ROI
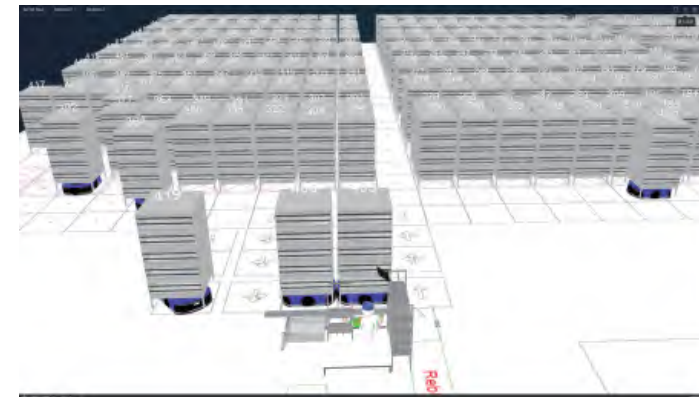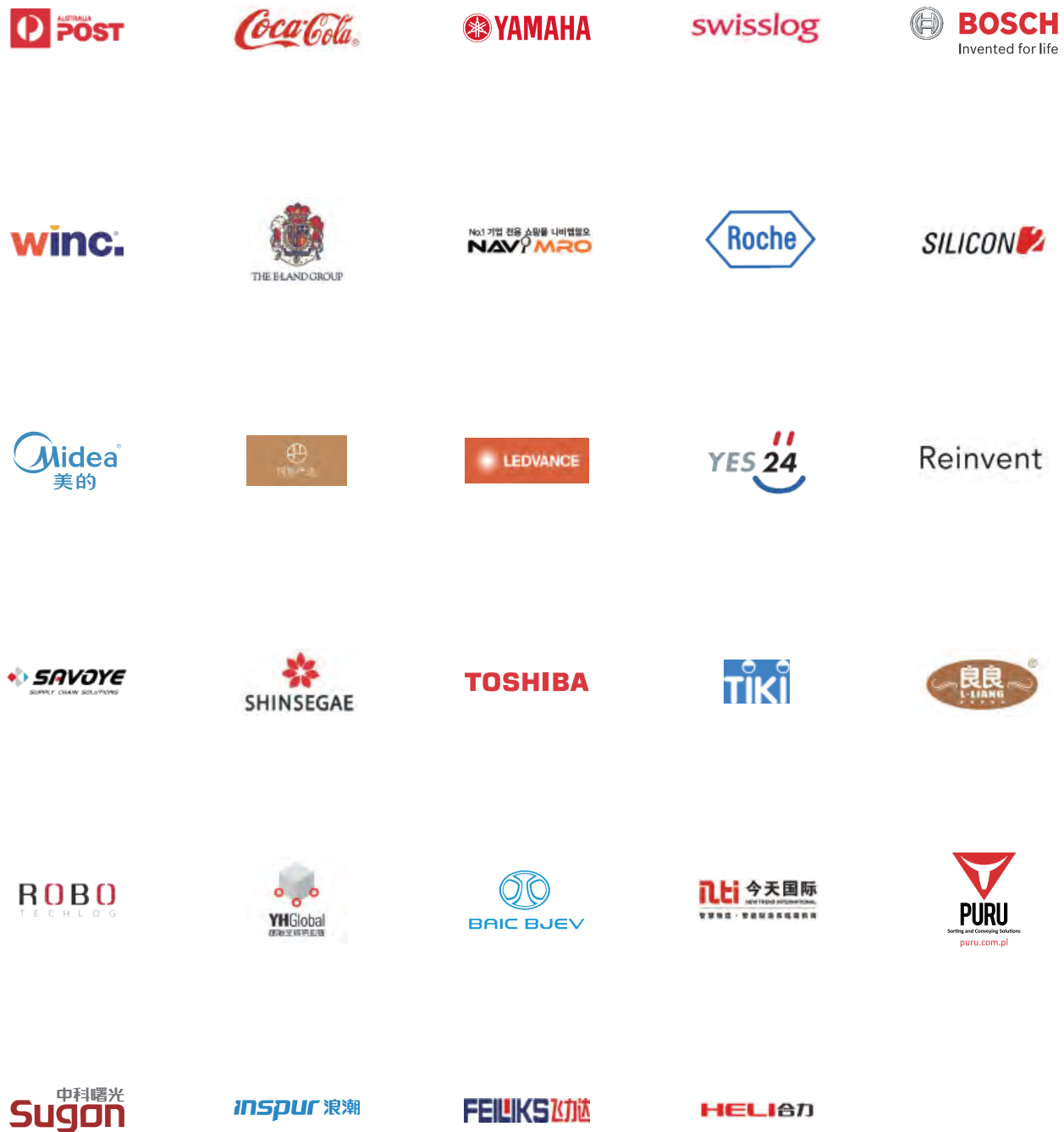
## 3D Simulating Case

- **Materials Handling**



- **Flexible Sortation**



- **Goods-to-person**



- **Human/AMR Collaboration**

# Intelligent Warehousing - Mushiny Partner



# Logistic Robots -Mushiny AMR Customization Expert & Robotic Management System -Synall Partner