



Automated Storage and Retrieval System For Warehouse Logistic Problem Solving





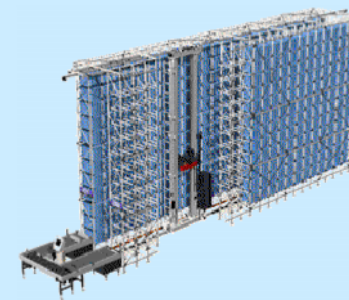
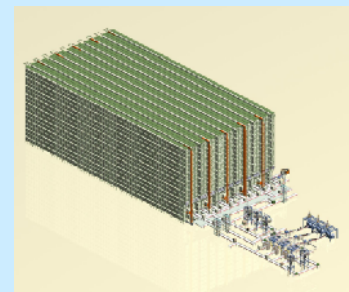
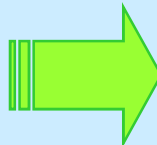
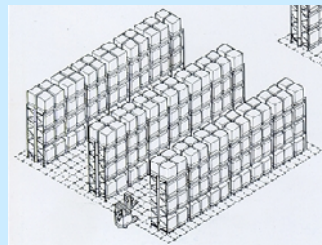
Summary of Automated Storage/Retrieval System

● What is the AS/RS?

It has Rack and Stacker Crane which is three-dimensional organized steel-frame structure.
It is also warehouse that consisted of input and output to handle unit load freight

● Advantage of AS/RS

1. Decrease of inventory – maintenance of minimum inventory can save cost of inventory effectively.
2. Storage efficiency increase – It can be stored high density by upper floor Type (compare to general warehouse, more than 3times)
3. Save manpower – By the compact system to use the remote control
4. Shortening of Input/output time – It can be save the working time sharply
5. Advantage of maintenance cost better than multilayer type - Save cost of construction and manpower economically
6. Warehousing work for safety – It can be realized unmanned warehouse
7. Simplify warehouse management – It can be connected to WMS to manage online system ideally
8. Maintenance of good's quality – Store the goods into the rack by unit of cell to maintain the quality





Classification of Automated Storage/Retrieval System

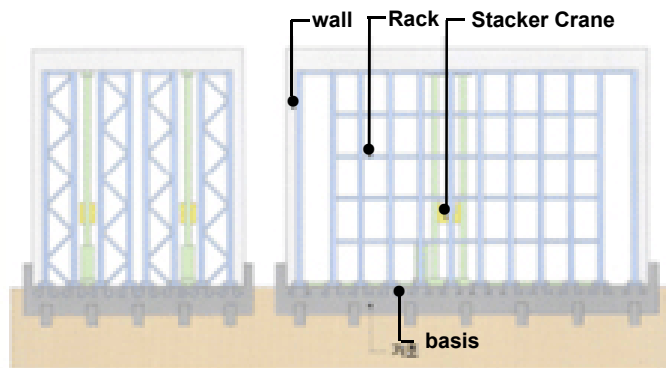
● Classification as building

Building Rack – Post is connected to Rack and building and become the structure.

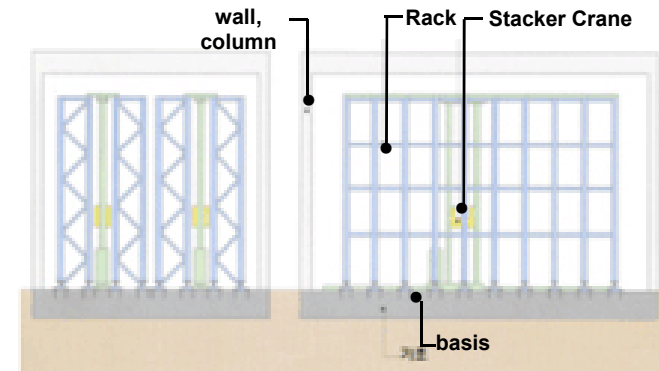
Commonly, it possibly can be made over than 30m .

Unit Rack – The structure of Rack is separated from the building independently.

It is suitable for ASRS which is about 10~15m height.



(Building Rack AS/RS)



(Unit Rack AS/RS)

● Classification as Store unit

Pallet ASRS – Store unit is Pallet

Bucket ASRS – Store unit is bucket



(Pallet store AS/RS)



(Bucket store AS/RS)

SFA makes
New Paradigm of logistics system

SFA



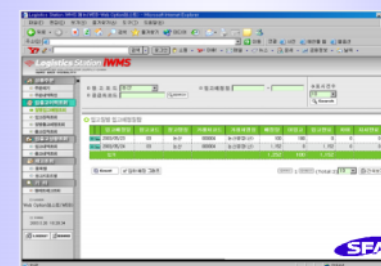
Stacker Crane / RTV



Stocker / EMS



S/W (WMS, ECS)



Lifter (Clean/Non-Clean)



Product Line of
Logistics System Div.

Auto Picking System



Conveyor (Loader & Unloader)



LGV / AGV / EMS





Classification of Automated Storage/Retrieval System

● Special type of AS/RS



(Heavy Material AS/RS)



(Roll Store AS/RS)



(Cold Storage AS/RS)

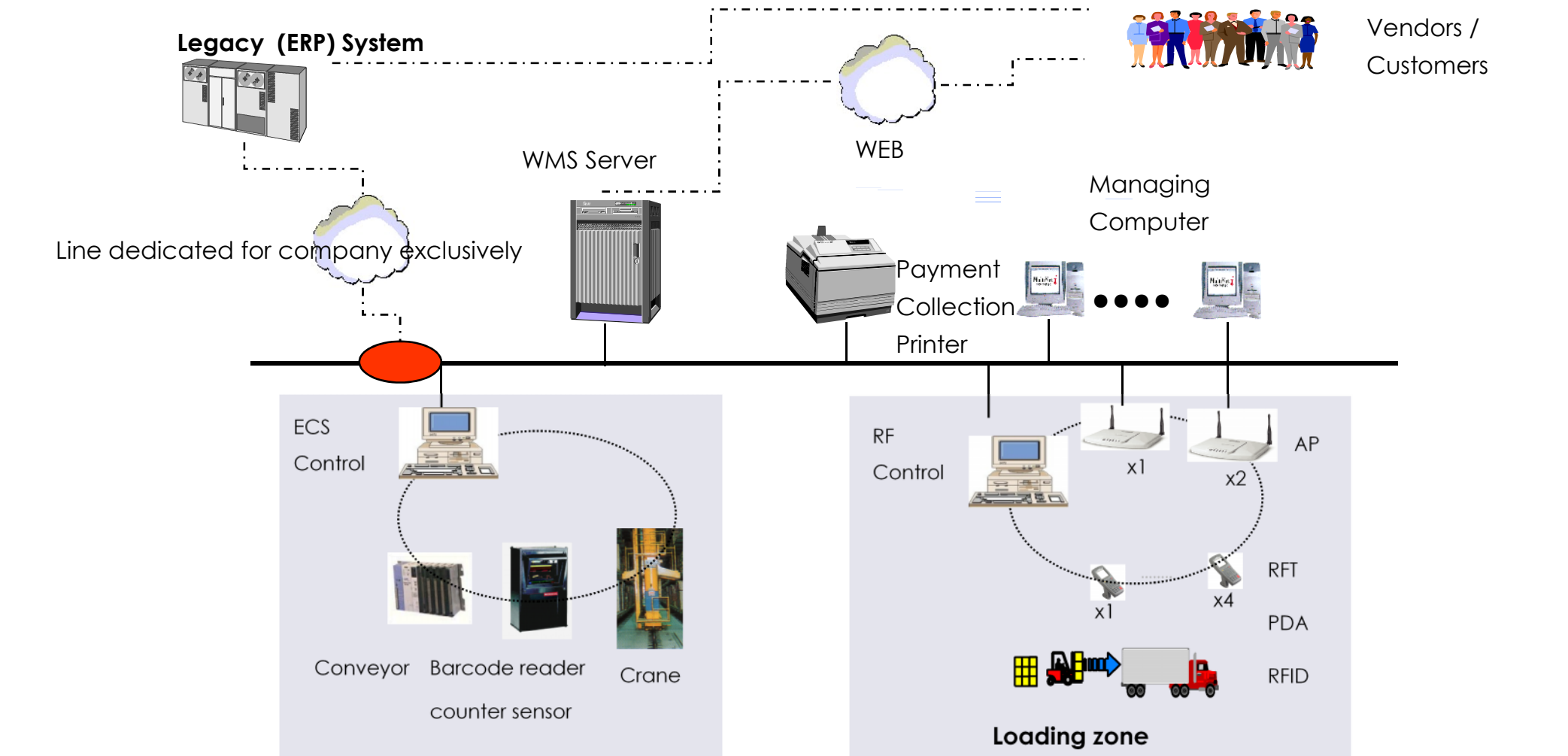


(Dangerous object AS/RS)

SFA makes
New Paradigm of logistics system

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New Paradigm of logistics system

Automated Storage and Retrieval System



System Configuration



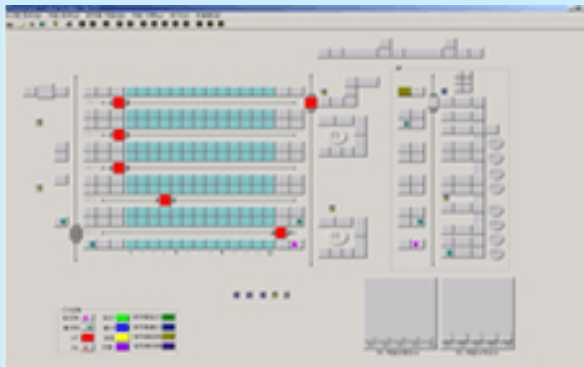
IT Solution

● WMS



WMS (Warehouse Management System) is informational system that is related to logistics center and automatic warehouse to handle in-put, out-put and location data. It's individually invented in the condition of between Client/ Server and Windows by GUI technology.

● ECS



ECS (Equipment Control System) controls stacker crane, convey or PLC, lifter, RGV, and barcode reader that are connected to logistics center and automatic warehouse. ECS is also in charge of command for input & output which is linked up with logistics center and automatic warehouse WMS.



IT Solution

● HMI (Monitoring System)

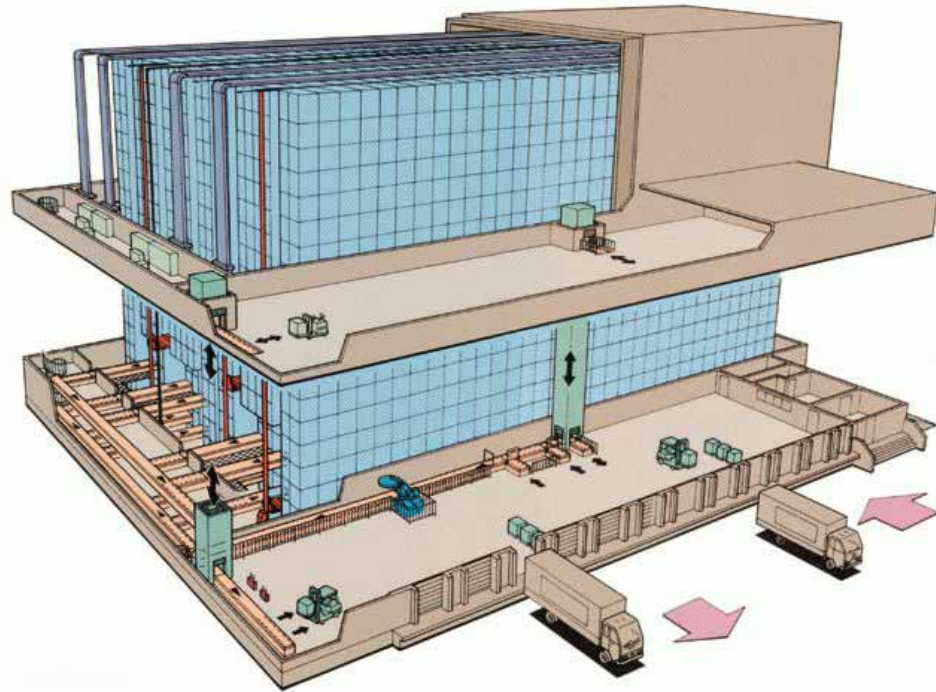


HMI (Human Machine Interface) is connected to various device to monitor and operate the device in real-time. In addition, it can monitor the all process of information at once in real-time simply. HMI also control and modify the value of high speed, low speed, acceleration and retardation about the conveyor, diverter and traverser. It is possible to be displayed the error and check the condition of transportation & operation for load at a look.

● RFID Solutions



In the condition of distribution consulting of our research institute, we put the EAN 14 Barcode into practical use in Logistics project. we will guide customer's RFID successfully. We started to solve the central challenge which are electron Tag price (excessive cost), code standardization, some technological defect etc... Basically, we put our feet on the ground for analysis to search the process of operation. we are also redesigning the creation of model and process, when bring in the RFID. At this time, all of supply chain is become target scope instead of singleness progress. After selecting the applicable target scope and items, we consider and examine the all aspects of technology, expense and effectiveness for feasibility to bring practical plan and real solution up for the customers.





Classification as building

- 1) **Building Rack** Post is connected to rack and building and become the structure. Commonly, it possibly can be made over than 30m .
- 2) **Unit Rack** The structure of rack is separated from the building independently. It is suitable for ASRS which is about 5~15m height.



(Building Rack)

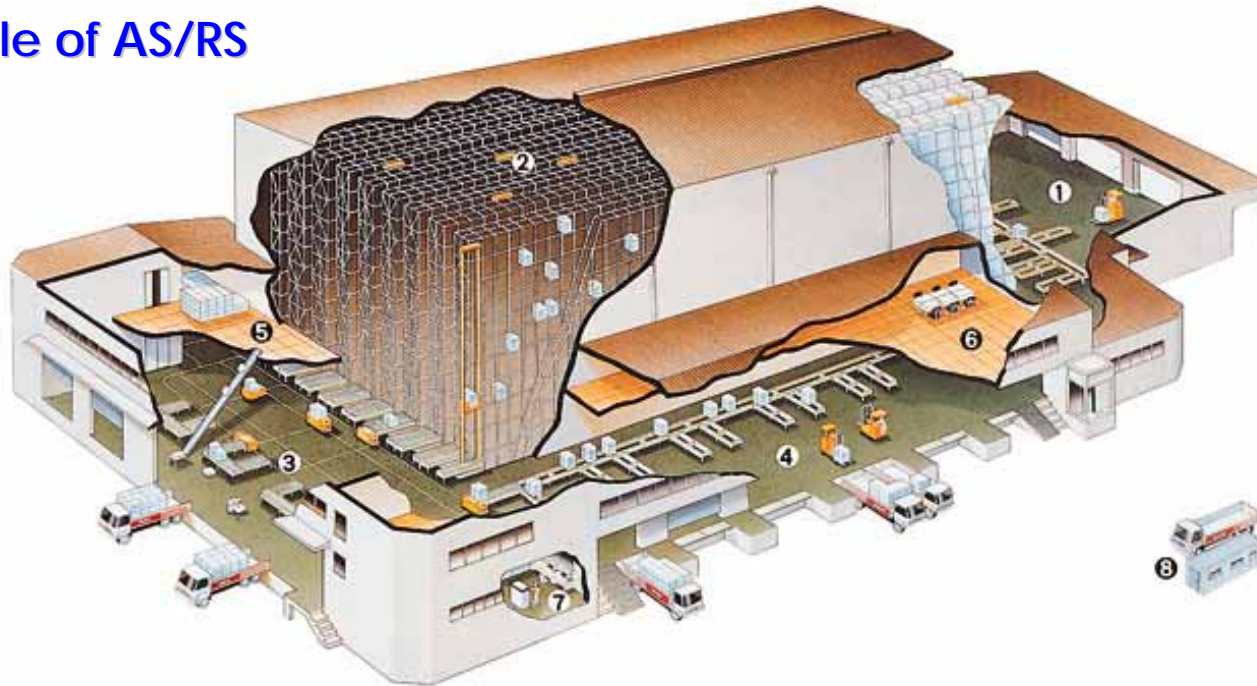


(Unit Rack)





3. Sample of AS/RS



Receiving Zone
Storage Rack
Picking Zone
Pallet Shipping
Small Size Warehouse
Office
Operating Room
Truck Control Center
Wall & Roof



Stacker Crane

- Single Fork
- Twin Fork
- Double reach



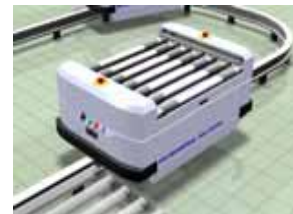
Rack

- Bucket/Pallet
- Single/Double Deep
- Open/Close



Conveyor

- Accum/Free Flow
- Chain/Roller
- Divert/Lift



RGV

- Loop Type
- Shuttle Type



LGV

- In-Door
- Out-Door



Computer

- SAP/ERP
- WMS
- ECS



4.2 Rack System

4.2.1 Open Face Type

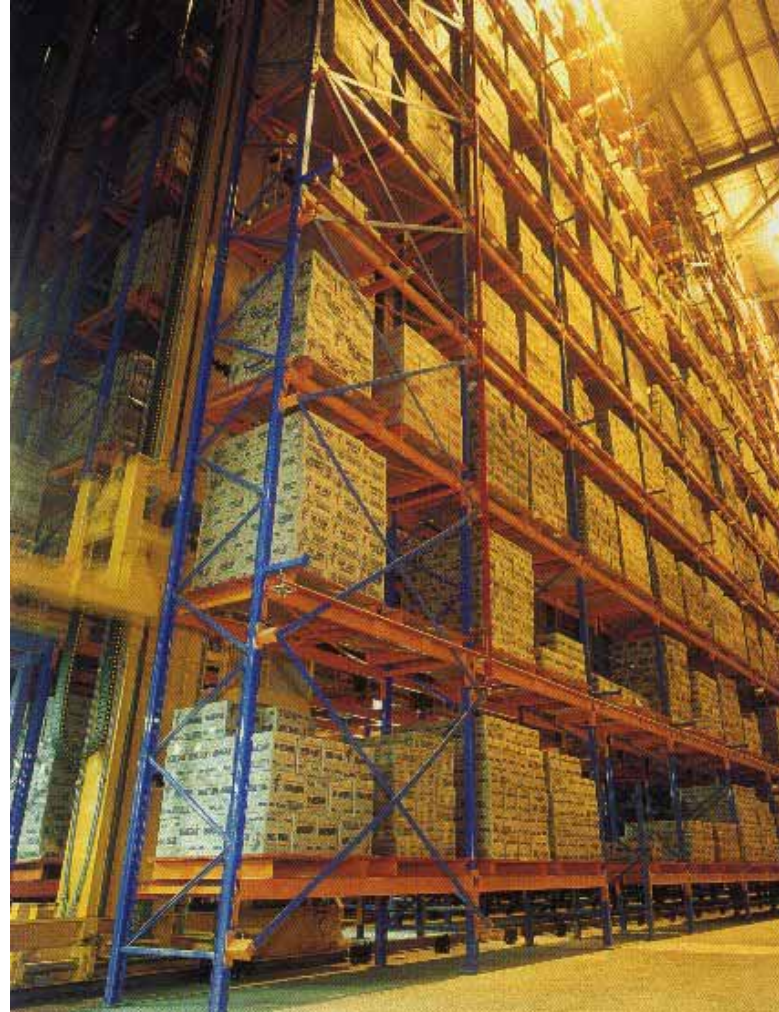
- ➡ 1 Pallet /1 Bay
- ➡ Load Arm
- ➡ 2/4-Way Pallet





4.2.2 Close Face Type

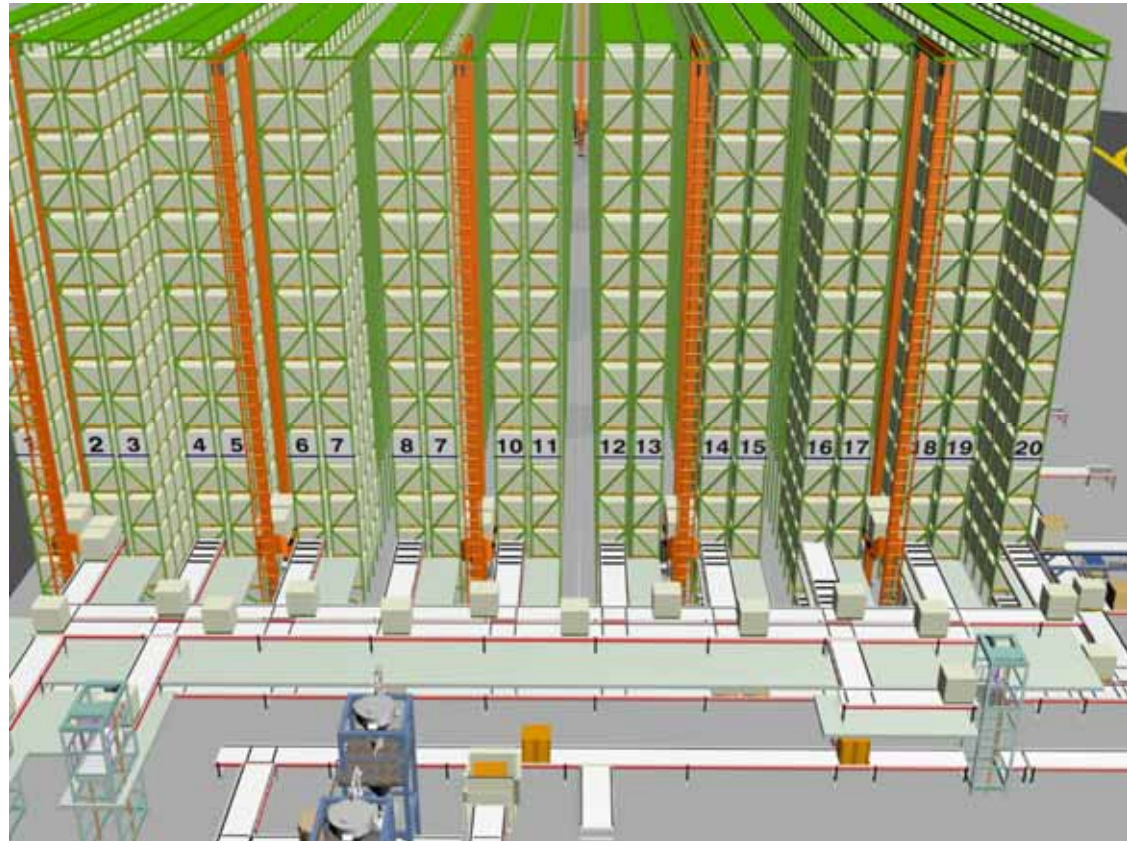
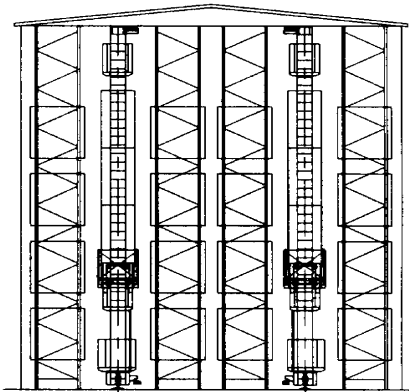
- ➡ 2 Pallet /1 Bay
- ➡ Load Beam
- ➡ Skid Pallet





4.2.3 Rack for Single Deep

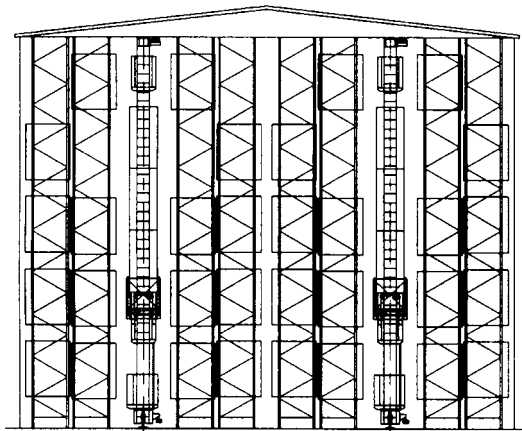
- 1 Pallet /1 Cell
- Single Reach Fork
- High Frequency
- Perfect – FIFO
- Single Deep





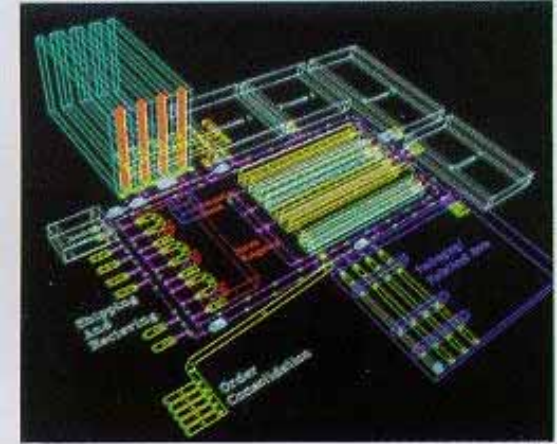
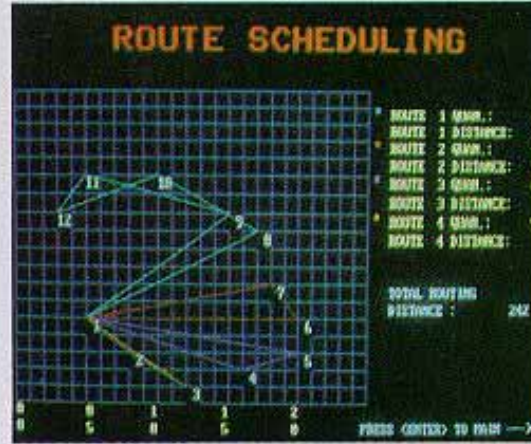
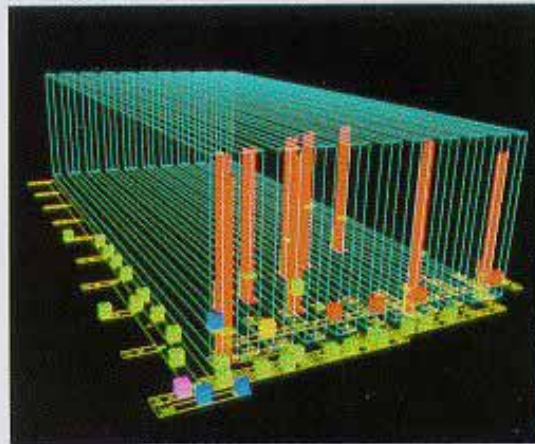
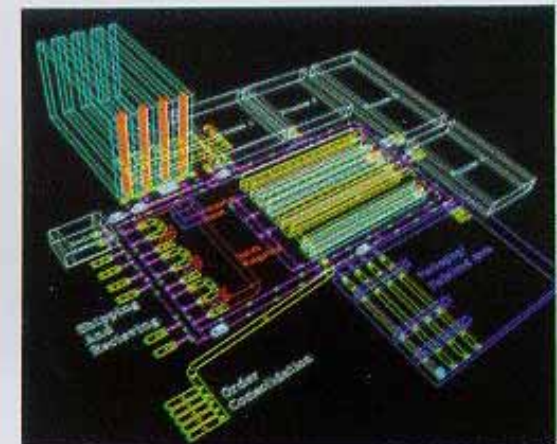
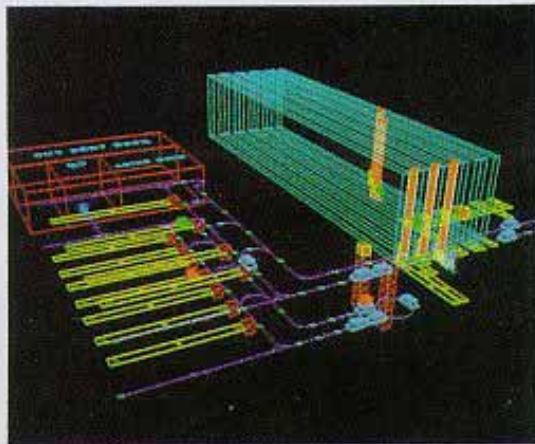
4.2.4 Rack for Double Deep

- 2 Pallet / 1 Cell
- Double Reach Fork
- High Storage Capa.
- Good - FIFO
- Double Deep





● Sample of 3D Performance Simulation





PART . AS/RS References

1. Pharmaceutical Field
2. Petrochemical Field
3. Steel Heavy Load Field
4. Bank & Security Field
5. Electronic Field
6. Foods Field
7. Cold Storage Field
8. Secondary Battery Field



2. Petrochemical Field - “S” Total Co., Ltd.



1. Handling Item
LD, LLD, HDPE &
Polypropylene
2. Storage
: 19,200 Cells
3. Rack Type
Open Face &
Rack Building
4. Area Space
: 10,500 m²
5. Equipment
: Twin Fork S/C 10 Sets
Bagging & Palletizing
Wrapping Machines
Hot Standby Computer



7. Cold Storage Field

7.1 "S" Milk Co., Ltd.



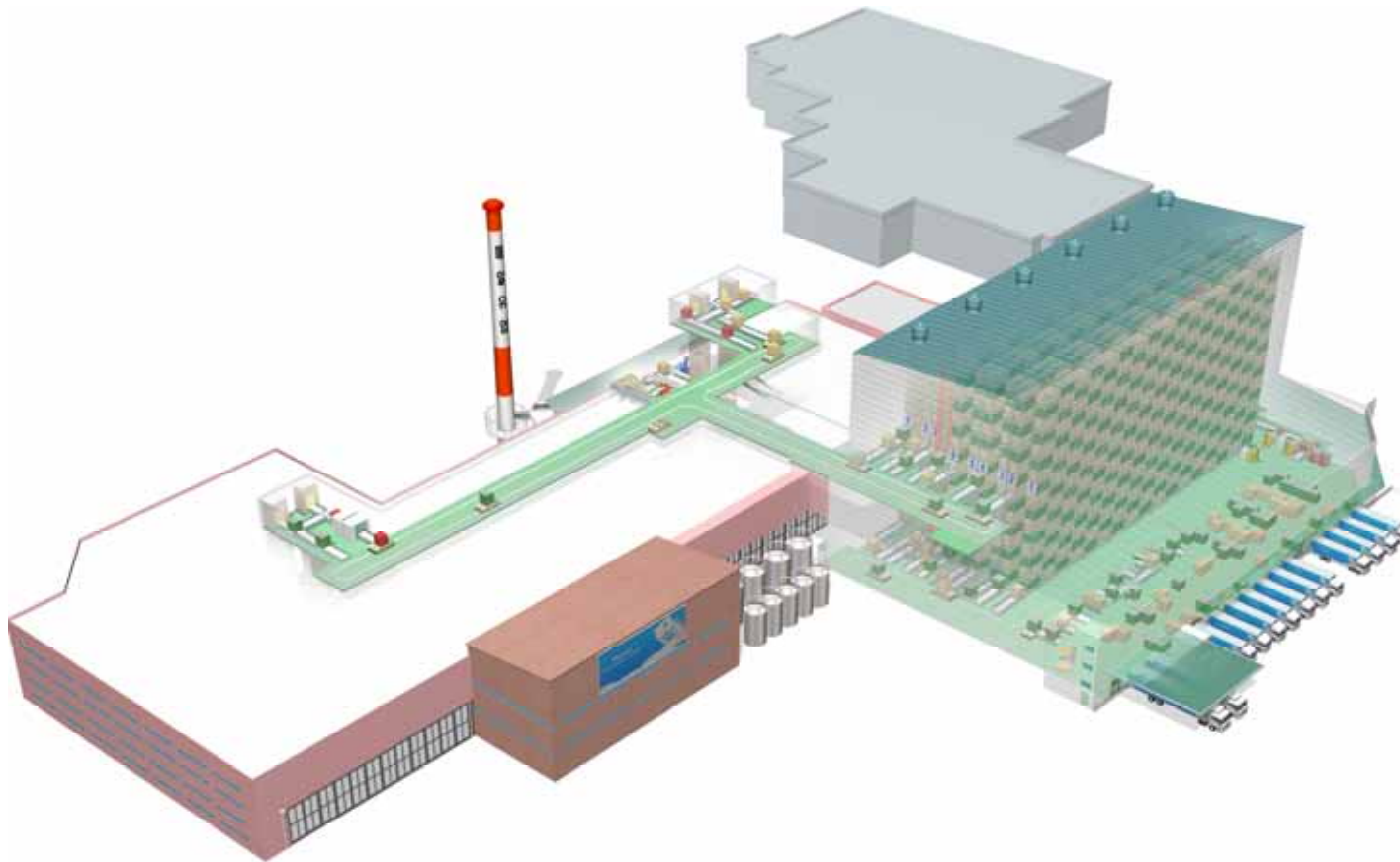
1. Handling Item
: Daily milk,
Cold Storage
2. Storage
: 10,024 Cells
3. Rack Type & Temp.
: Unit Rack/Crate, Pallet
-25℃, 4℃
4. System
: S/C 12 Sets
RTV 8 Sets
Auto Stacker 6 Sets
DPS System





7. Cold Storage Field

7.2 “M” Daily Food & Milk Co., Ltd.



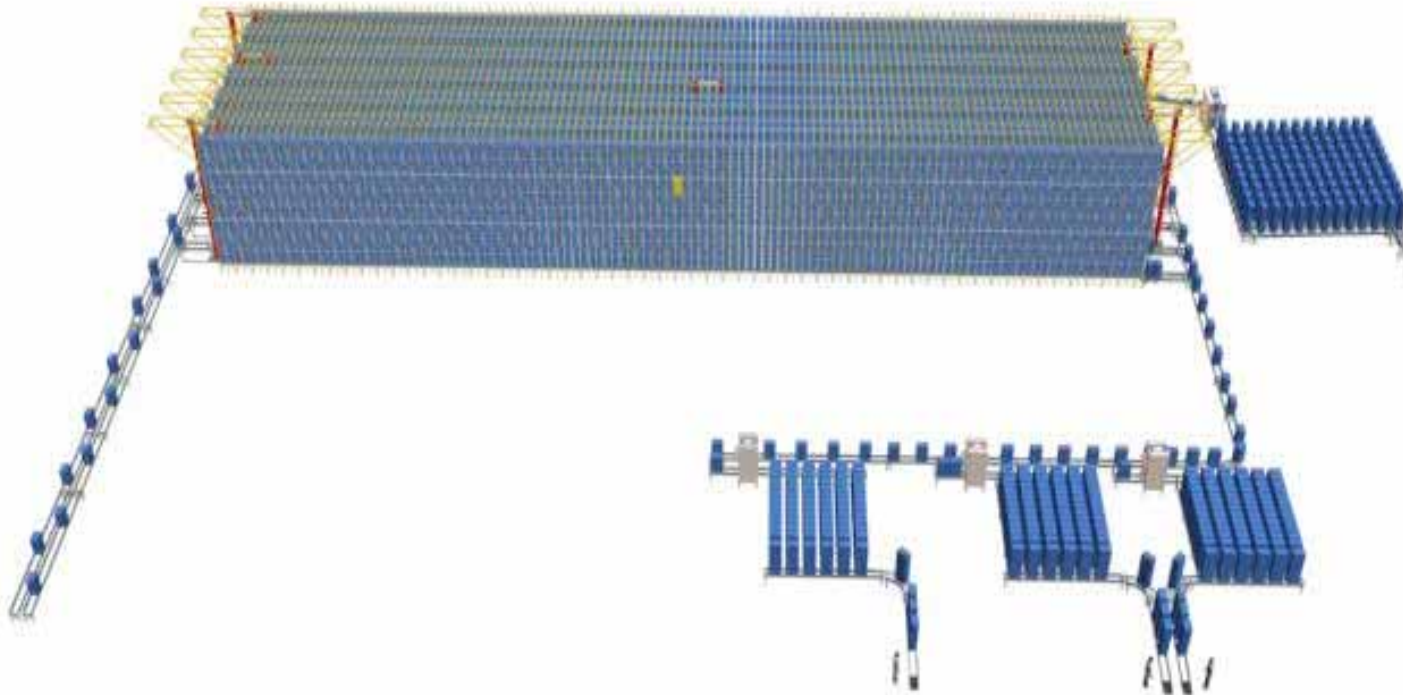
1. Handling Item
: Daily milk,
Normal & Cold Storage
2. Storage
: 5,428 Cells
3. Rack Type & Temp.
: Building Rack/Pallet
3.5℃, 20℃
4. System
: S/C 5 Sets
RTV 12 Sets
Lifter 4 Sets
Palletizing System





7. Cold Storage Field

7.3 “P” Croissant Co., Ltd.



1. Handling Item
: Bakery
Cold Storage

2.Storage
: 10,968 Cells
65,808 Boxes

3.Rack Type & Temp.
: Unit Rack/ Box
-5℃, -25℃

4.System
: Stacker Crane 6 Sets
Auto Stacker 14 Sets
Auto Unstacker 1 Set
Conveyor System





PART . Advantage of SFA AS/RS

1. Total logistics Solution Provider

With the operation of logistics research unit that takes the exclusive duty of consulting, SFA builds and provides a total logistics system to encompass consulting, engineering, designing, fabrication and installation of system.

2. Abundant Project References

- 1) More than 280 reference sites
- 2) Largest market share in Korea (about 50%)
- 3) Supplied References in Thailand, Singapore, U.S.A, etc.
- 4) Many projects for special warehouses have been undertaken.

3. High Performance & Quality

- 1) up to 300 m /min, α : 1.5 m/sec²
- 2) up to 25 ton/Pallet
- 3) up to -30 °C
- 4) up to Clean Class #10 (Semi-Conductor, LCD)



4. Localization

- 1) Bravo Industry Co., Ltd. : www.bravorack.com
- 2) Racking and Localization of EPM
- 3) Fast & Convenient BS & AS

5. Investment Cost Saving

- 1) by Optimized Engineering
- 2) by Localization
- 3) by Standard and Modularization of Equipment



“ Thank you ”

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