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Mixed Case Picking System

—— How to help warehouses to improve the capabilities of order fulfillment?

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Why does a warehouse need a full-case picking and distribution system?

To address challenges such as high labor costs, efficiency bottlenecks, picking errors, and warehouse space waste in warehouses of the fast-moving consumer goods (FCMG) and circulation industries, the full-case mixed-code picking and distribution system achieves efficient, precise, and intensive handling of full-case goods through automated material handling and intelligent scheduling. It serves as a core solution for modern intelligent warehousing.

● Pain points

· **Labor challenges:** High costs, difficulties in recruitment, and safety hazards from high-intensity handling.

· **Efficiency bottlenecks:** Manual processing of full-case/full-pallet orders is slow, making it difficult to meet e-commerce timeliness requirements (such as same-day delivery).

· Accuracy and damage: Manual picking is error-prone, and goods are prone to collision damage.

· **Space waste:** Traditional warehouses require wide aisles, resulting in low storage density.

· **Coarse management:** Lack of real-time data to support fine-grained optimization.

● Value of the solution

· **Automation substitution:** Robots accurately handle full cases/pallets, liberating human labor and ensuring safety.

· **Efficiency leap:** 7×24-hour high-speed operation with intelligent scheduling significantly improves order throughput.

· **Precision and accuracy:** System commands combined with automatic identification achieve near-zero error picking.

· **Space optimization:** Narrow robot aisles support high-density storage and improve warehouse capacity.

· **Data-driven:** Automatic data collection throughout the process enables operational optimization and decision-making.

How does the system work?

1.Task Receipt and Preparation

The picking system obtains orders from the customer's business system, parses and generates full-case picking tasks, and schedules AGVs to transport the pallets of materials to be picked from the automated storage and retrieval system (AS/RS) or buffer area to the de-stacking position of the picking workstation.

2.Robot picking operation

After visual positioning, a 3D camera scans the material pallet to generate grabbing points and sends them to the robot. The robot grabs single-case products from the de-stacking position and places them on the order-specific pallet according to order requirements.

3.Order pallet offline

The order pallets completed with picking are transported by AGVs to the stretch wrapping machine and labeling machine. After packaging, they are returned to the AS/RS buffer area via the customer's hoist or directly dispatched from the warehouse.

The core driver of the system -- IPS

The full-case mixed-code picking and distribution system is driven by the self-developed core software IPS (Intelligent Picking System), which realizes the mixed palletizing of robots and the scheduling of peripheral docking equipment.

1. Full-process task management

Order Parsing and Task Generation: Receive orders from the customer's business system, automatically analyze the order structure, split and generate full-layer picking tasks and full-case picking tasks, sort them by priority, and allocate tasks to corresponding workstations to reduce equipment switching time.

2. AGV and Robot Scheduling

Dispatch AGVs to transport pallets of materials to be picked from the automated storage and retrieval system (AS/RS) to the de-stacking position of the picking workstation, or deliver completed order pallets to the stretch-wrapping/labeling stations. Monitor the real-time status of robots (e.g., idle, working, faulty), and dynamically assign tasks to idle workstations to prevent equipment downtime.

3.Mixed-Code Strategy and Path Optimization

· Mixed Palletizing and Order Splitting: Generates mixed-code solutions based on order requirements to optimize palletizing logic (e.g., heavy items do not stack on light items, large items do not stack on small items). Reduces inefficient handling. For example, grouping different SKUs from the same order onto pallets to minimize AGV round trips.

· Picking Path Planning: Generates the optimal picking sequence based on workstation locations and material distribution to reduce robot travel distance.

4.Real-time Monitoring and Exception Handling

Device status visualization: Displays the operating status of robots and AGVs (such as task progress, battery level, fault codes) through an interface, supporting remote start/stop and mode switching (automatic/manual).

How about the warehouse efficiency?

1   Efficiency Improvement and Capacity Breakthrough

With the support of feeding and transportation equipment, 4 robots can handle approximately 20,000 cases per day. Compared with traditional manual picking (about 150 cases per person per hour), the efficiency is 1 to 2 times higher than the original.

2   Zero-error Picking Guarantee

The case dropping rate is approximately 0.01%, and the 3D vision camera reviews the stacking pattern. The software system guides the robot picking according to order requirements, ensuring the picking accuracy reaches 99.9%, which is 5-10 percentage points higher than manual picking.

3   Significant reduction in labor costs with excellent return on investment.

Each workstation requires 0.5-1 maintenance personnel (only responsible for handling exceptions), reducing labor input by 90% compared to manual picking, with an ROI (Return on Investment) of less than 3 years.

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System Performance

Core Parameters	
Picking workstation efficiency	2000-3000 boxs/10h/unit
The floor area of the picking workstation	35 ㎡ /unit
Scope of Adaptation	It can be compatible with cartons or shrink films at the same time.
Single-case weight range	It is recommended to be below 30 kg.
Single-case size range	200mm≤ L≤ 600mm 200mm≤ W≤ 600mm 100mm≤ H≤ 500mm
Adaptable Stack Height	Maximum 1.8 meters including the pallet.

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