WORLD RACK

PROJECT CASES FROM COLD STORAGE

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INTELLIGENCE STORAGE EQUIPMENT CO., LTD.

2025.4.7

01 China-ASEAN (Baise)

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Customer Requirements

With the construction of supporting facilities such as the China-ASEAN Agricultural Product Trading and Cold Chain Storage Center, Baise No.1 will further develop the fruit and vegetable logistics markets in surrounding regions like Yunnan and Guizhou, as well as ASEAN countries such as Vietnam, Laos, and Myanmar. It will directly supply Beijing with ASEAN-origin ecological rice, fruits, and seafood from the Indian Ocean, while also distributing northern agricultural products to ASEAN countries via Special Freight Train. Baise No.1 agricultural products undergo a full-process information service system, strictly adhering to food safety standards to achieve traceability "from farm to table," allowing regulators and consumers to clearly understand information about production, processing, sales, and other stages of agricultural products.

PROJECT CASES FROM COLD STORAGE-China-ASEAN (Baise)

Customer Needs

For Cold Storage, the #4 and #5 warehouses of the China-ASEAN (Baise) Agricultural Product Trading Center, their available warehouse height is 16,100 mm, requiring the design of 31,000 storage goods positions. The WMS + WCS system technology will be adopted, seamlessly integrating with the customer's existing software system, and the system will be upgraded according to changes in the customer's production and inventory methods.

PROJECT CASES FROM COLD STORAGE-China-ASEAN (Baise)

WAP Solution

Given the customer’s diverse product range, large storage volume, and extremely high requirements for storage utilization rate, WAP has customized a dense storage combination of shuttle racking system and high-bay pallet racking system for the customer, paired with WAP’s independently developed and customized shuttles as well as WMS + WCS system technology for management. WAP will also assist the customer’s design institute in completing the equipment drawings required for fire protection inspection and coordinate with racking installation.

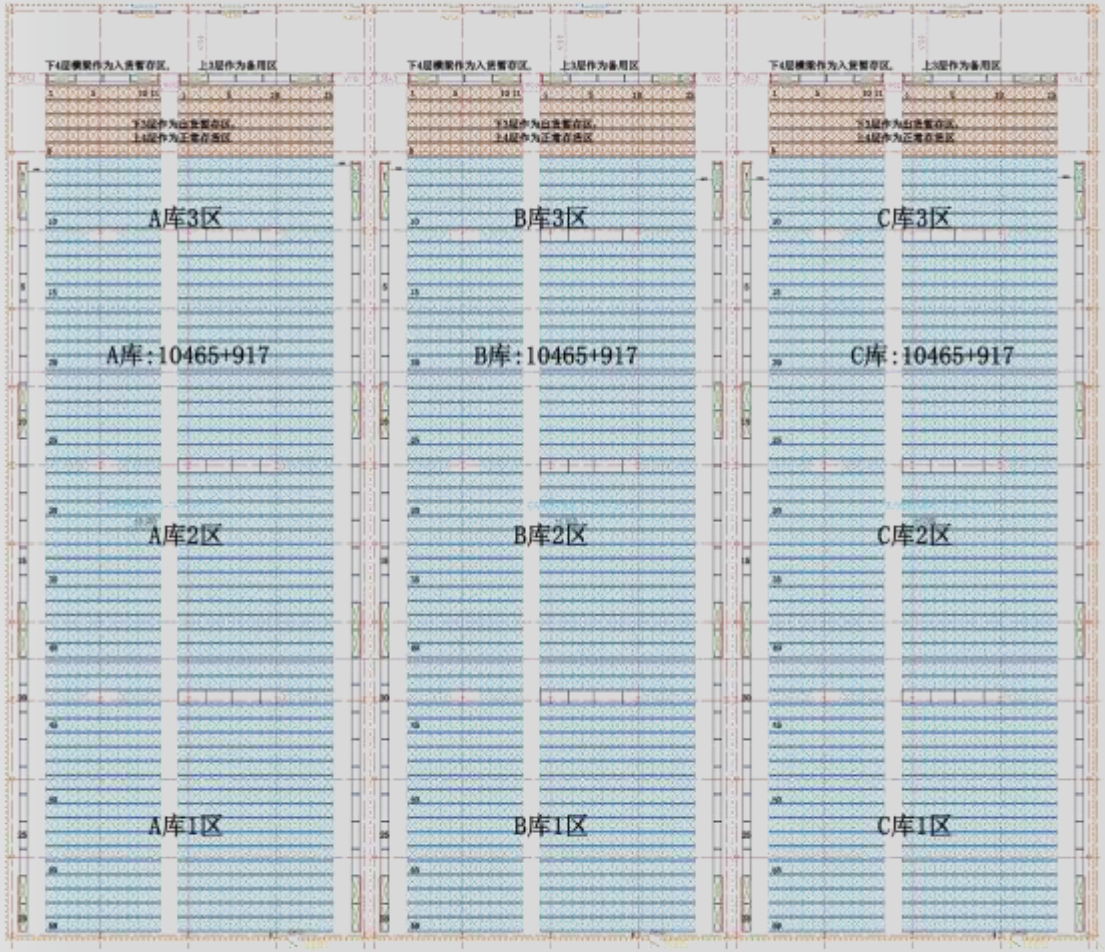
The standard shuttle racking system is a high-density, semi-automated pallet storage system composed of racking, shuttles, and forklifts. Shuttle racking maximizes warehouse space utilization rate, while shuttles reduce forklift operations, thereby improving warehouse storage and retrieval efficiency.

WAP Solution

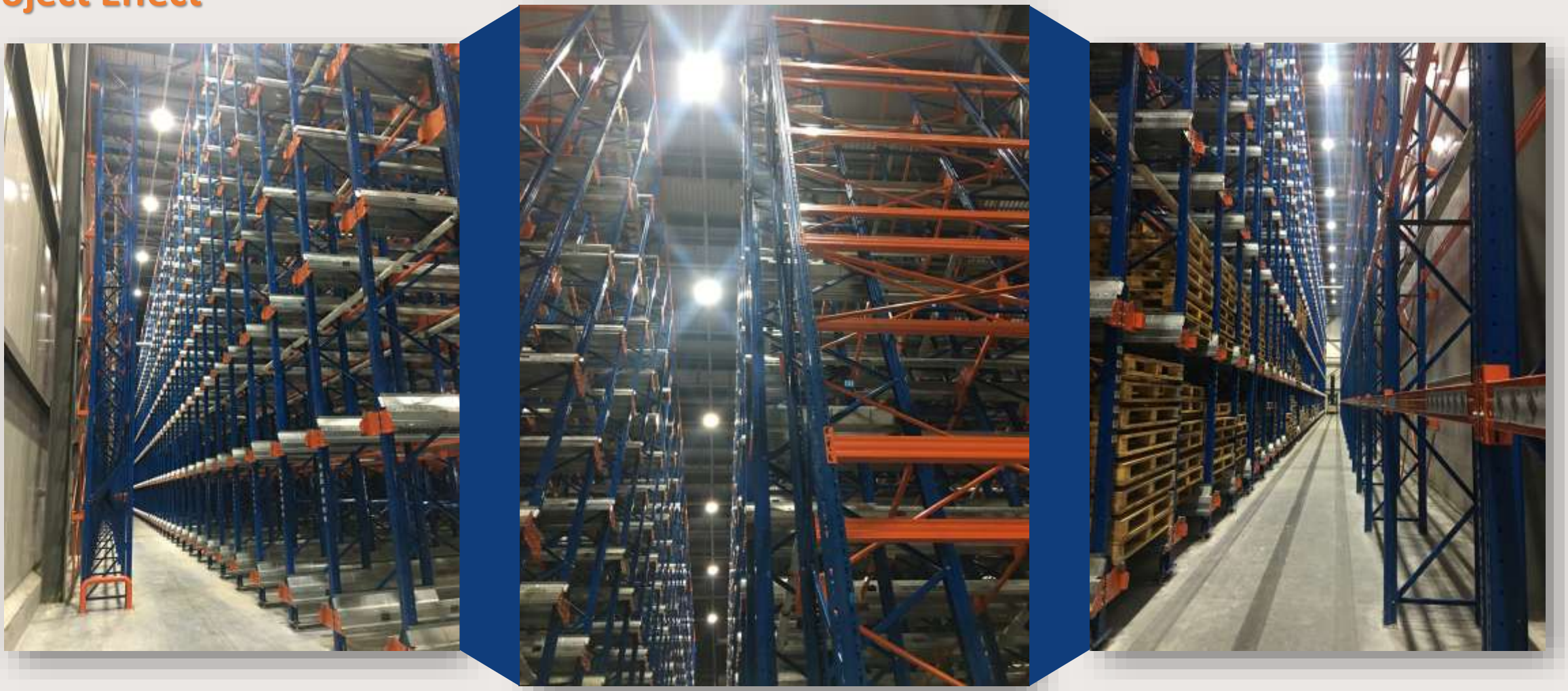
Pallets are four-way entry type, with barcodes on all four sides, a single usable surface, and a stringer-type base structure (see image below). They are compatible with AGVs, forklifts, conveyors, lifts, shuttles, pallet sorters, stackers, and ASRS racking systems.

The forklifts used are Crown TSP series very narrow aisle (VNA) three-way type, with a maximum lifting height of 13,485 mm, featuring high-speed moving, rotation, lateral movement, and load handling. The electromagnetic wire guidance system allows the forklift to operate in the narrowest aisles. In extreme temperature conditions, the spacious cabin provides operators with a comfortable working environment and excellent visibility, enhancing operational efficiency and endurance.

For this project, WAP's final racking design reaches a height of 14 meters, with 7 storage levels, totaling 34,146 pallet positions, a storage capacity of 34,000 tons, and forklift aisles of 1.8 meters.



Project Effect



02

五丰冷食

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Customer Requirements

Zhejiang NF Refrigerated Food Co., Ltd. was established in 1993 as a joint venture by three shareholders: Hong Kong NF Refrigerated Food Co., Ltd. (a subsidiary of China Resources Group), Hangzhou Commercial Asset Management Company, and Zhejiang Cereals, Oils & foodstuffs import & Export co., Ltd. At present, Zhejiang NF has developed into one of the leading enterprises in the cold food industry in East China; it is a large-scale cold food manufacturing enterprise which integrates research and development, production, storage and sales of cold food products. Zhejiang NF has three major production bases under its jurisdiction, namely Hangzhou, Jiaxing, and Huzhou, with an annual output of 100,000 tons. Yangzhou NF is a subsidiary of Zhejiang NF Refrigerated Food Co., Ltd. It was officially completed and put into operation in 2012. The Yangzhou production base has an investment of 220 million RMB and covers an area of 95333 m2, with an annual output of 33,000 tons. It plays the role of a production, storage, and distribution center in Jiangsu region, their service scope covers Jiangsu, Anhui, and surrounding areas.

PROJECT CASES FROM COLD STORAGE-NF

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Customer Profile

Warehouse size: 5400 square meters

Pallet type: 川-shaped wooden pallet with four entrances

Pallet specification: 1200W * 1000D

Cargo height: 1850mm (pallet height included)

Cargo weight: 1000KG

Stored products: cold drinks and frozen products

Cold storage temperature: -25 ℃

Time management: First-in-first-out

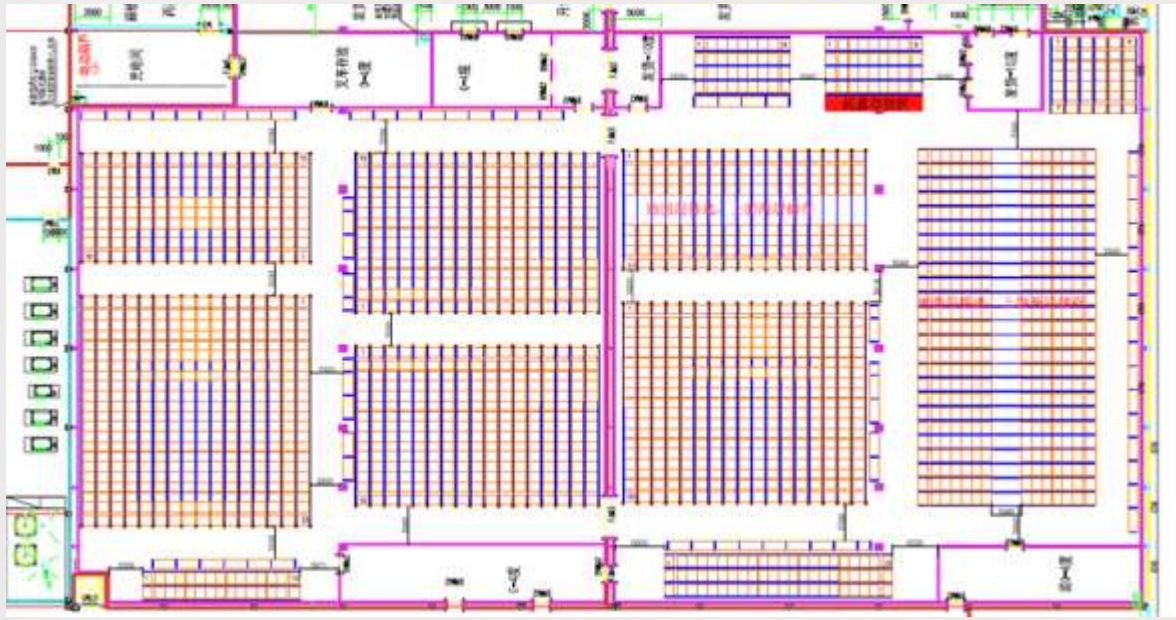
WAP Solution

Applying a racking structure mainly consisting of shuttle racking,

And supplemented by beam and roller type racking.

Division of functional areas

- **Storage area:** Shuttle racking + Beam racking
- **Outbound shipping area:** Shuttle racking
- **Sales area:** Shuttle racking + Roller racking
- **Unified pallet specification :** 1200(W)*1000(D)*150(H)/mm
- **Goods specification:** 1200(W)*1000(D)*1850(H)/mm
- **Work method:** First In First Out (FIFO)
- **Single pallet load:** 1000KG
- **Configurated layers:** 3 layers



Project Effect

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PROJECT CASES FROM COLD STORAGE- Kerisom

Customer Requirements

Kerisom Food Biotechnology (Jiangsu) Co., Ltd is an enterprise that leverages an international R&D team to organically integrate global premium food resources. Equipped with advanced production technologies, it is dedicated to manufacturing high-quality green agricultural food products that demonstrate dietary characteristics from various global regions. To better serve its core business, strengthen key control point management, and highlight functional specialization, the company has established six divisions focused on key areas and distributed operations. These divisions include: the "Butter Division," "Bio-R&D Division," "Staple Foods Division," "Organic Vegetables Division," "Cold Storage & Logistics Division," and the "Philanthropy Division," which is committed to giving back to society and spreading love.

PROJECT CASES FROM COLD STORAGE- Kerisom

Customer Profile

Warehouse area: 4,800 m²

Warehouse temperature: Cold storage (-18°C to -20°C)

Warehouse clear height: 10.42 meters

Pallet specifications: 1,200 (W) × 1,000 (D) mm

Cargo dimensions: 1,200 mm (including pallet)

Cargo weight: 500 kg/pallet

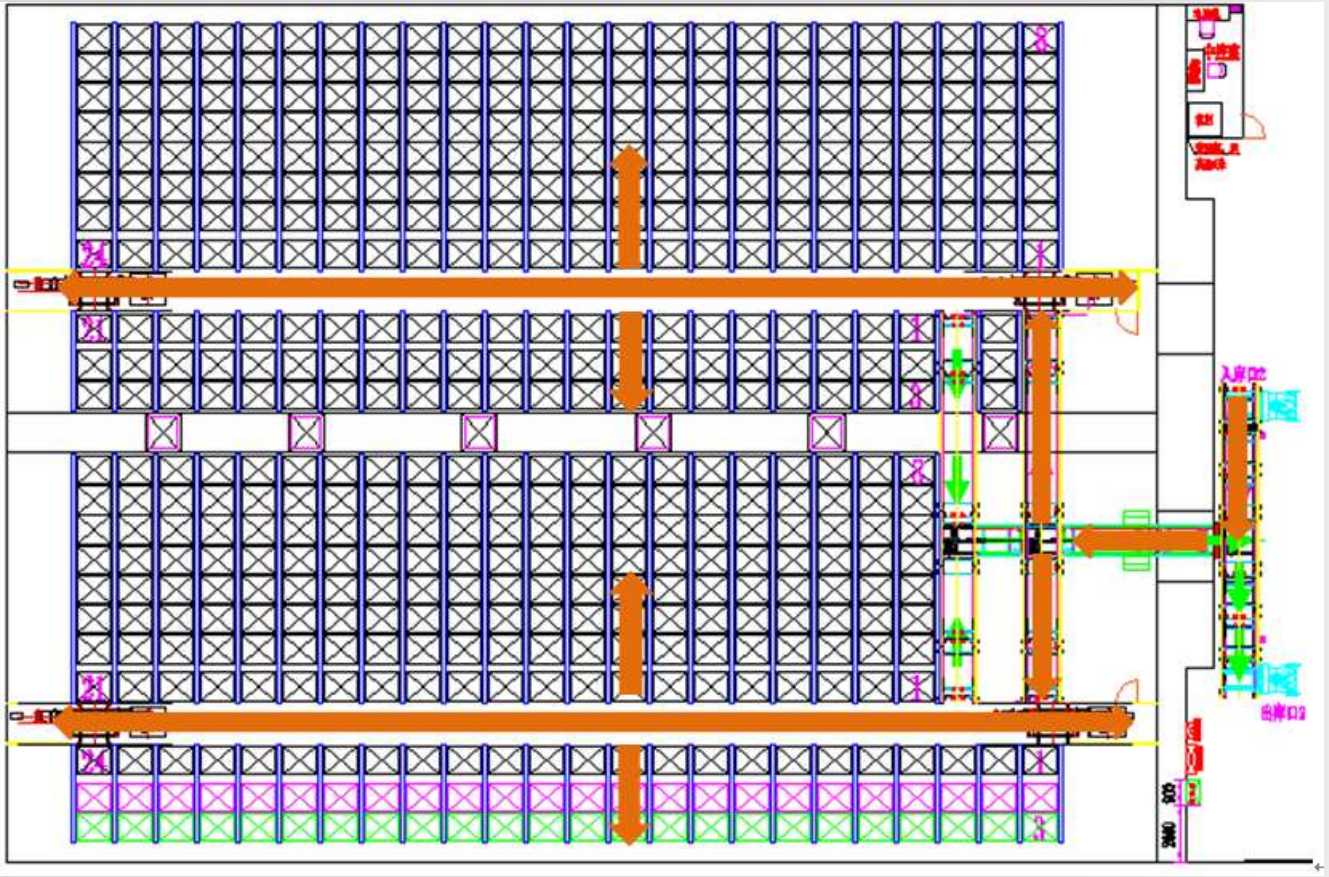
PROJECT CASES FROM COLD STORAGE- Kerisom

Customer Needs

This automated high-density storage system is specifically designed for the "Cold Storage & Logistics Division" as a high-tech, high-value solution. It enables forklift-free operation within racking zones to meet safety requirements while significantly improving warehouse inbound/outbound efficiency and reducing shipping/receiving errors.

- Enhance logistics capabilities and efficiency
- Increase storage capacity and improve warehouse utilization rate
- Improve operational safety
- Reduce shipping error rates

PROJECT CASES FROM COLD STORAGE- Kerisom



Entering the warehouse

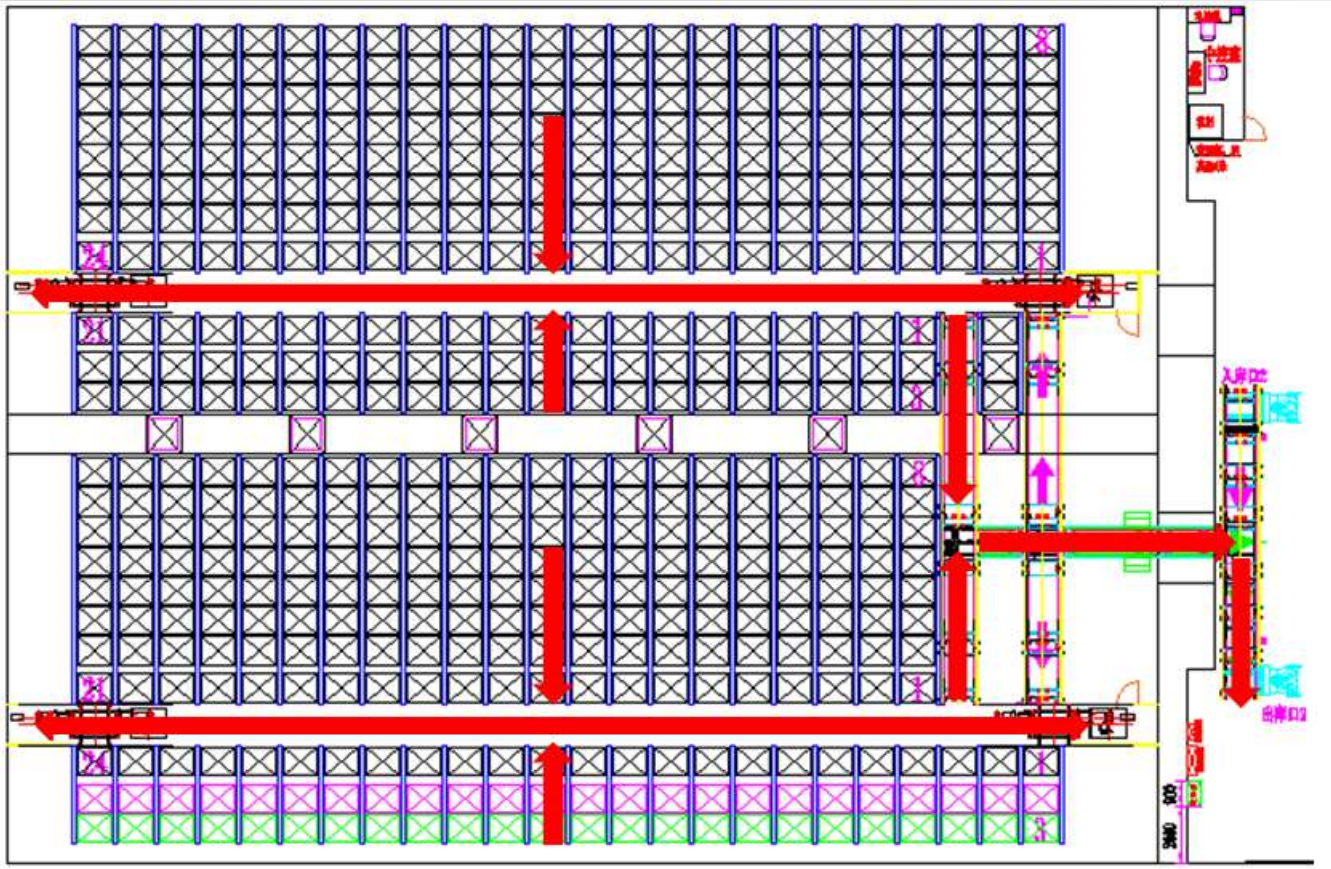
WAP Solution

The primary storage/retrieval equipment in this system operates reciprocally within crane aisles, transporting pallets between conveyors and shuttle racking. The stacker cranes achieve high efficiency with travel speeds up to 160 m/min and lifting speeds up to 60 m/min.

The logistics system includes:

- 8-layer shuttle racking system
- 8 shuttles
- 8 stacker cranes
- Conveyor system with dimension inspection equipment
- AGVs
- Warehouse Management System (WMS)
- Electrical control system
- Warehouse Control System (WCS)
- Operator terminal equipment
- Project duration: 180 days.

PROJECT CASES FROM COLD STORAGE- Kerisom



Retrieve from warehouse

WAP Solution

The project is designed as a fully automated stacker crane shuttle storage system covering approximately 4,800 m², divided into four zones: three frozen storage zones (-18°C to -20°C) and one chilled storage zone (5°C). The effective storage height is 10.68 m, with racking height of 10.42 m. The "stacker crane + shuttle" high-density storage system provides 7,978 pallet positions with aisle depths of 3-pallet and 8-pallet configurations. Each pallet measures 1,200 × 1,000 × 800 mm and uses double-sided accessible plastic pallets with a rated load of 500 kg/pallet. The warehouse employs fan-based cooling to maintain low humidity.

Racking System:

- 8 layers with 7,978 pallet positions
- Storage capacity: 3,989 tons of products

PROJECT CASES FROM COLD STORAGE- Kerisom

WAP Solution

Stacker Crane System:

- 8 stacker cranes
- Travel speed: 0–160 m/min
- Lifting speed: 0–30 m/min
- Conveyor speed: 0–18 m/min
- Powered by brush-type electrified rails
- AC 380V 3-phase 5-wire conductor rails (5-core type) mounted on one side of the track
- Designed rated load capacity: 750 kg

Shuttle System:

- 8 shuttles
- Designed rated load capacity: 500 kg
- Unloaded speed: 0.8–1.1 m/s
- Full-load speed: 0.7–1.0 m/s
- Battery life: >8 hours
- Charging method: charging on stacker cranes

WAP Solution

Dimension Inspection System:

- Based on storage unit dimensions (L/W/H), performing PLC function configuration and action control according to allowable errors.

One Set of Inbound and Outbound Conveyor System:

- Adopting chain conveyors
- Speed: 4–12 m/min
- Designed rated load capacity: 500 kg

Warehouse Management System (WMS): 1 set

Warehouse Control System (WCS): 1 set

Project Effect

The high-density storage design significantly improves warehouse capacity. In this project, the 8-layer system with 7,978 pallet positions (across four zones) increases storage efficiency by 40% compared with traditional AS/RS, with peak throughput of 16 pallets/hour per zone.

All integrated technologies and software offer excellent cost-performance ratios. Key components (shuttles, stacker cranes, conveyors) use world-class parts including motor reducers, PLCs, wireless communication devices, fieldbus systems, laser rangefinders, and encoders. The design incorporates self-recovery and redundancy of the system for robust interference resistance. Racking strength, stiffness, and stability are validated through parametric design, FEM modeling, and structural testing.

To eliminate safety risks, improve throughput and accuracy, as well as enable ERP integration, Kerisom partnered with WAP to implement this fully automated stacker crane shuttle system. Forklift operators now simply deliver/receive pallets on conveyors while automated systems handle storage/retrieval tasks.

Based on the collection and analysis of preliminary data, WAP has planned and designed the project as a fully automated stacker crane shuttle system. For inbound storage, forklift operators only need to deliver the goods to the conveyor line at the warehouse entrance, and then the automated equipment works together under the control of the WMS and WCS to transport the goods to the designated storage location according to pre-set storage rules. On the contrary, when picking up goods, the system will also send them to the outbound conveyor line based on the order and optimized picking rules. Forklift operators only need to follow the prompts on the outbound display screen to remove pallet goods from the outbound conveyor line and deliver them to the platform.

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PROJECT CASES FROM COLD STORAGE- HAOXIANGNI

Basic Information

Haoxiangni Jujube Co., Ltd. was founded in 1992 and listed on the Shenzhen Stock Exchange SME Board on May 20, 2011, becoming the first publicly traded company in China's jujube industry. Haoxiangni is a comprehensive enterprise integrating jujube cultivation, processing, cold storage, R&D, exports, and tourism. Guided by market demand, driven by technological innovation, and centered on brand management, the company adheres to a strategic focus on product serialization, premiumization, and health nutrition, continuously expanding market share and brand recognition. It has now become a leader in the jujube industry. The company operates four production and processing bases in Xinzheng (Henan), Cangzhou (Hebei), Ruoqiang (Xinjiang), and Aksu (Xinjiang), with over 8,000 mu of self-owned raw material bases, 15 wholly-owned subsidiaries, 1 equity participating subsidiary, and more than 3,000 employees. Its sales network covers nearly 2,000 exclusive stores in over 300 cities nationwide.

Customer Profile

Warehouse type: Cold storage

Environment conditions: Temperature requirements of -4°C / -18°C

Clear height: 16,820 mm

Working hours: 16 hours/day for inbound;

16 hours/day for outbound

Current pallet specifications: 1,200 (W) × 1,000 (D) × 150 (H) mm

Installation site: Haoxiangni Industrial Park, Xinzheng City, Henan Province

PROJECT CASES FROM COLD STORAGE- HAOXIANGNI

Customer Needs

Haoxiangni's rapid growth has attracted widespread attention. With booming business, its current storage model can no longer meet operational demands, leading to issues such as severe capacity shortages, low inbound/outbound efficiency, rising storage costs, and inventory management difficulties. These challenges have become bottlenecks hindering further development.

- Plastic/wooden pallets with stringer bases (four-way entry)
- **Load capacity:** 800 kg/pallet
- **Packaging:** Cartons (woody grain workshop, raw jujube workshop); woven bags (jujube slice workshop)
- **Dimensions:**

Pallets: 1,200 (W) × 1,000 (D) × 150 (H) mm

Loaded goods: 1,200 (W) × 1,000 (D) × 1,600 (H) mm

WAP Solution

Semi-Automated Shuttle Racking + Fully Automated Shuttle Racking

By combining semi- and fully automated systems, this solution maximizes storage density and operational efficiency.

WAP believes the key lies not in warehouse size but in selecting the right storage equipment. Our high-density solutions optimize limited space to boost utilization and productivity while reducing labor and equipment costs.

Shuttle Racking: Racking + Shuttles + Forklifts

Advantages:

- High-density storage: Minimizes aisle space, allowing for higher storage space per unit projected area and significantly improving warehouse utilization rate.
- Flexible workflows: Customizable for site, product, and task needs, improving inventory management level.
- Enhanced safety: Forklifts operate outside racking, reducing damage and accidents.
- Efficiency: One operator can manage multiple shuttles at the same time, reducing waiting time and maintenance costs.

05

YumChina

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PROJECT CASES FROM COLD STORAGE- Yum China

Basic Information

Yum China Holdings, Inc. is China's leading restaurant company, committed to becoming a global pioneer in innovative dining. Since the opening of its first restaurant in 1987, Yum China has expanded across all provinces, autonomous regions, and municipalities in mainland China, operating over 8,700 restaurants in more than 1,300 cities and towns as of June 2019.

PROJECT CASES FROM COLD STORAGE- Yum China

Customer Profile

- **Warehouse Area:** 12,000 m²
- **Warehouse Temperature:** Cold storage and ambient storage
- **Clear Height:** 10.5 meters
- **Pallet Specifications:** 1,200 mm (W) × 1,000 mm (D)

PROJECT CASES FROM COLD STORAGE- Yum China

Customer Needs

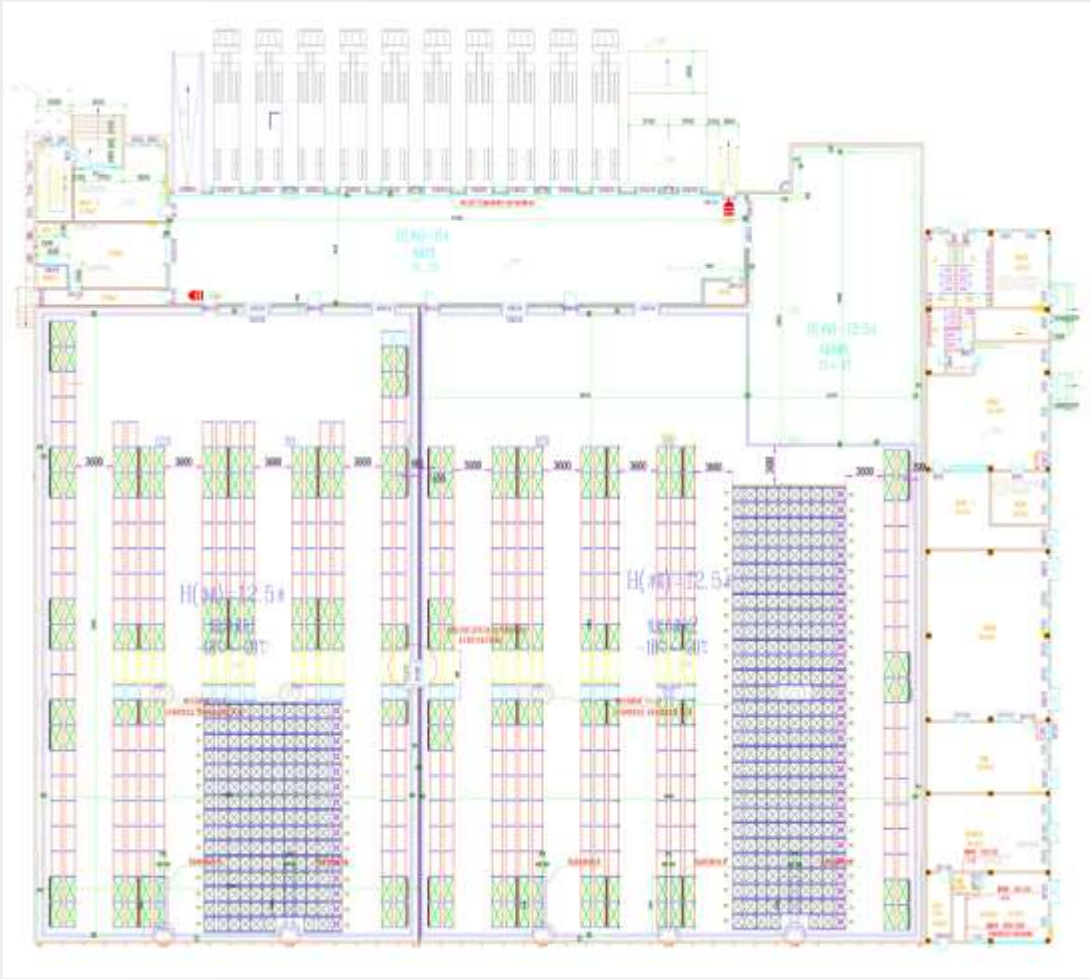
The newly built logistics distribution center in Shenzhen primarily serves major clients such as Yum, HAVI, and PANGU. Key features include:

- Focus on cold chain distribution, with limited dry storage operations.
- Standardized pallet storage (1,200×1,000 mm).
- Cold storage products categorized into Class A (high-turnover), B, and C items, with both full-pallet and piece-picking operations.
- Maximize storage capacity while maintaining efficient picking and outbound workflows, given the high construction costs of cold storage.
- Dry storage area (5,200 m²): Stores packaging materials, grains, oils, and other ambient-temperature goods.
- Cold storage area (6,800 m²): Dedicated to vegetables and meats, with multi-zone temperature control to ensure food quality.

PROJECT CASES FROM COLD STORAGE- Yum China

WAP Solution

- Needs Analysis: Collaborated with the client to classify A/B/C products and determine picking area requirements.
- Layout Optimization: Worked with design institutes to plan racking arrangements, defining upright spacing and partitions based on racking layouts to maximize storage.
- System Configuration:
  - I. Shuttle Racking: 2,700 pallet positions for centralized Class A storage with larger storage capacity per unit area (high-density, high-efficiency full-pallet operations).
  - II. Double-Deep Beam Racking: 12,000 pallet positions for Class B/C items.
  - III. Single-Deep Beam Racking (Dry Storage): 3,600 pallet positions.
  - IV. **Design Details:**
    1. All racking support 6-level storage (with racking height of 11.5 m and warehouse clear height of 12.5 m).
    2. Double-deep cantilever racking features ground stacking storage on the first layer for easy piece-picking and buffer stocking.
- Cold Storage Retrofit:
  - A1 Warehouse: Converted from dry storage using racking as the primary support for insulation and fan systems—a proven approach for such retrofits.



PROJECT CASES FROM COLD STORAGE-HUA FU COLD CHAIN

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HUA FU COLD CHAIN

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PROJECT CASES FROM COLD STORAGE-HUA FU COLD CHAIN

Basic Information

Shanghai Huafu Cold Chain Logistics Co., Ltd. is a professional logistics company specializing in the distribution of refrigerated, frozen, and temperature-controlled goods. Its operations span major cities across China, and in 2008, it established service teams in Dalian (Northeast), Shanghai (East China), and Wenzhou (South China). With extensive expertise in low-temperature logistics, Huafu is equipped with temporary high/low-temperature cold storage facilities, offering adjustable temperatures from -20°C to 25°C to meet diverse cargo requirements. The company owns a fleet of refrigerated trucks ranging from 2 to 30 tons, making it one of the few logistics providers in Shanghai capable of long-distance transport with its own vehicles. Each truck is outfitted with GPS satellite tracking and a real-time temperature monitoring system, ensuring clients have full visibility of their shipments.

PROJECT CASES FROM COLD STORAGE-HUA FU COLD CHAIN

Customer Profile

- **Current Warehouse Setup:** Floor stacking
- **Cargo Weight:** 800 kg
- **Warehouse Area:** 12,000 m²
- **Pallet Dimensions:** 1,200 mm (W) × 1,000 mm (D)
- **Pallet Type:** Stringer type wooden pallets
- **Cargo Dimensions (incl. pallet):** 1,200 mm
- **Warehouse Clear Height:** 9.5 meters
- **Storage Temperature:** Freezer (-18°C to -25°C)

PROJECT CASES FROM COLD STORAGE-HUA FU COLD CHAIN

Customer Needs

To support the river-economy market's needs, the warehouse will primarily store low-temperature meat products, seafood, and agricultural goods, with goals to:

- Enhance logistics efficiency.
- Maximize storage capacity and space utilization rate
- Enable clear categorization and flexible access.
- Support palletized transport.
- Upgrade to data-driven warehouse management.
- Elevate corporate image

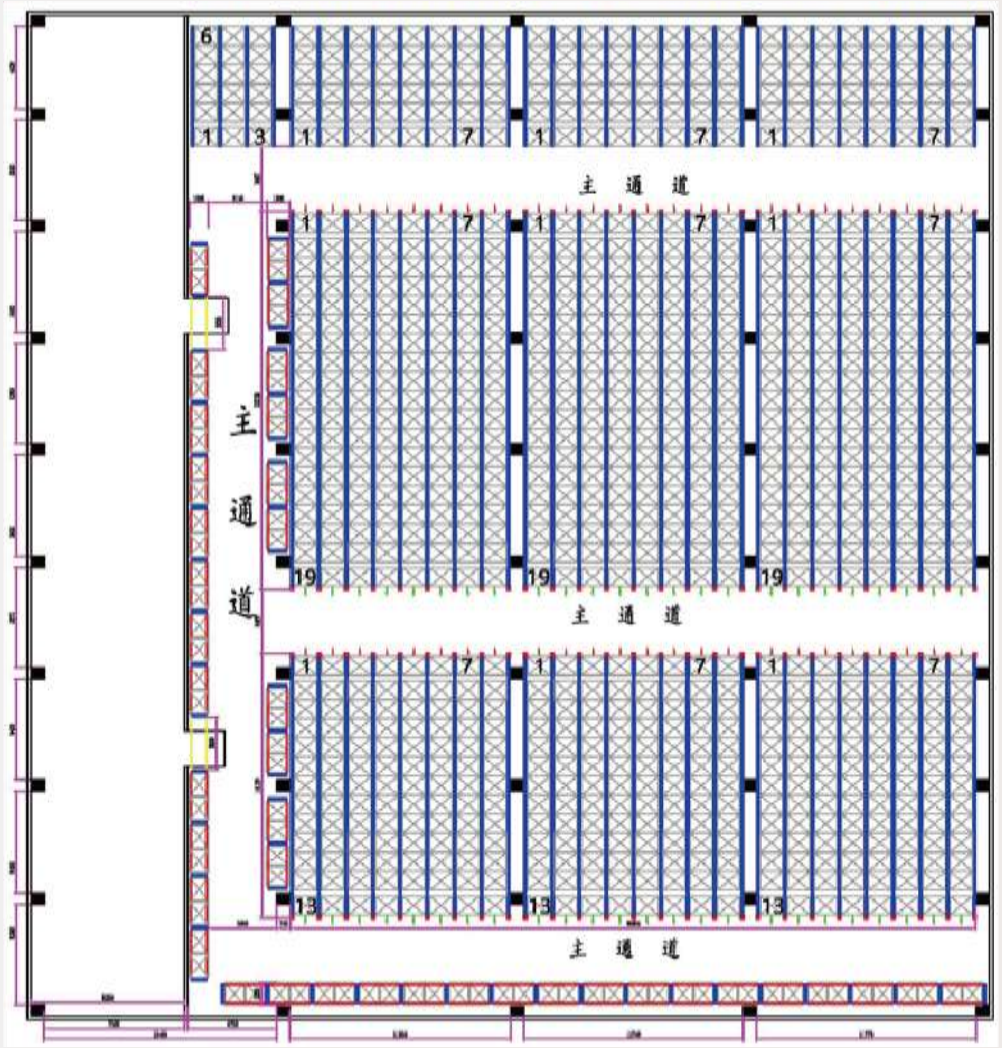
WAP Solution

To balance storage density and operational efficiency,

WAP proposes a hybrid system combining:

- **Shuttle Racking**
- **Beam Racking**

This design minimizes non-operational spaces (e.g., forklift aisles) and maximizes storage per unit projected area, tailored to the client's role as a trading market hub.



Project Effect

The End

Thank you for listening.

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