

Forklift RFID Automatic Reading Kit

Digital China Group.
IoT Department



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Marketing Analysis of Intelligent Warehousing

The formation of automated warehousing systems is not a task that can be completed in a short period. The development of the entire automated warehousing process has gone through various stages. Currently, warehouses at different stages coexist, and there is still significant market space for the upgrading of mechanized warehouses.



Manual Warehousing

- Manual Handling
- Manual Accounting
- Manual Management
-

Mechanized Warehousing

- Forklift
- Conveyor Belt
- Stacker Crane
-

Automated Warehousing

- AGV/AMR
- Automated Shelving
- Automated Sorting Equipment
-

Integrated Automated Warehousing

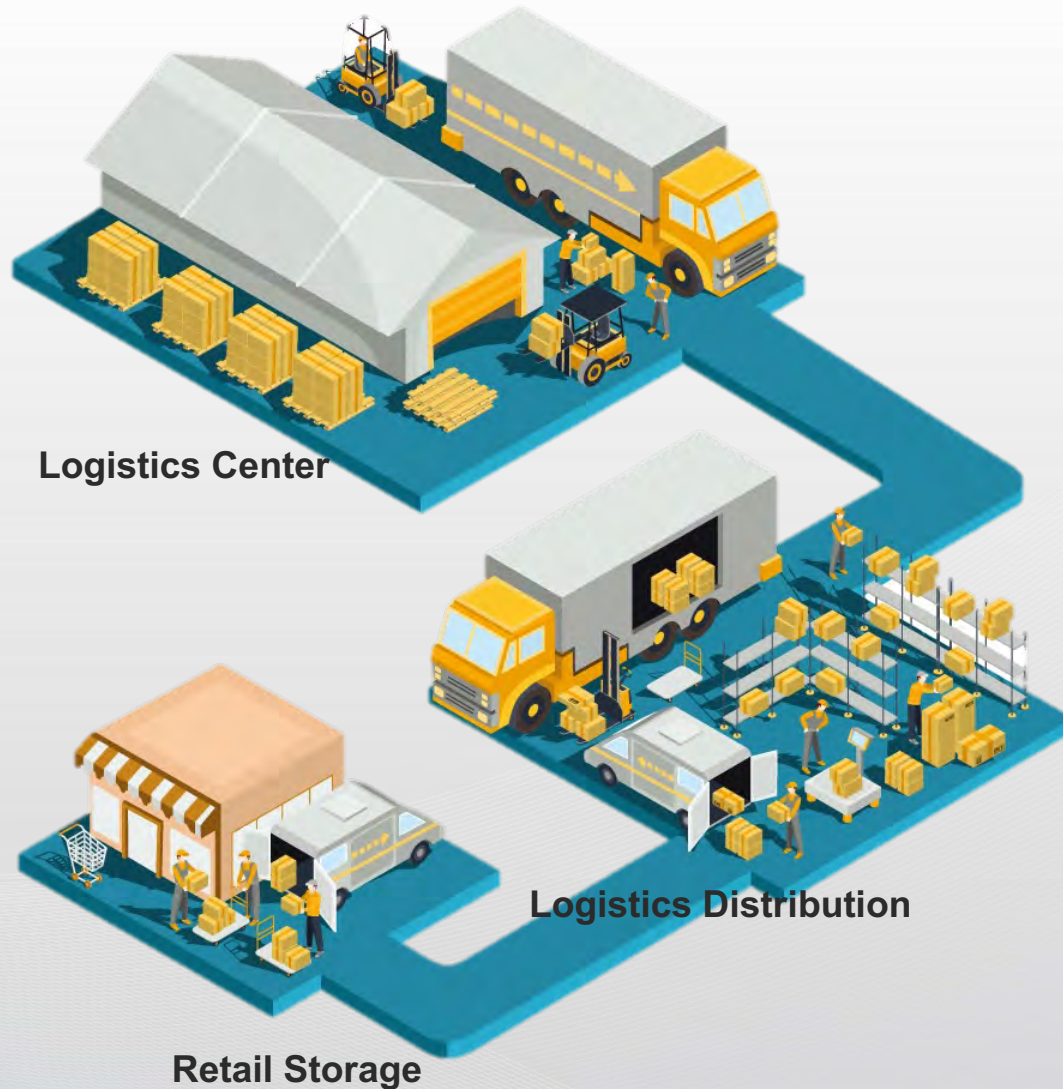
- Hardware and Software Integration
- Data Interoperability
- Organic Collaboration
-

Intelligent Warehousing

- Radio-Frequency Identification (RFID)
- Machine Vision
- Digital Twin
-



Warehouse Types



Logistics Center. It is the core part of the entire logistics system, serving as the centralized processing point for the flow of information, goods, and funds throughout the entire process from suppliers to end consumers.

Business Characteristics.

- Needs to complete processes such as receiving management, warehouse management, shelf management, in-stock management, and outbound management.
- Rapid turnover of goods with high requirements for timeliness and accuracy. Traditional management models can lead to long operating times, low efficiency, and information errors.
- Complex processes that require detailed data management. Traditional management models are unable to meet the needs of managers.

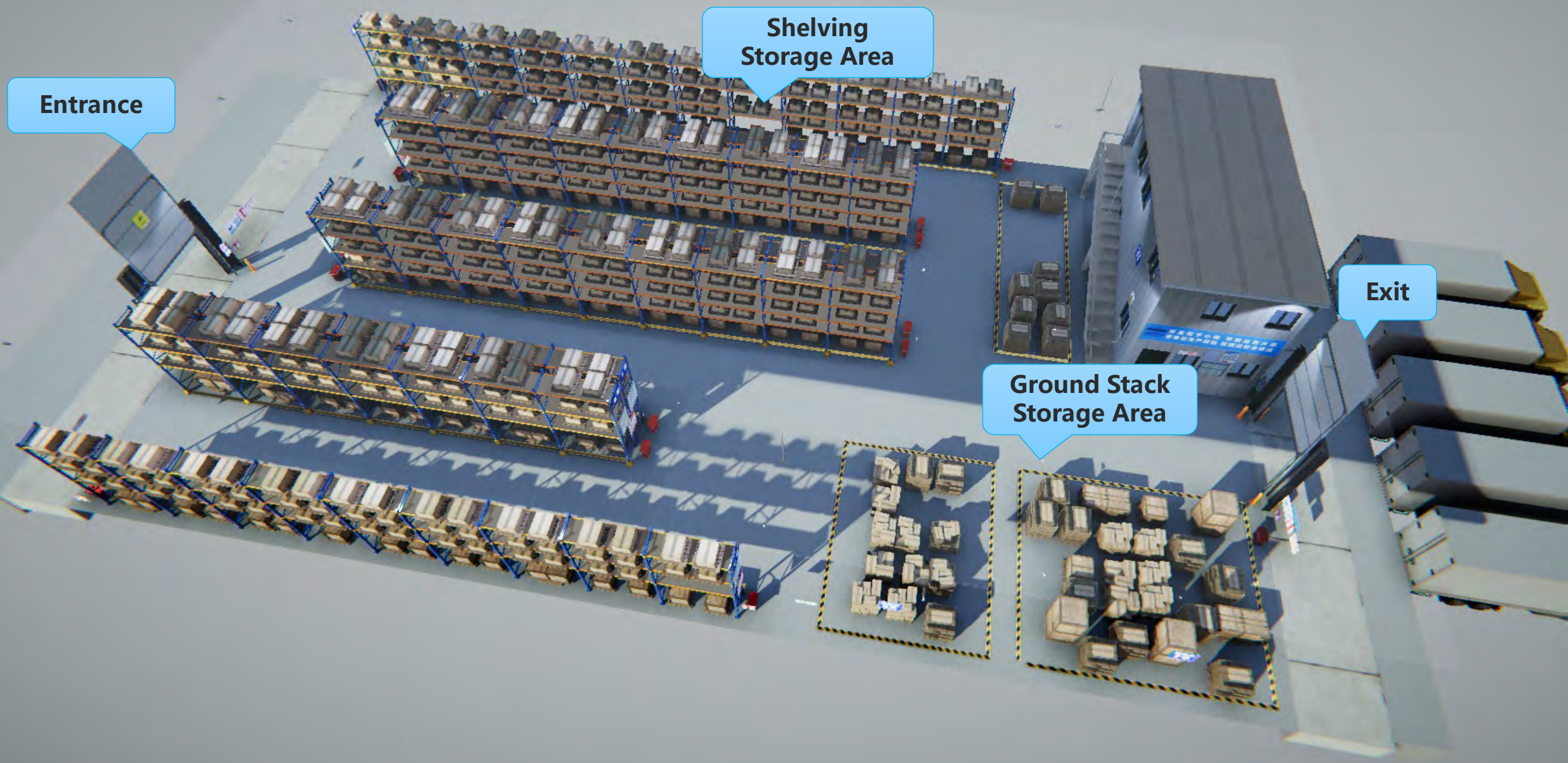
Fast Turnover, High Timeliness
Large Goods, Forklift Operations
Whole In, Whole Out

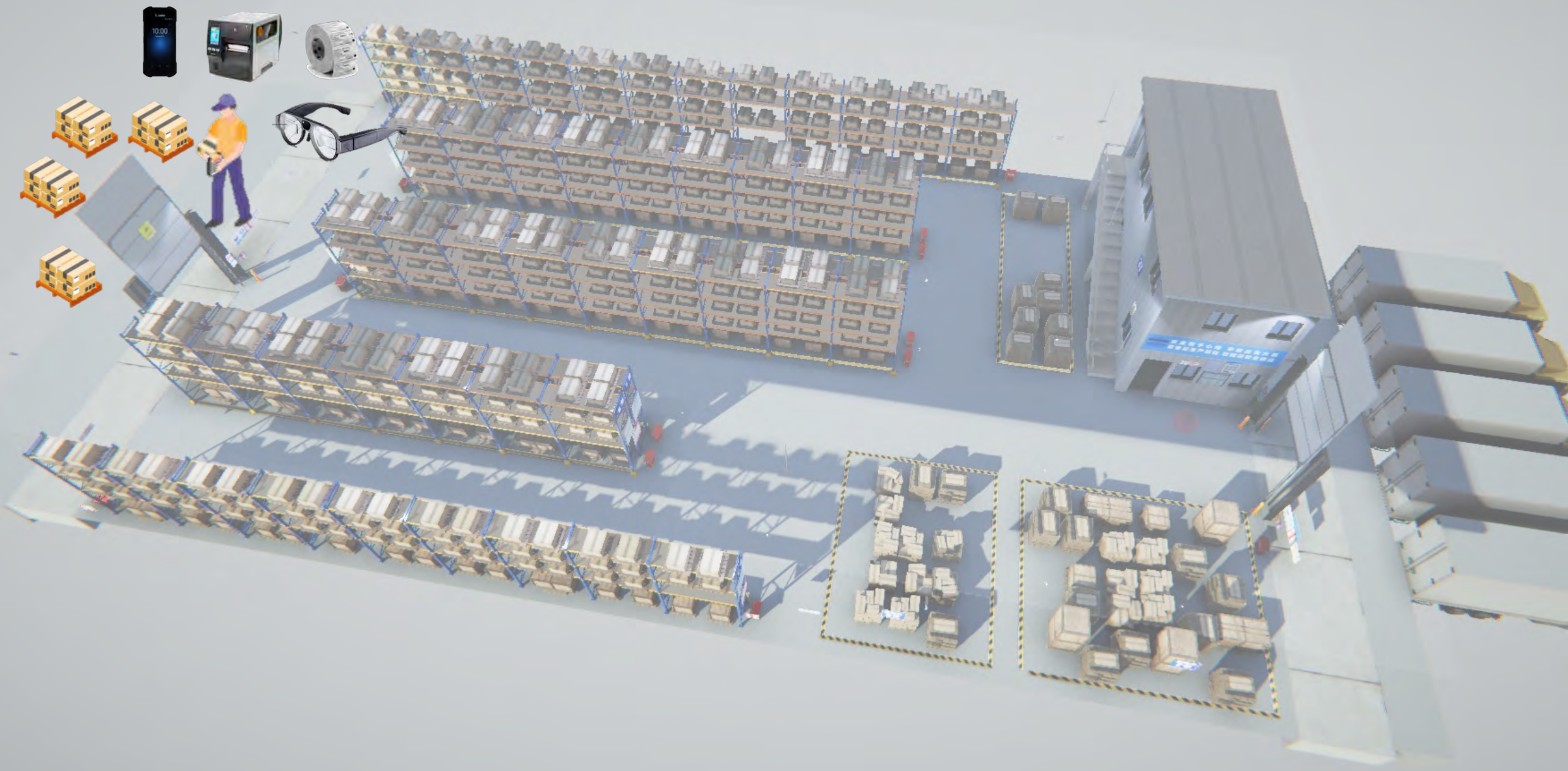
Warehouse Operations-related Issues

- **Low Efficiency.** During inbound and outbound operations, forklift operators often disembark to scan and verify codes, significantly impacting operational efficiency.
- **Unsafe Practices.** Operators frequently leave the forklift running while disembarked, violating safety regulations and posing potential safety hazards.
- **Low Output.** Excessive dismounting and remounting actions by operators result in inefficient operations, consuming physical energy, and adversely affecting individual output.
- **Labor Intensive.** In some warehouses, an additional staff member is assigned to handle code scanning to ensure the forklift operator can focus on driving, leading to wastage of manpower resources.



Application scenarios







RFID Flexible Anti-Metal Electronic Tags



Universal RFID electronic tags (non-anti-metal)

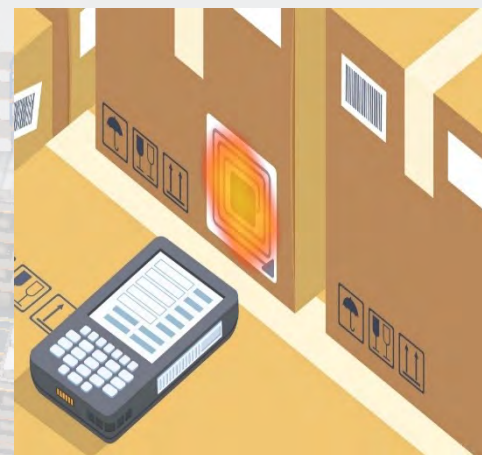


Impact-resistant and anti-metal hard RFID tags



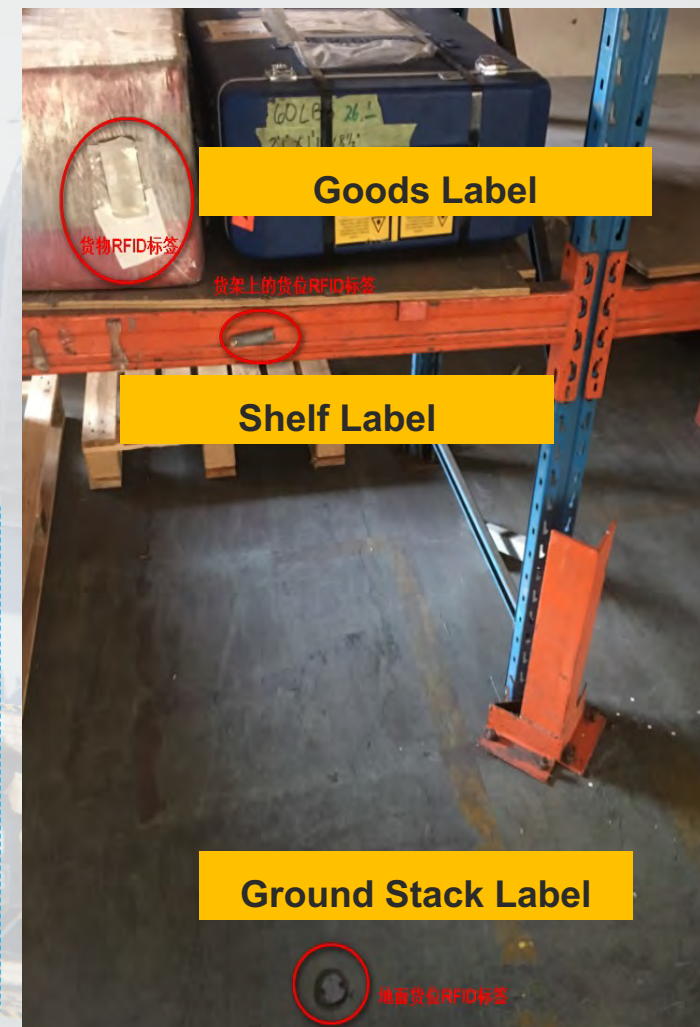
High-temperature and acid-alkali resistant electronic tags

Goods Label

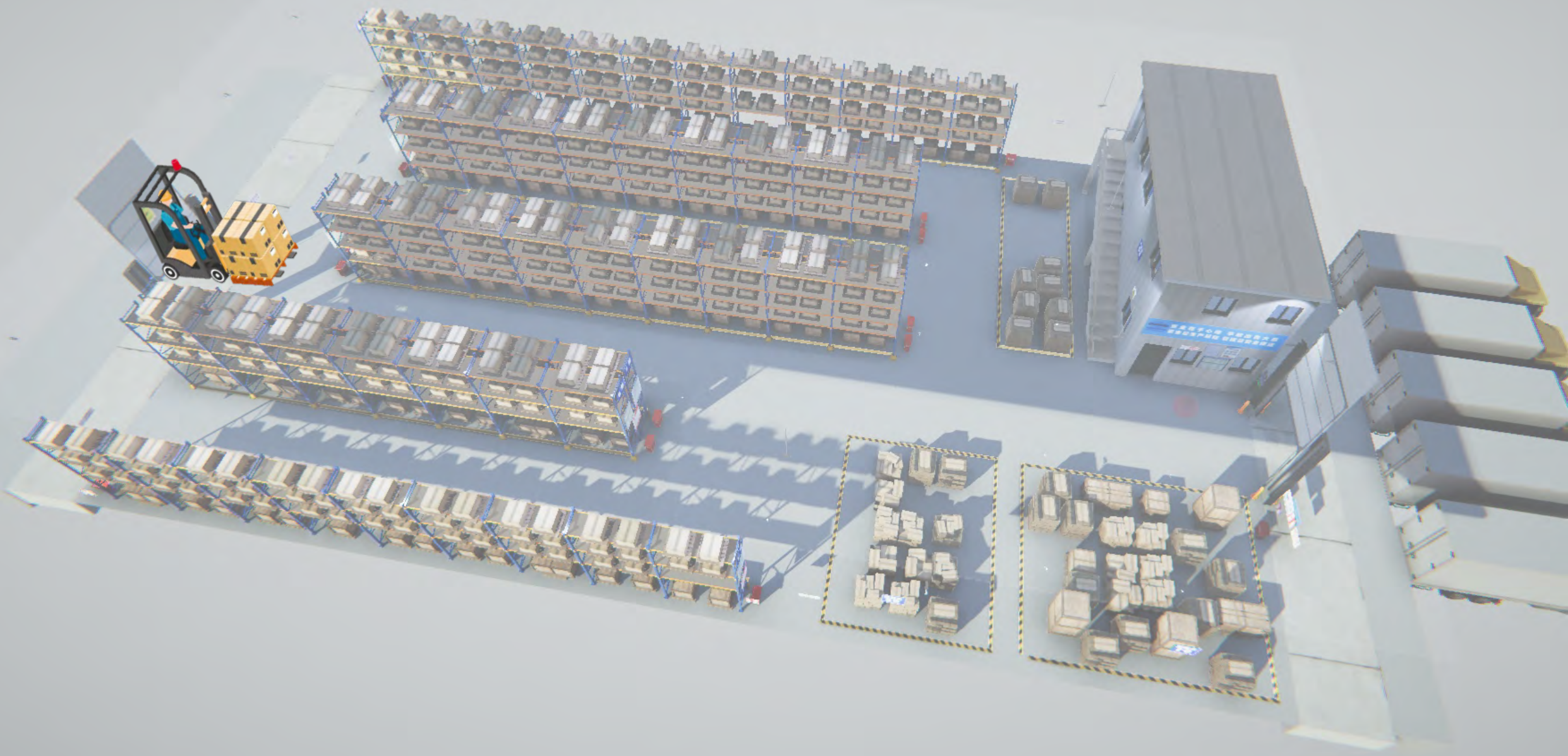


Pallet Label

- For easy identification, improved recognition speed and accuracy, without altering work habits, it is recommended to affix RFID labels on both sides of the fork entry of each tray. Two labels are required for each tray



Ground Stack Label



入库

| 任务 | 主单号 | 分单号 | 货物RFID | 件数 | 重量 | 当前货位 | 目标货位 |
|----|---------------|-----|--------------|----|----|------|------|
| 入库 | 999-123456781 | 003 | 191604000194 | 2 | 0 | | |
| 入库 | 999-123456781 | 002 | 191604000192 | 2 | 0 | | |

货物RFID

货位ID

货高 cm

功率- 功率+

库位坐标: 2.5, 30.1, 5.7
运输坐标: 4.9, 5.1, 0.0
实时温度: 0
实时位置: 4.9, 5.1, 8
光电值: 0 1

Task Info





| 入库 | | | | | | | |
|----|---------------|-----|--------------|----|----|------|------|
| 任务 | 主单号 | 分单号 | 货物RFID | 件数 | 重量 | 当前货位 | 目标货位 |
| 入库 | 999-123456781 | 003 | 191604000194 | 2 | 0 | | |
| 入库 | 999-123456781 | 002 | 191604000192 | 2 | 0 | | |

货物RFID 多货位

货位ID

货高 cm 测高 推荐货位

功率- 功率+ 确认入库 ☐ 自动 解冻货物 解冻货位 返回主页

货位坐标: 2.5, 30.1, 5.7
 货架坐标: 4.9, 5.1, 0.0
 实时位置: 0
 实时位置: 4.9, 5.1, 0
 光电反馈: 0 1



司机师傅把货物放在货架上



| 出库 | | | | | | | |
|----------------|---------------|-----|--------------|----|----|------|------|
| 出库20s超时，请尽快出库！ | | | | | | | |
| 任务 | 主单号 | 分单号 | 货物RFID | 件数 | 重量 | 当前货位 | 目标货位 |
| 出库 | 999-12345678I | 001 | 191604000193 | 2 | 0 | C204 | 1 |
| 出库 | 999-12345678I | 001 | 191604000195 | 2 | 0 | C204 | 1 |
| 出库 | 999-12345678I | 001 | 191604000196 | 2 | 0 | C204 | 1 |
| 出库 | 999-12345678I | 001 | 191604000200 | 2 | 0 | C216 | 1 |

货物RFID: 191604000200

实时库存: 0
 实时位置: 5.6, 4.4, 97
 光电传输: 0 1

功率- 15 功率+
 确认出库
自动
解冻货物
返回主页

Automatic
Timeout Task
Reminder

Automatic
Selection of
Outbound Tasks



数据自动回传



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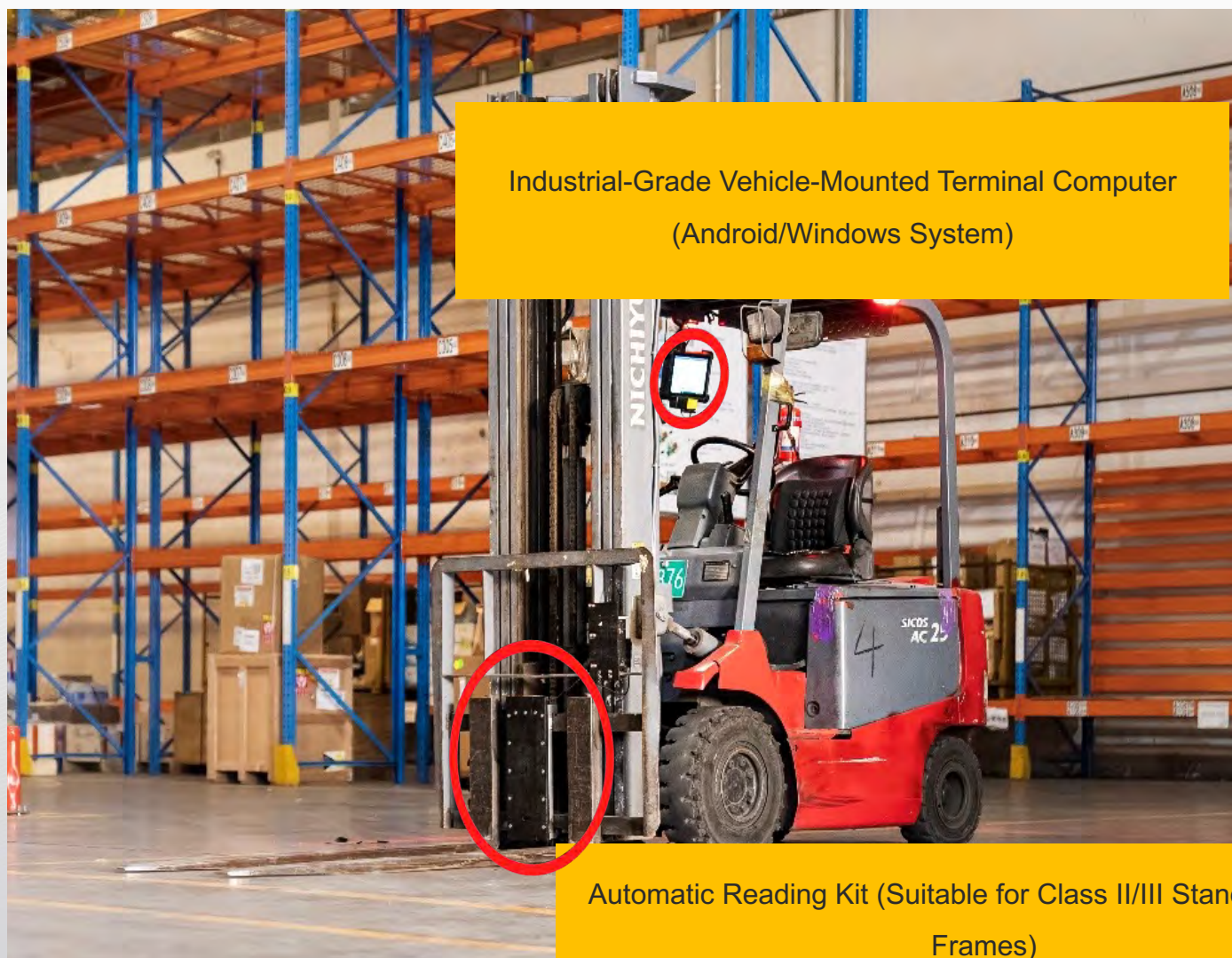


Application Environment Transformation

Fundamental Environment Transformation

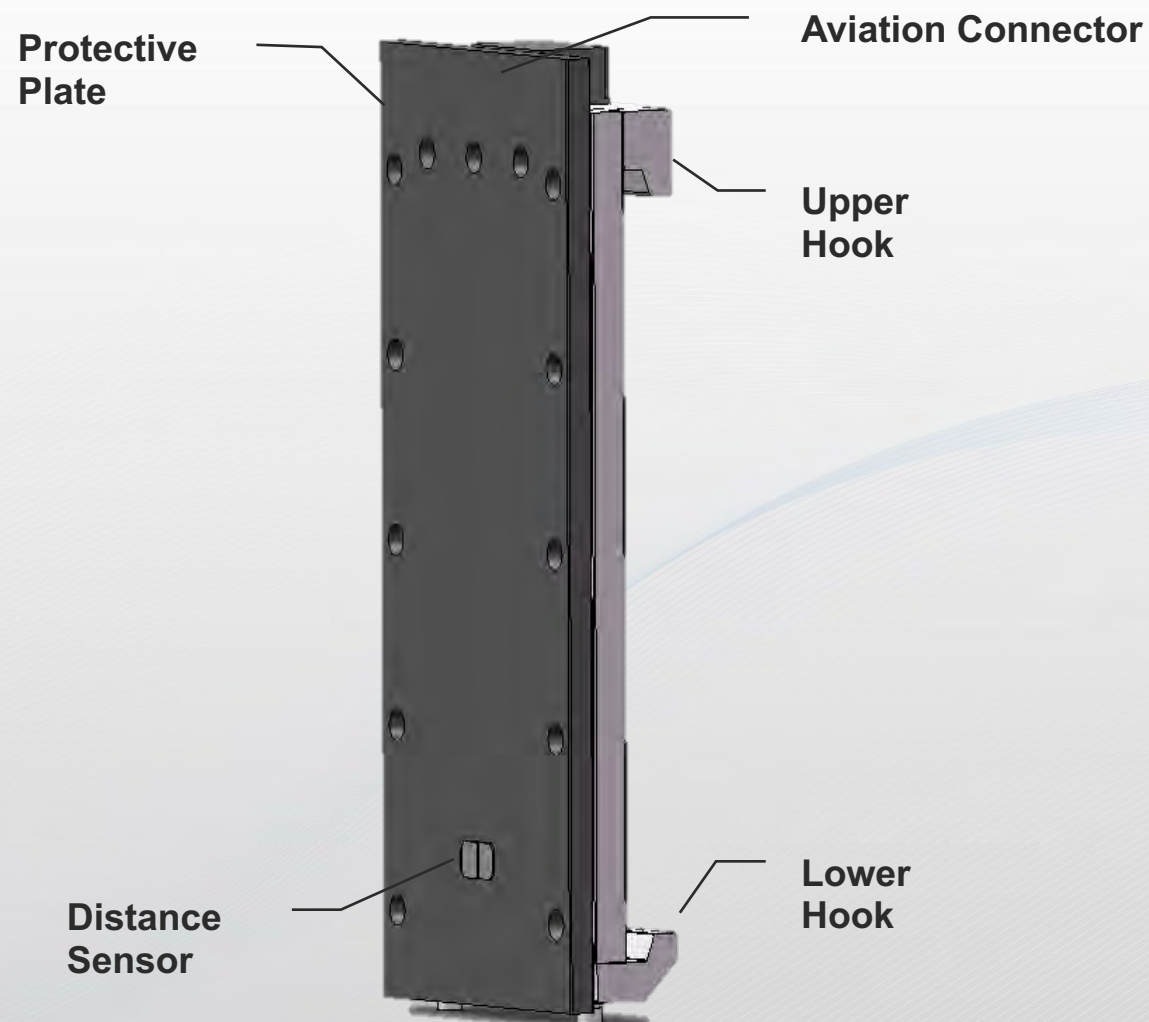


Forklift Modification



Functionality and Structure

- **Automatic Identification.** Automatically identify RFID tag data for goods/pallets/ground stacks/shelves.
- **Pickup Action Recognition.** Automatically recognize forklift pickup actions, ensuring accurate reading of goods/pallet tags during pickup.
- **Drop-off Action Recognition.** Automatically recognize forklift drop-off actions, ensuring accurate reading of shelf/ground stack tags during drop-off.
- **Fork Height Recognition.** Automatically recognize the height of the forklift's cargo lift, assisting in determining the height of the shelving location during stocking.
- **Forklift Status Data.** Includes battery level, reader connection status, temperature, and other data.



Product Features

Flexible Power Adjustment

The reader's reading power is flexible, allowing for the optimal antenna power to be provided for different operating environments and tag types.

Precision Reading

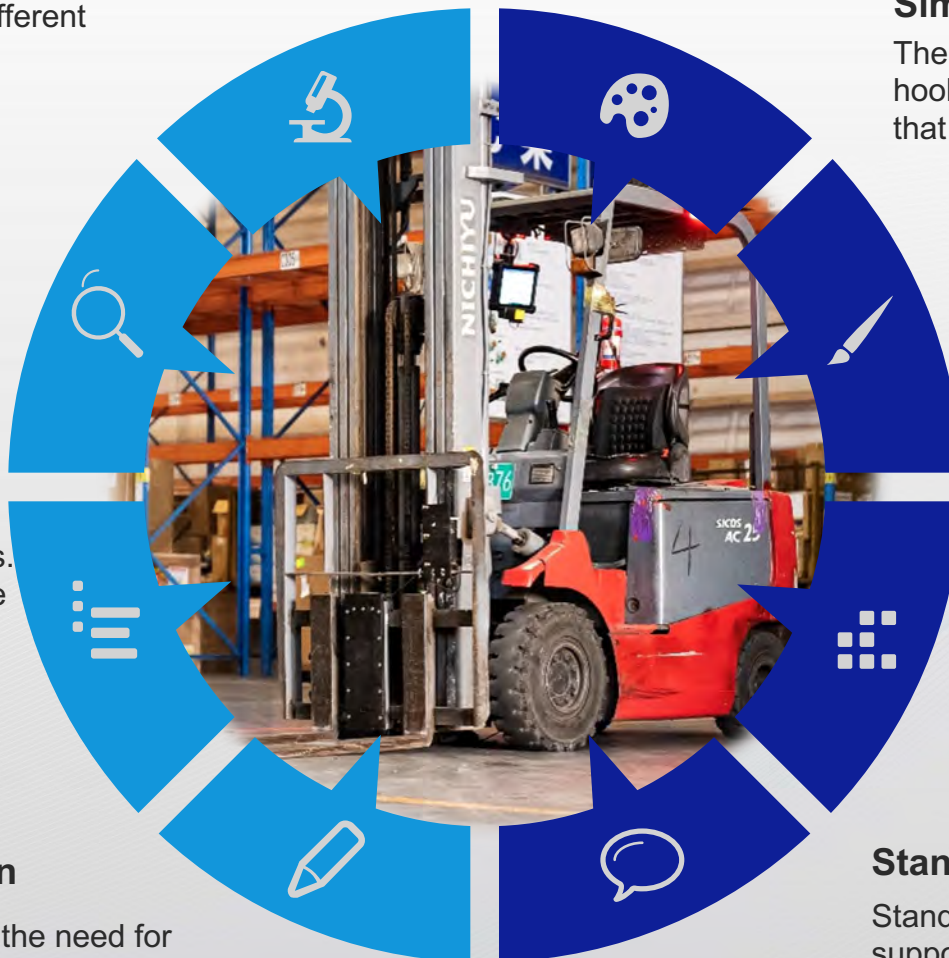
The device with a high-precision distance sensor, supporting reading tags at the optimal distance to avoid misreads and omissions, ensuring 100% accuracy.

Highly Recognition

Automatically discerns pickup and drop-off actions. The device could automatically turn to sleep mode and work mode. That could prevent continuous operation during travel from causing tag misreads and unnecessary power consumption.

Wireless Bluetooth Communication

Wireless Bluetooth communication to avoid the need for wired infrastructure modifications, damage, and maintenance.



Simple and Convenient Installation

The integrated component features upper and lower hooks, ensuring a simple and convenient installation that can be completed within half an hour.

Durable and Collision-Resistant

Aluminum alloy frame and high-strength racing steel plate material provide collision resistance and durability, ensuring that internal components are not damaged in case of impact.

Compatibility with Mainstream Forklifts

The device suit type II and III forklifts.

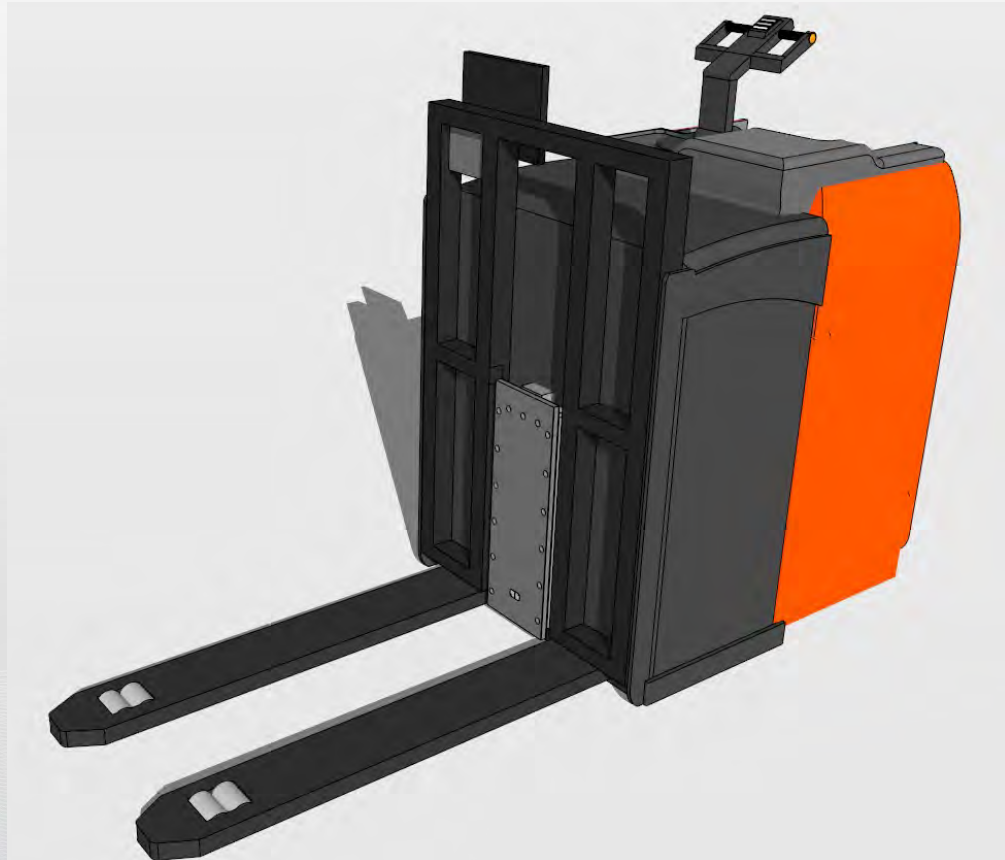
Standard SDK (Software Development Kit)

Standard SDK with open multi-level functionalities, supporting efficient integration with third-party systems.

Installation Video



Applications of Electric Hydraulic Vehicles

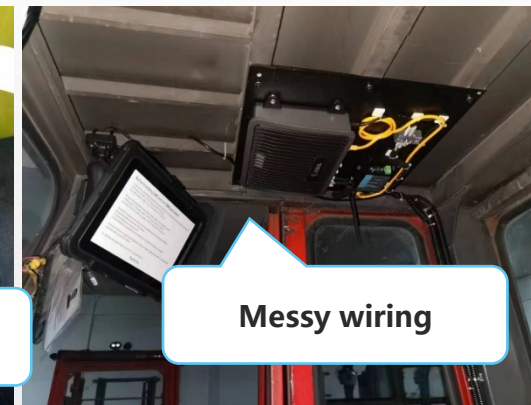
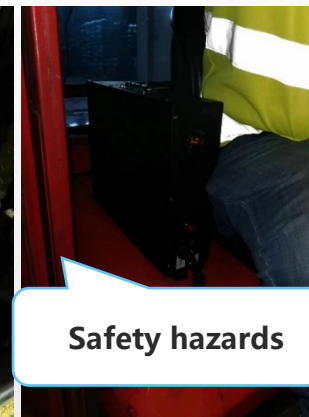
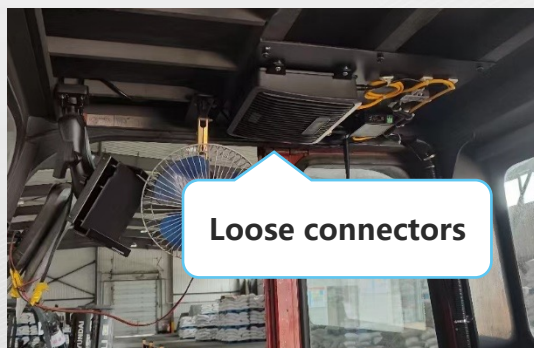


Installation Comparison

One-piece Installation



Split Installation



Parameters - Standard Version



Configuration: Main Unit + POC Testing Software
(Standalone Version)

Main Unit

| Parameters | | Model | Type II | Type III |
|---------------------|---------------------------------|-------|--------------------------------------------------------------------------|---------------|
| Basic Parameters | Adaptation Fork Type | | Type II | Type III |
| | Forklift Rated Lifting Capacity | | 1000-2500kg | 2501-4999kg |
| | Device Size | | 490* 200* 66mm | 591*200*76mm |
| | Weight | | 6kg | 7.5kg |
| | Package Size | | 570* 290* 140mm | 670*310*160mm |
| | Package Weight | | 12kg | 14kg |
| | Power Requirements | | 10-16VDC、max24W@12V、GX12 Aviation Plug | |
| | Communication Interface | | Bluetooth 2.0 | |
| | Operating Temperature | | -20℃~50℃ | |
| | Storage Temperature | | -20℃~70℃ | |
| | Operating Humidity | | 10%~95% RH | |
| | Protection Level | | IP53 | |
| RFID | RFID Protocol Support | | EPC C1G2、ISO18000-6B/C | |
| | RF Power Output | | 0dBm-33dBm (could be adjusted) | |
| | RF Antenna Specifications | | 4dBi circularly polarized antenna -1dBiC circularly polarized antenna | |
| Height/ Distance | Height Measurement | | 0-12m | |
| | Distance Measurement" | | 0-2m | |

Optional: Lithium Battery, Lead-Acid Battery,
Select as Needed

Accessories

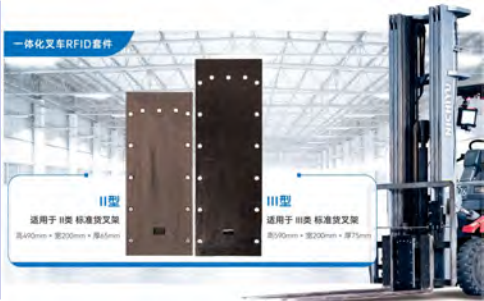

| Lithium Battery | |
|-----------------------|-------------------------------------------------------------|
| Battery Specification | 12VDC-20AH |
| Power Supply Voltage | DC9-12.6V、GX12Aviation Plug |
| Battery Dimension | 158*90*60mm |
| Battery Weight | 1.25kg |
| Usage Time | Continuous operation for over 8 hours, standby for 72 hours |

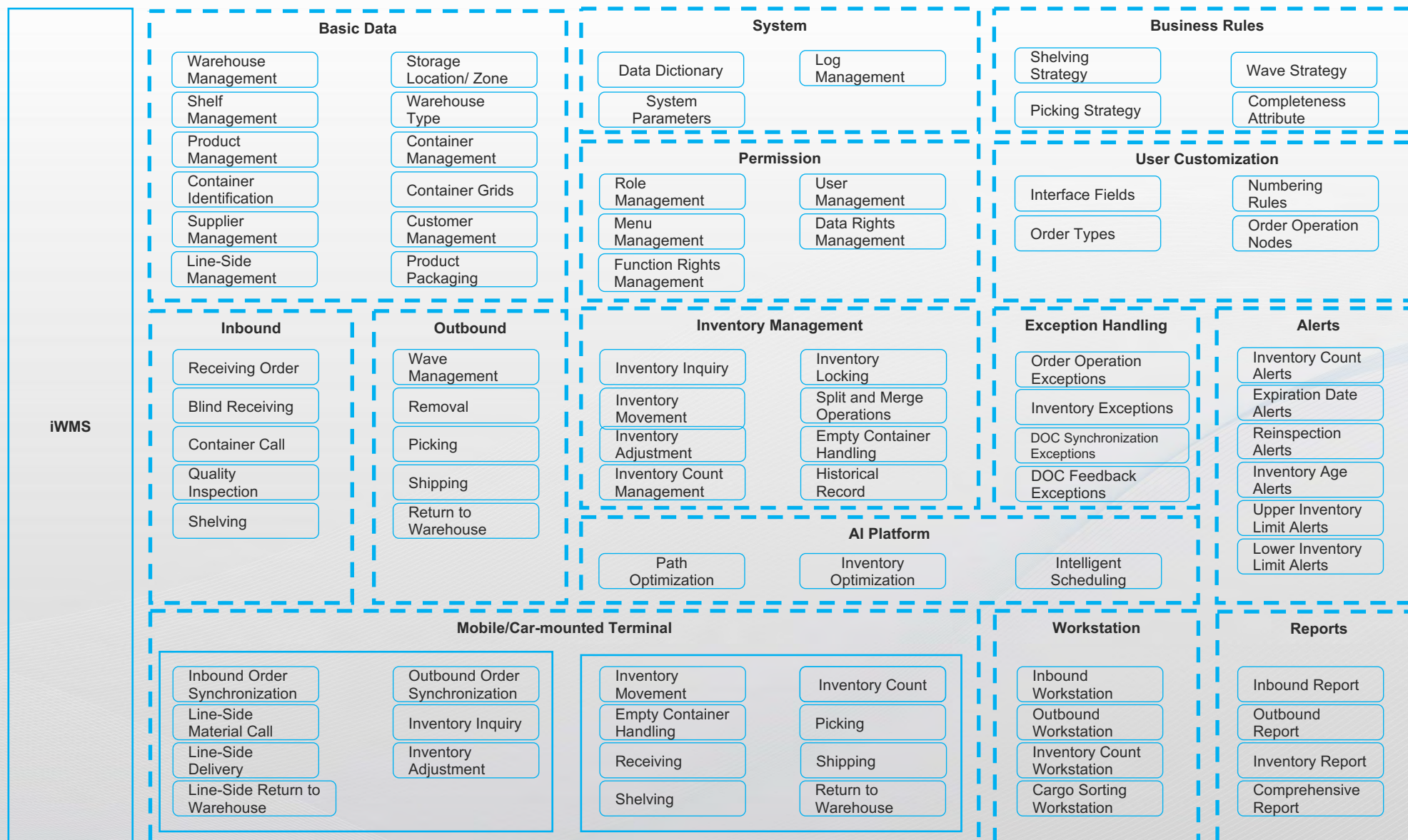
| Lead-Acid Battery | |
|-----------------------|-------------------------------------------------------------|
| Battery Specification | 12VDC-20AH |
| Power Supply Voltage | DC9-12.6V、GX12 Aviation Plug |
| Battery Dimension | 158*90*60mm |
| Battery Weight | 1.25kg |
| Usage Time | Continuous operation for over 3 hours, standby for 16 hours |

Application Effect Analysis

| Number | Content | Compariso n Group | Operator | Frequency | Action Breakdown | | | | | | | Time in Total (S) | Forklift Operation Time (S) | Overall Efficiency Improvement Rate(%) |
|--------|---------------------|----------------------------------|---------------------|-----------------|-----------------------------------------------|-------------|-------------------------|------------------------|----------------------------------------|-----------------------------|------------------------------|----------------------------|----------------------------------|----------------------------------------------|
| | Type | | | | T1. Shelf Location and Task Founding | T2. Picking | T3. Forklift Working | T4. Forklift Moving | T5. Forklift Pickup and Drop-off | T6. LPN Code Scanning | T7.Shelf Code Scanning | | | |
| 1 | Shelving | Forklift Reading Kit Group | Enhanced Forklift | 1 st | / | 28 | 6.4 | 25 | 7 | / | / | 80.4 | 76.0 | 30.7 |
| 2 | | | Enhanced Forklift | 2 nd | / | 32 | 4 | 29 | 14 | / | / | 97 | | |
| 3 | | | Enhanced Forklift | 3 rd | / | 25 | 9 | 21 | 19 | / | / | 90 | | |
| 4 | | | Enhanced Forklift | 4 th | / | 27 | 9 | 25 | 17 | / | / | 99 | | |
| 5 | | | Enhanced Forklift | 5 th | / | 32 | 6 | 36 | 8.8 | / | / | 97.8 | | |
| 6 | | Manual Forklift Group | Manual Forklift | 1 st | 17 | 29 | 6 | 35 | 12 | 4 | 1 | 104 | 109.7 | |
| 7 | | | Follow-up Personnel | 1 st | 17 | 29 | 6 | 35 | 12 | 4 | 1 | 104 | | |
| 8 | | | Manual Forklift | 2 nd | 18 | 34 | 11 | 37 | 14 | 3 | 1 | 118 | | |
| 9 | | | Follow-up Personnel | 2 nd | 18 | 34 | 11 | 37 | 14 | 3 | 1 | 118 | | |
| 10 | | | Manual Forklift | 3 rd | 16 | 30 | 8 | 29 | 18 | 5 | 1 | 107 | | |
| 11 | | | Follow-up Personnel | 3 rd | 16 | 30 | 8 | 29 | 18 | 5 | 1 | 107 | | |
| 12 | Picking off | Forklift Reading Kit Group | Enhanced Forklift | 1 st | / | 29 | 14 | 22 | 10 | / | / | 75 | 78.0 | 31.6 |
| 13 | | | Enhanced Forklift | 2 nd | / | 27 | 12 | 14 | 17 | / | / | 70 | | |
| 14 | | | Enhanced Forklift | 3 rd | / | 34 | 11 | 22 | 16 | / | / | 83 | | |
| 15 | | | Enhanced Forklift | 4 th | / | 30 | 12 | 20 | 17 | / | / | 79 | | |
| 16 | | | Enhanced Forklift | 5 th | / | 36 | 10 | 17 | 20 | / | / | 83 | | |
| 17 | | Manual Forklift Group | Manual Forklift | 1 st | 16 | 37 | 7 | 32 | 15 | 3 | 7 | 117 | 114.0 | |
| 18 | | | Follow-up Personnel | 1 st | 16 | 37 | 7 | 32 | 15 | 3 | 7 | 117 | | |
| 19 | | | Manual Forklift | 2 nd | 14 | 30 | 11 | 28 | 17 | 5 | 5 | 110 | | |
| 20 | | | Follow-up Personnel | 2 nd | 14 | 30 | 11 | 28 | 17 | 5 | 5 | 110 | | |
| 21 | | | Manual Forklift | 3 rd | 17 | 28 | 16 | 30 | 14 | 3 | 7 | 115 | | |
| 22 | Follow-up Personnel | 3 rd | 17 | 28 | 16 | 30 | 14 | 3 | 7 | 115 | | | | |

Competitive Analysis

| Comparison Items | Forklift RFID Automatic Reading Kit | Current Status |
|--------------------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Product Form |  |  |
| Product Integration | High-Level Integration | Decentralized and complicated installation and debugging. |
| Power Supply Method | Lithium battery powered. No circuit or oil pipe modifications | Forklift powered, requires additional oil pipes |
| Installation type | No drilling required, does not alter the forklift's structure | Requires modification to the forklift, drilling for installation |
| Installation Time | 30 mins/set | 2 days |
| Safety | Aligned with the fork, preventing damage to goods | Installed redundant structures may collide with goods causing damage |
| Collision Resistance | Integrated aviation-grade aluminum frame. 1cm thick high-strength collision-resistant plate. | Common structural components, no protection or simple protection, susceptible to damage |
| Post-Maintenance | Maintenance-free | Requires regular maintenance, replacement of oil pipes |
| Automatic Sleep Function | ✔ | ✘ |
| Risk of Misreading | Built-in algorithms, combined with sensor data to ensure accurate reading of goods and narrow aisle shelf locations | May misread non-forklift picked goods near the forklift, potential for misreads in narrow aisles |
| Applicability | Suit type II and III forklifts. | Customization required based on the vehicle |



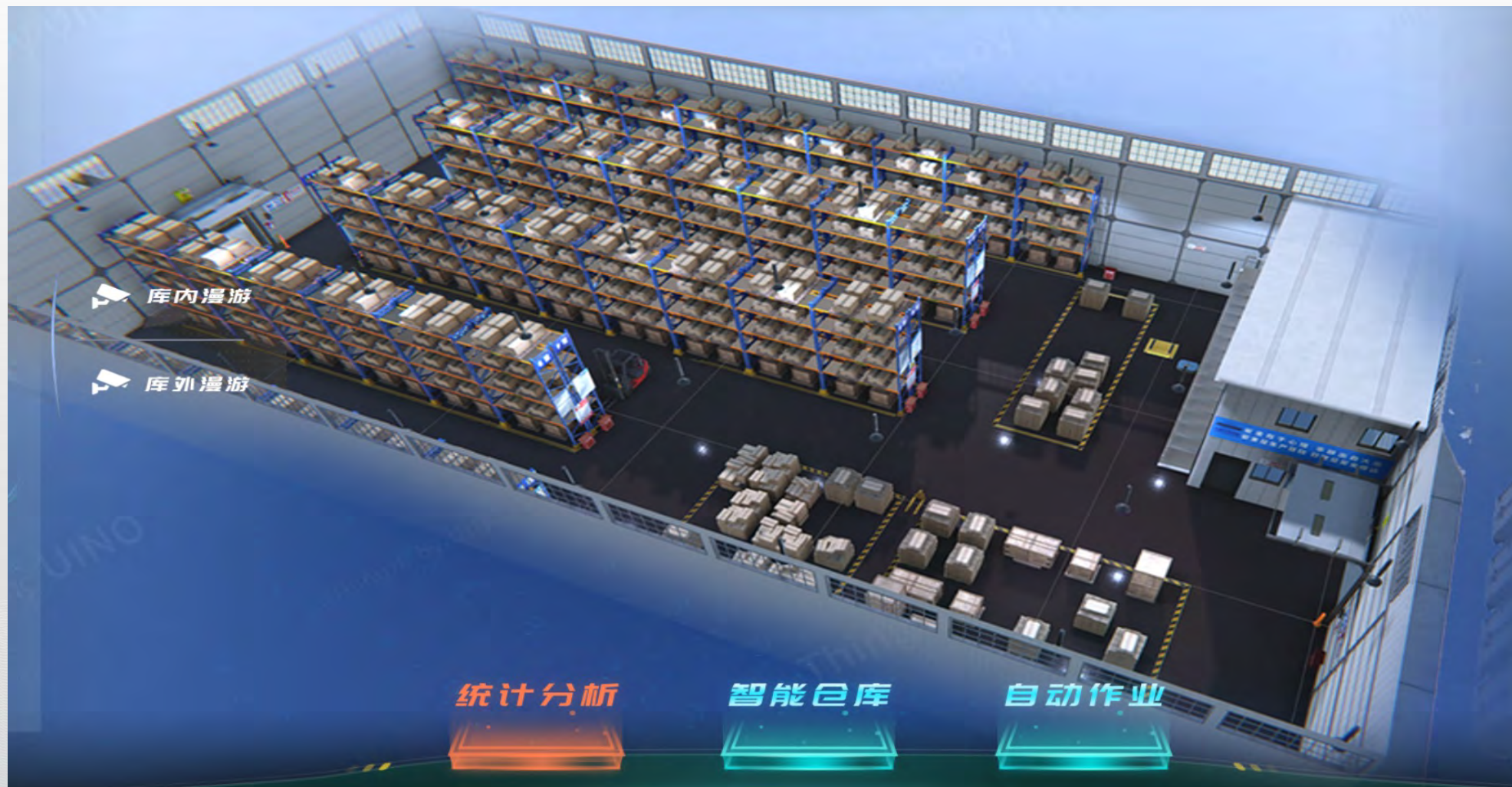
Data Display Screen



Built on big data analysis technology, the comprehensive data analysis dashboard centralizes the storage, analysis, and processing of key metrics such as inbound and outbound volumes, inventory levels, order fulfillment rates, and personnel performance. It presents these insights in a visualized format, aiding managers and decision-makers in gaining a better understanding of the operational status of logistics parks and warehouses.

Digital Twin

By creating a virtual scene in three-dimensional digital format, integrating applications such as business automation, operational digitization, data visualization, and digital business model simulation, we achieve visualized management and refined control of warehouse business dynamics, equipment operations, and intelligent alarms. This enhances warehouse management and service capabilities.



Digitized Warehouse and Intelligent Warehouse

| Comparison Items | Forklift Upgrade and Retrofit | Smart Warehouse |
|------------------------------------|-------------------------------|----------------------------------------------|
| Site Requirements | No special requirements | High site requirements, involving renovation |
| Construction Time | Short-term | Long-term |
| Cost | Low | High |
| Return on Investment | Fast | Slow |
| Technical Requirements | Low | High |
| Probability of Using Old Equipment | High | Low |

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Case Study

Background

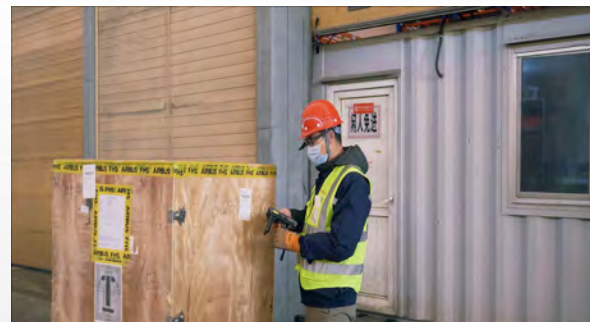
A supervised warehouse with an area of 1800m², specializing in the storage and inspection of customs goods. Manual operations lead to low efficiency and high error rates; high labor costs; lack of efficient tools for customs inspection and security supervision.

Upgrading

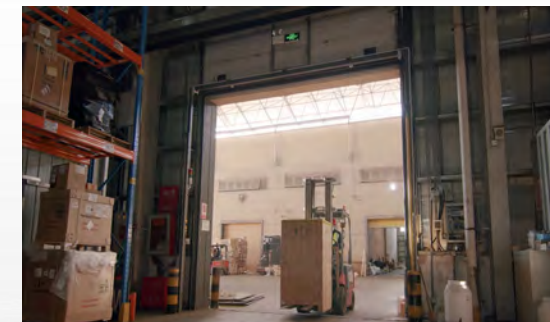
- RFID System: RFID channel gates, RFID upgrade for forklifts, handheld devices.
- Security System: Smart glasses, fixed cameras, dome cameras.
- Positioning System: UWB system (including base stations, asset/personnel tags).
- Software System: iWMS system

Results

- 80% Efficiency Improvement in Inbound Processes.
- 60% Efficiency Improvement in Outbound Processes.
- 70% Reduction in Workload for Document Entry.
- 100% Accuracy in Inbound and Outbound Processes.
- Reduction of Staff from 26 to 12.
- Reduction of Forklifts from 5 to 2.



Inbound with smart glasses



Automatic measure



Guide and record the shelf listing



Remote inspection with smart glasses

Customer Feedback

The intelligent system has changed our work totally. It liberate staff from complexed and repetitive work on inbound, in-stock, and outbound operations. Thereby meeting the shipper's demands for efficiency, safety, accuracy, and timeliness. It has established a leading demonstration effect in the customs supervision warehouse, ensuring effective supervision of import and export goods by customs. Within the company's system, it has created an intelligent application benchmark, providing a reference model for optimizing processes, improving efficiency, and reducing costs for many other warehouse managements. '

— Deputy General Manager, a Logistics Company

Case Study



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FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure

Supporting Policies



Training

- Sales training.
- Technical training



SDK Development

- Standard SDK package.
- Development guides



Backup Device

- Based on order quantity



Remote Technical Support

- Remote installation guidance
- Troubleshooting support
- Etc.,

Thank you!