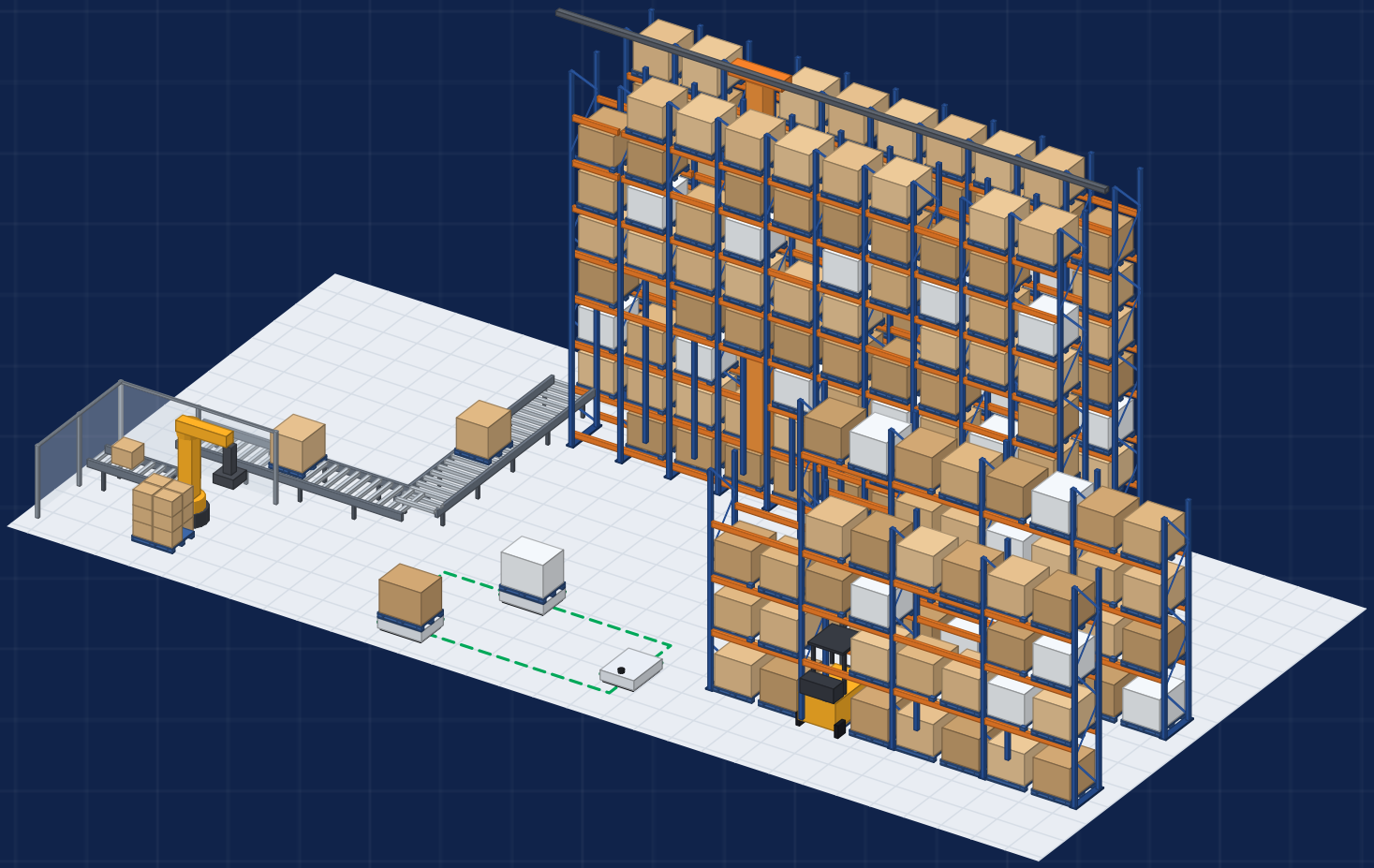
SOLUTIONS CATALOGUE
2026

TVV STORAGE SOLUTIONS

Complete warehouse solutions

Consulting, design and installation of racking, pallets, automated systems and warehouse management software.



RACKING | PLASTIC PALLETS | AUTOMATION | WMS SOFTWARE

tvvgroup.vn
+84 932 681 324
tvvequipmentwarehouse@gmail.com

One partner for your entire warehouse system

TVV STORAGE SOLUTIONS consults on, designs and installs storage systems for factories and distribution centres, from pallet racking and plastic pallets to conveyors, robots and warehouse management software. Every solution starts from your warehouse's real data and is designed so that every component works together.

COMMON WAREHOUSE CHALLENGES

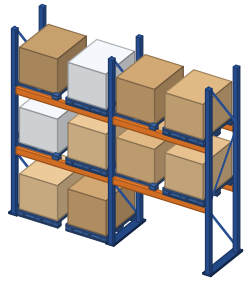
01
Not enough storage space
Stock grows but floor space doesn't; building height goes unused.

02
Slow to locate goods
Locations live in operators' memory.

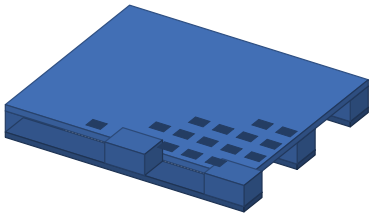
03
Stock records drift
Records and physical stock disagree; counts drag on.

04
Weak lot and expiry tracing
Near-expiry stock ships late; recalls are hard to contain.

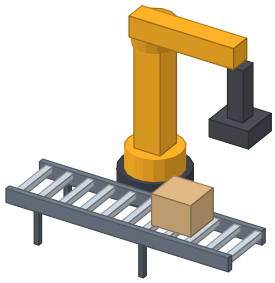
FOUR SOLUTION AREAS



Racking
Selective, double-deep, drive-in, radio shuttle, mobile and flow racking.
PAGE 05–08



Plastic pallets
Selected for load, rack dimensions and handling equipment.
PAGE 09



Automation
AS/RS, conveyors, robot palletizers, AMRs and AMFs.
PAGE 10–12



Software
TVV WMS and AI consulting for warehouses.
PAGE 13

SUITABLE FOR WAREHOUSES IN

- Food and beverage
- Pharmaceuticals
- Electronics
- Logistics and 3PL
- Wood and furniture
- Textiles and garments

Racking, pallets, equipment and software designed by one team fit together from the very first drawing.

Five steps from survey to operation

One team follows the project end to end, so survey data carries through to drawings, installation and software set-up.

1

Site survey

Measure the floor, clear height, slab, columns and doors; collect product data and inbound/outbound flows.

2

Layout design

Develop 2D/3D options and compare capacity, aisles and operation between them.

3

Equipment selection

Match racking, pallets, conveyors, robots and lifting equipment to one another.

4

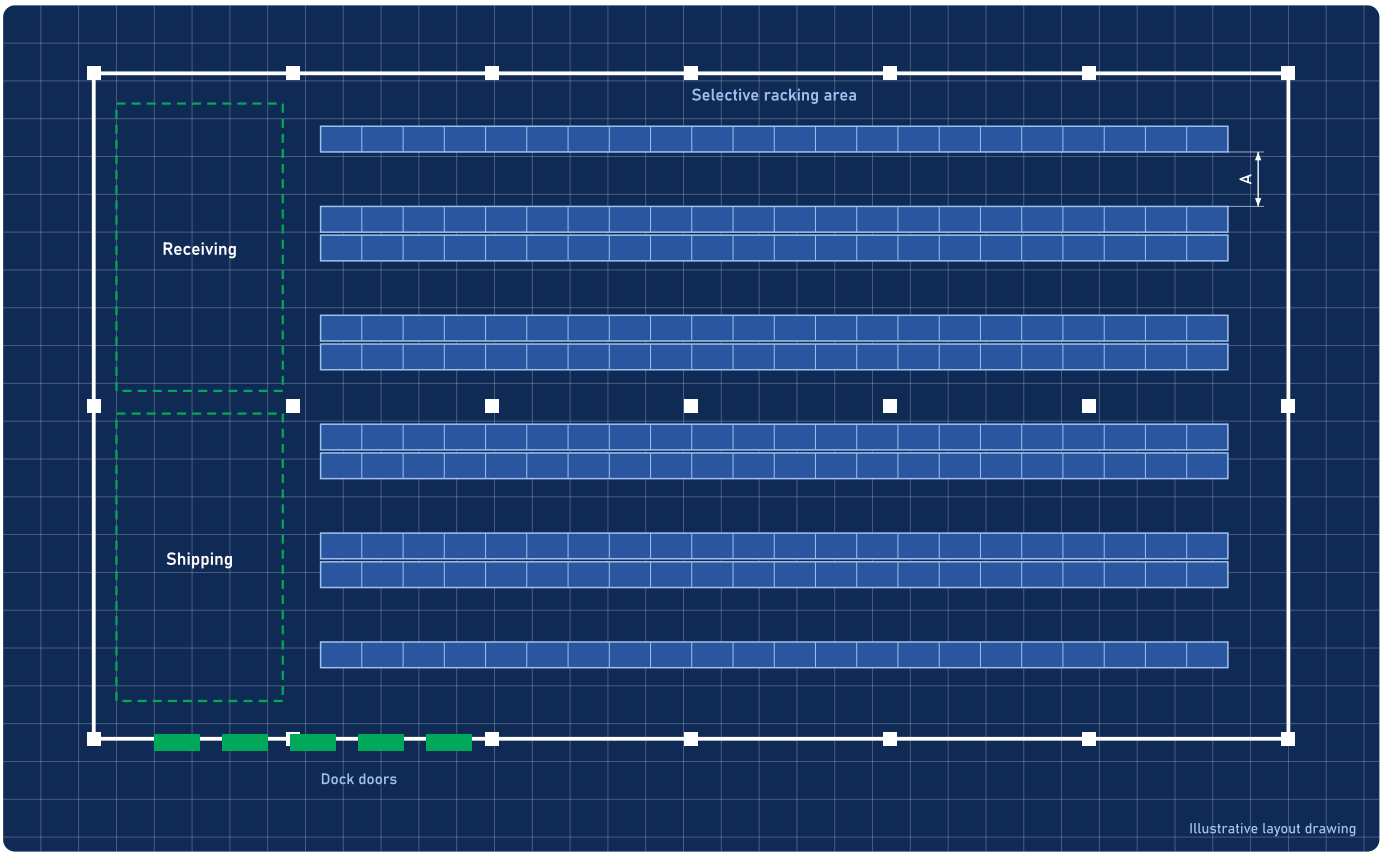
Installation

Install to approved drawings; inspect and accept each work package.

5

Handover and operation

Configure the software from the warehouse layout, train your team, provide 24/7 support.



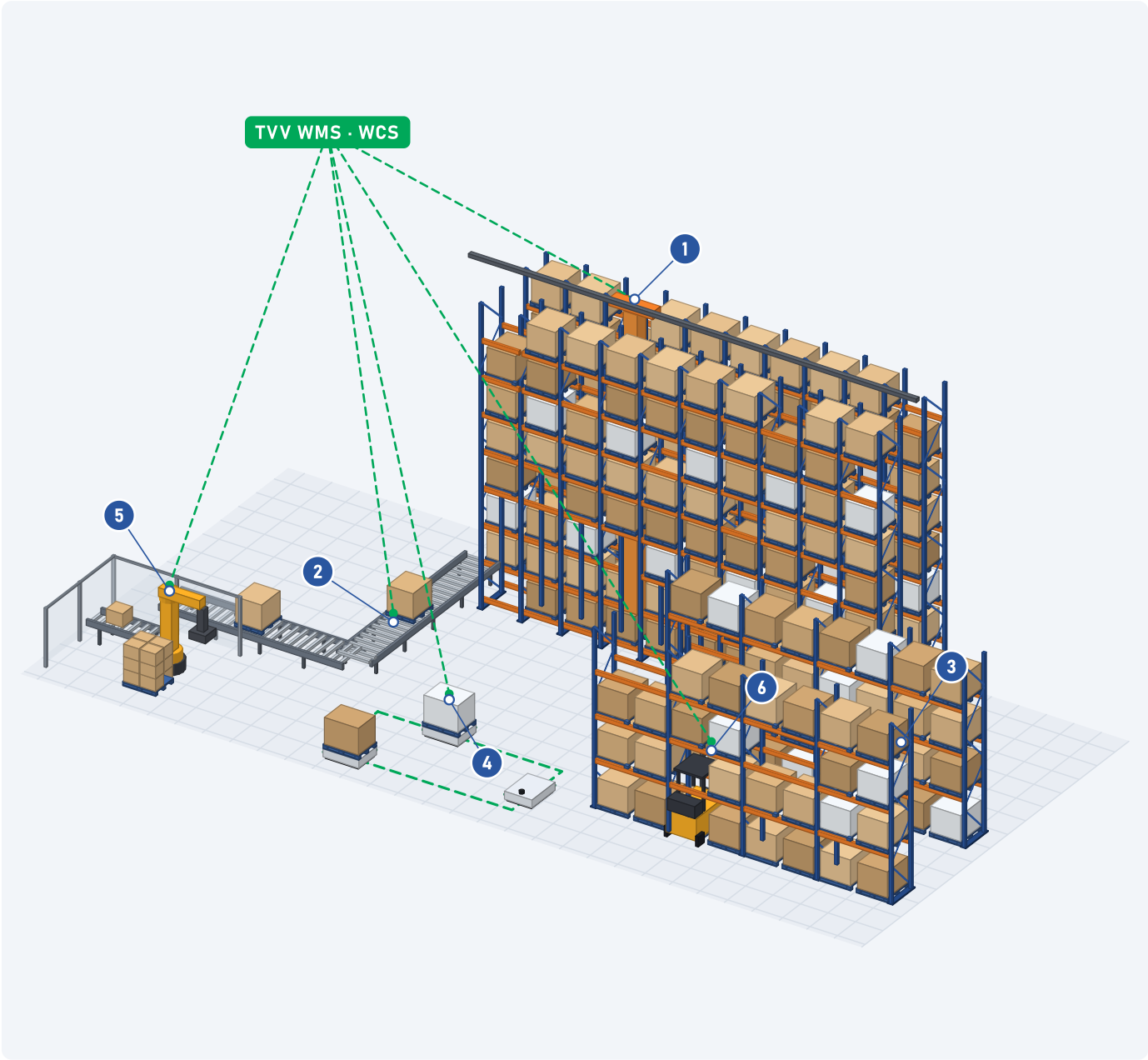
What we need to design your system

The more complete the data, the closer the design and the faster the quotation.

- ✓ Warehouse floor plan (CAD or PDF)
- ✓ Clear height; positions of columns, doors, lights and sprinklers
- ✓ Dimensions and weight of pallet loads
- ✓ Number of SKUs and pallet positions required
- ✓ Daily and peak-hour inbound/outbound volumes
- ✓ Existing lifting equipment; FIFO/FEFO and temperature requirements

Many subsystems, one control layer

An example warehouse combining automated storage, conventional racking and mobile robots. TVV WMS connects the subsystems through work orders, locations and the status of every pallet.



1 **AS/RS · stacker crane**
Automated pallet storage in high-bay racking. p. 10

2 **Pallet conveyors**
Link packing, AS/RS and shipping. p. 11

3 **Selective racking**
Positions for pallet-by-pallet flows. p. 06

4 **AMR**
Move pallets between zones. p. 12

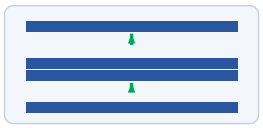
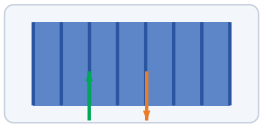
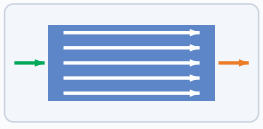
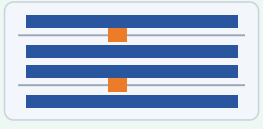
5 **Robot palletizer**
Stack cases onto pallets at end of line. p. 12

6 **Forklift**
Handling in conventional racking. p. 06

WMS **TVV WMS · WCS** — manages locations, lots, expiry dates and dispatches tasks to equipment. The level of integration with each device is defined per project. p. 13

Choose racking by product profile and flow

No single rack type suits every warehouse. The choice depends on the number of SKUs, pallets per SKU, stock rotation and handling equipment.

PLAN VIEW	SYSTEM	DENSITY	ACCESS	ROTATION	EQUIPMENT	BEST FOR
	**Selective racking**	●○○○	Direct to every pallet	Any	Counterbalance or reach truck	Many SKUs, pallet-by-pallet flows
	**Double-deep racking**	●●○○	Front pallet blocks the rear	LIFO	Double-deep reach truck	Several pallets per SKU
	**Drive-in racking**	●●●○	By lane	LIFO · FIFO (drive-through)	Forklift drives into lane	Few SKUs, high quantity per SKU
	**Radio shuttle racking**	●●●○	By lane, via shuttle	FIFO or LIFO	Forklift + shuttle	Few SKUs, many pallets each, high throughput
	**Mobile racking**	●●●○	One aisle open at a time	Any	Standard forklift	Expensive or limited floor space
	**Pallet flow racking**	●●●○	By lane	Automatic FIFO	Load one end, pick the other	Strict FIFO, date-controlled goods
	**AS/RS**	●●●●	Automatic, every pallet	Software-controlled	Stacker crane	High-bay, continuous operation

●○○○ Relative storage density, for initial guidance only. The final layout depends on the building, the goods and the handling equipment, and is calculated by TVV after the survey.

QUICK GUIDE

Many SKUs, any pallet must be reachable	→ **Selective**
Two or more pallets per SKU, more positions needed	→ **Double-deep**
Few SKUs, many pallets per SKU	→ **Drive-in · Radio shuttle**
FIFO or FEFO is mandatory	→ **Flow rack · Radio shuttle**
Limited space, infrequent access	→ **Mobile**
Tall building, continuous multi-shift operation	→ **AS/RS**

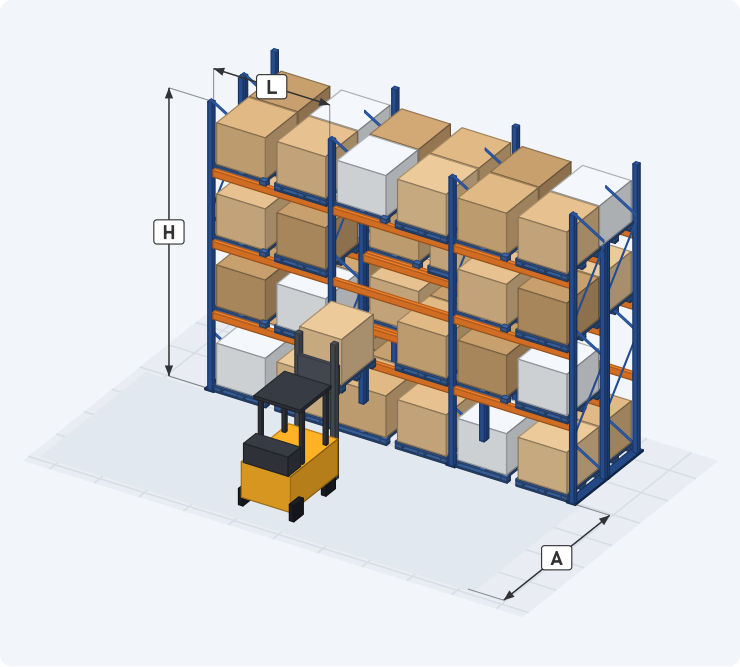
FIFO
First in, first out

LIFO
Last in, first out

FEFO
First expired, first out

A Selective racking

Every pallet has its own position, directly accessible from the aisle.



H rack height · L beam length · A aisle

HOW IT WORKS

Upright frames and beams form pallet positions on each level. A forklift stores or retrieves any pallet without moving another.

BEST FOR

- Many SKUs, pallet-by-pallet flows
- Product mix changes over time

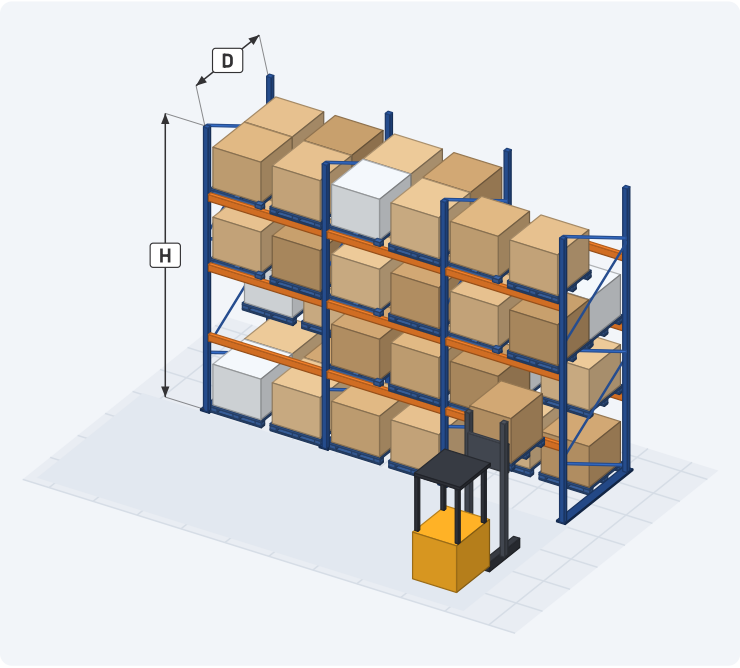
DESIGN NOTES

- Aisle width set by the forklift type
- Beam level loads confirmed by engineering
- Upright protection at row ends and aisles

DENSITY	ACCESS	ROTATION
● ○ ○ ○	Direct to every pallet	Any

B Double-deep racking

Two pallets deep on each side for more positions in the same area.



H rack height · D two-pallet depth

HOW IT WORKS

Each side holds two pallets one behind the other. The rear pallet is reachable only when the front position is empty, so it suits SKUs with two or more pallets.

BEST FOR

- Several pallets per SKU
- More capacity while keeping aisles

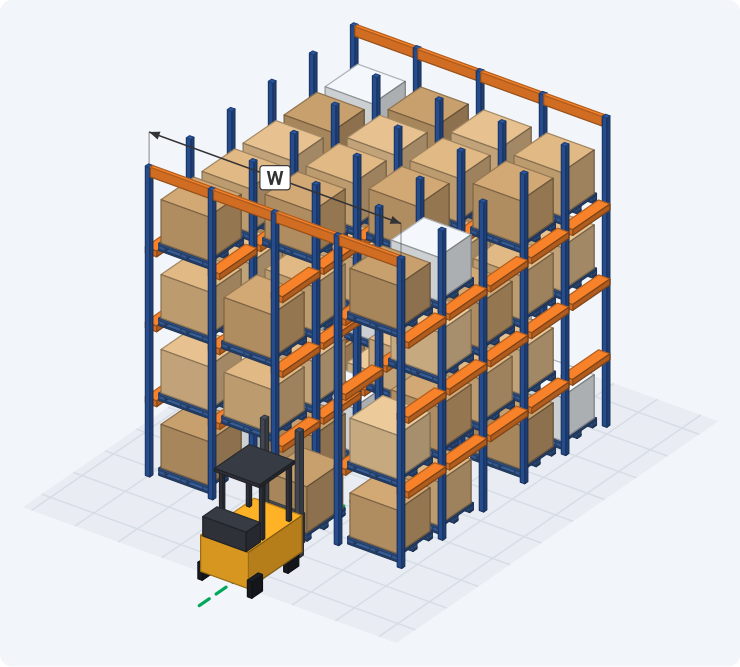
DESIGN NOTES

- Requires a reach truck with extending forks
- Lift height and visibility for the rear position
- Software tracks front and rear positions

DENSITY	ACCESS	ROTATION
● ● ○ ○	Front pallet blocks the rear	LIFO

C Drive-in racking

Forklifts drive into the lane; pallets rest on rails at each side.



W block width

HOW IT WORKS

There are no aisles between rows; pallets sit on rails along each side of the lane. Drive-in loads and unloads from one end (LIFO); drive-through opens at both ends (FIFO).

BEST FOR

- Few SKUs, high quantity per SKU
- Cold stores and high-cost floor space

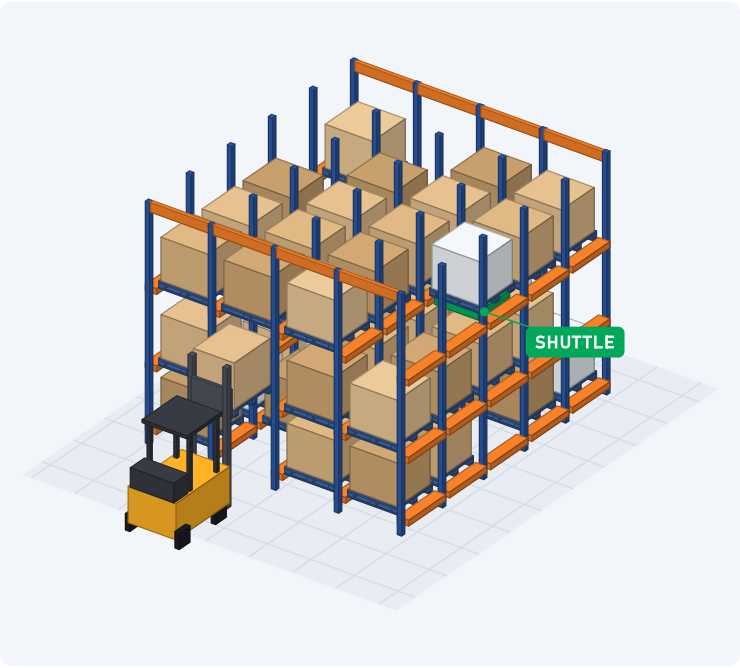
DESIGN NOTES

- Uniform pallets rated for edge support
- Lane size matched to forklift and pallet
- One SKU or lot per lane

DENSITY	ACCESS	ROTATION
●●●○	By lane	LIFO · FIFO (drive-through)

D Radio shuttle racking

A remote-controlled shuttle carries pallets inside the lane.



Green: shuttle inside the lane

HOW IT WORKS

The forklift sets the pallet at the lane entry; the shuttle runs on rails, carries it deep into the lane and brings it back on demand. The forklift never enters the lane.

BEST FOR

- Few SKUs, many pallets each, high throughput
- Cold stores and food warehouses

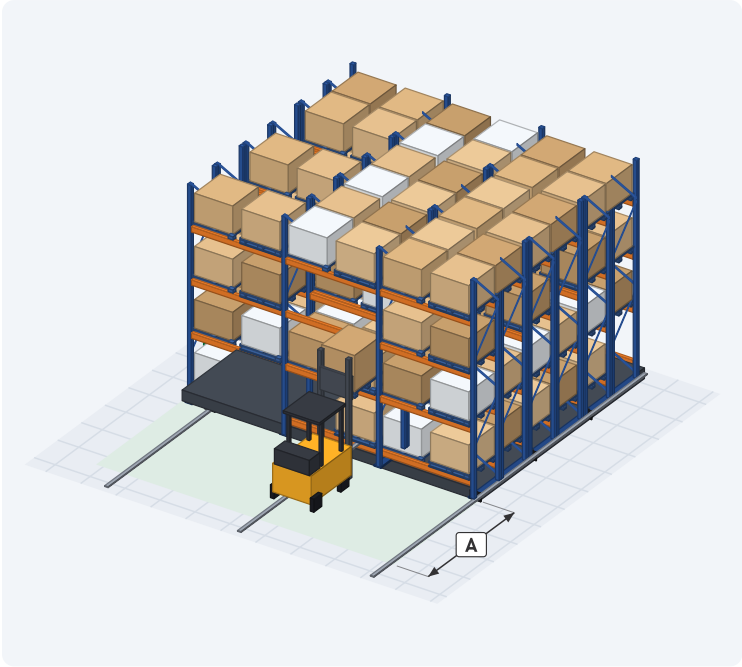
DESIGN NOTES

- Pallets matched to rails and rated for rail support
- Check pallet deflection and base design
- Shuttles move between lanes by forklift

DENSITY	ACCESS	ROTATION
●●●○	By lane, via shuttle	FIFO or LIFO

E Mobile racking

Racks sit on mobile bases and open an aisle only where needed.



A open aisle

HOW IT WORKS

Rack rows travel on floor rails, driven by motors. The operator selects a row and the system shifts the bases to open an aisle there.

BEST FOR

- Expensive or limited floor space
- Low access frequency; cold stores

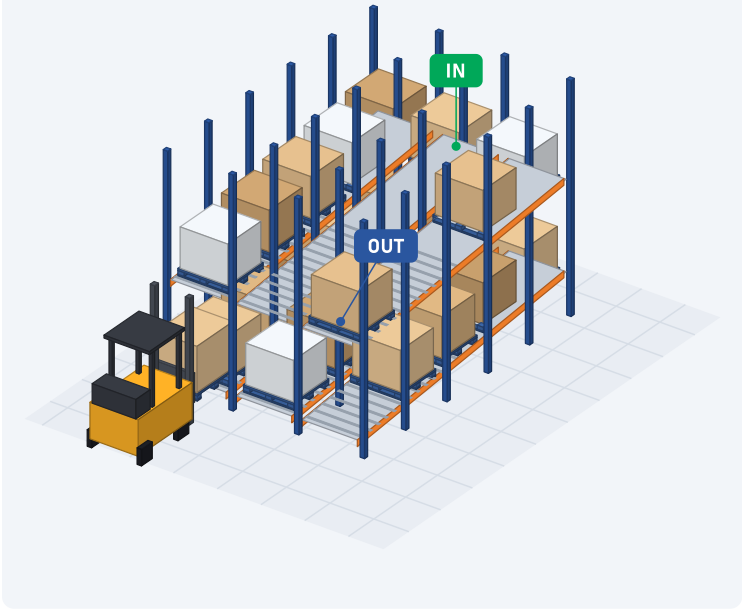
DESIGN NOTES

- Slab and rails meet flatness requirements
- Safety sensors in the aisle
- Aisle opening time affects throughput

DENSITY	ACCESS	ROTATION
●●●○	One aisle open at a time	Any

F Pallet flow racking

Pallets glide on inclined rollers: load at one end, pick at the other.



Load at the rear, pick at the front

HOW IT WORKS

Roller lanes have a slight slope; pallets move to the pick face by gravity. Brake rollers control speed and a separator holds back the next pallet during picking.

BEST FOR

- Strict FIFO, date-controlled goods
- Separate loading and picking aisles

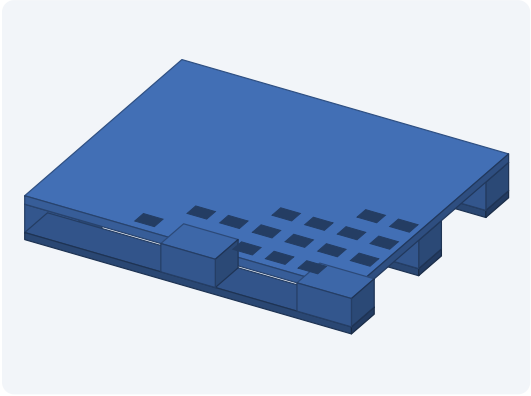
DESIGN NOTES

- Uniform pallets with roller-friendly bases
- Slope and brake rollers sized to the load
- Lane length based on pallets per SKU

DENSITY	ACCESS	ROTATION
●●●○	By lane	Automatic FIFO

Pallets rated for the load, matched to racking and equipment

The pallet is where goods meet racking, conveyors and forklifts. TVV selects or designs pallets together with the racking so that dimensions and loads match.



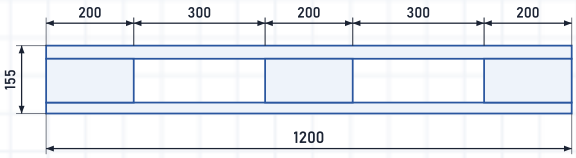
TECHNICAL DRAWING EXAMPLE

Welded plastic pallet for AS/RS

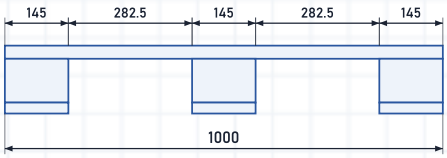
Three bottom runners let the pallet travel steadily on conveyors and through automated storage.

Rated loads are confirmed for each pallet model and its conditions of use.

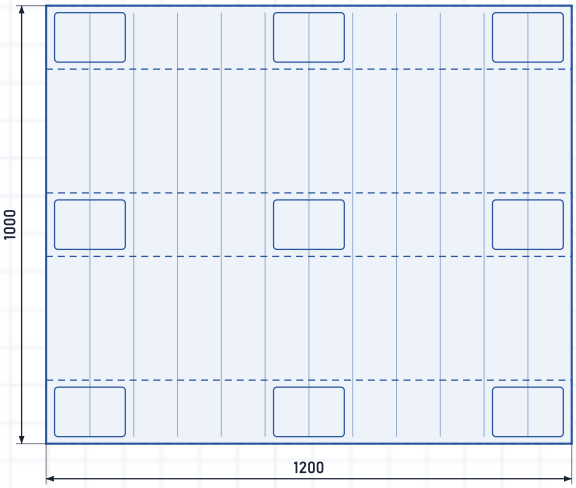
FRONT VIEW · 1200 SIDE



SIDE VIEW · 1000 SIDE



TOP VIEW



Size	**1200 × 1000 × 155 mm**
Material	**HDPE, 0.97 g/cm³**
Build	**Welded, 3 bottom runners**
Units	**mm**

Three load ratings to tell apart

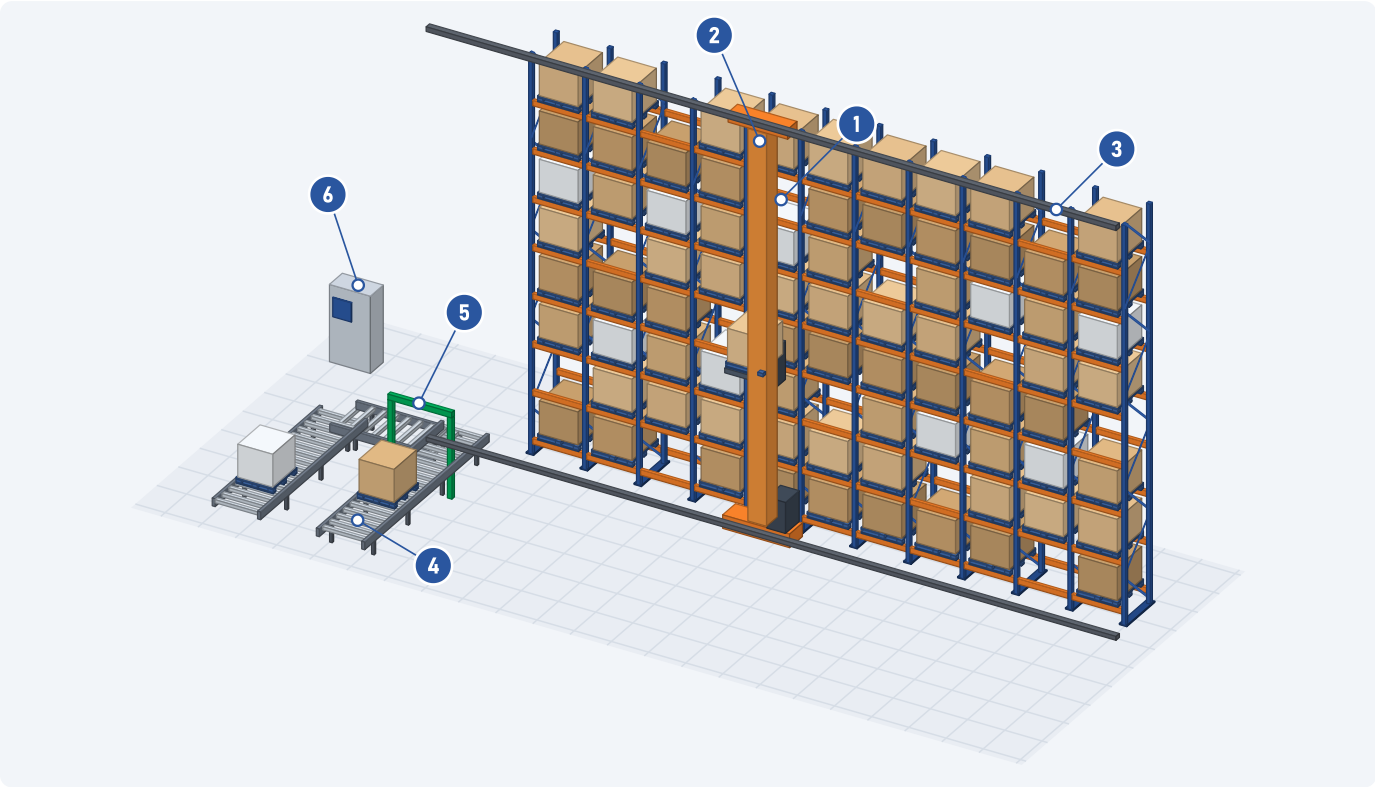
1. **Static load**
   Pallet resting on a flat floor, including stacking.
2. **Dynamic load**
   While the pallet is lifted and moved by a forklift.
3. **Racking load**
   While supported on beams or rails with no centre support.

Check before you choose

- ✓ Size fits beams, shuttle rails and conveyors
- ✓ Fork entry: 2-way or 4-way
- ✓ Base: runners for conveyors and AS/RS, blocks for floor use
- ✓ Hygiene and temperature: food, pharma, cold storage

AS/RS: automated pallet storage in high-bay racking

A stacker crane travels a narrow aisle between two rack rows, storing and retrieving pallets on software command. The building is used to its full height, with no operators in the storage zone.



1 Stacker crane
Travels the aisle, lifts and places pallets.

2 High-bay racking
Uses the full building height.

3 Guide rails
Floor rail carries the load; top rail stabilises.

4 In/out conveyors
Hand-off point with the rest of the site.

5 Check station
Checks size and weight before storage.

6 Control cabinet
Links WCS/WMS that dispatch the crane.

Operating cycle

1. Pallet enters the conveyor and passes the check station
2. WMS assigns a storage location
3. The stacker crane picks it up and stores it
4. On dispatch: the crane retrieves it to the conveyor

Best for

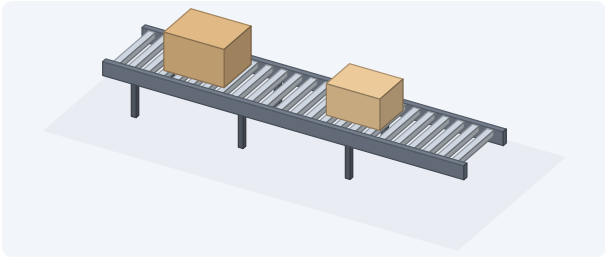
- Tall buildings, limited floor area
- Multi-shift, steady throughput
- Strict traceability and control
- Cold stores, restricted access

Design notes

- Uniform, conveyor-grade pallets
- Throughput calculated from crane cycles and real flows
- Slab, structure and fire safety designed together

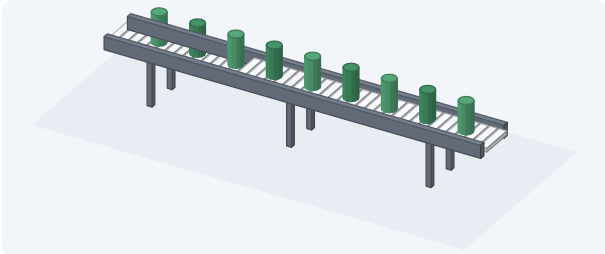
Conveyors matched to the load and the flow

The conveyor type follows the load (base, size, weight, hygiene) and the flow between production, packing, storage and shipping.



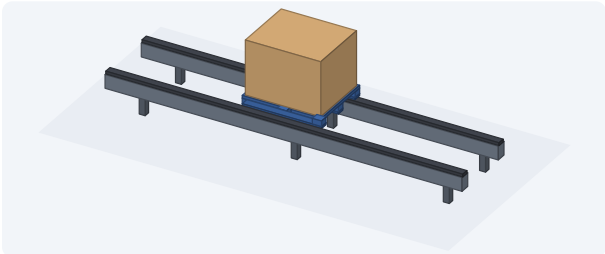
Roller conveyor

Cartons, totes and flat-bottomed loads; gravity or powered rollers.



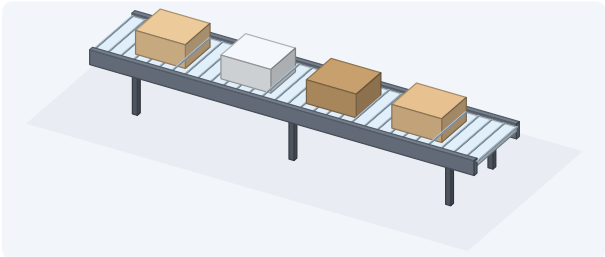
Plastic chain conveyor

Bottles, cans and small products; handles curves, easy to clean.



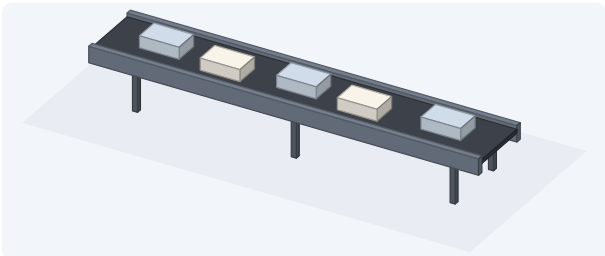
Pallet conveyor

Moves pallets between zones and in and out of AS/RS; chain or roller type.



Modular belt conveyor

Interlocking plastic modules; food-friendly, washable, flexible routing.



Belt conveyor

Small, irregular or bagged products; can run on an incline.

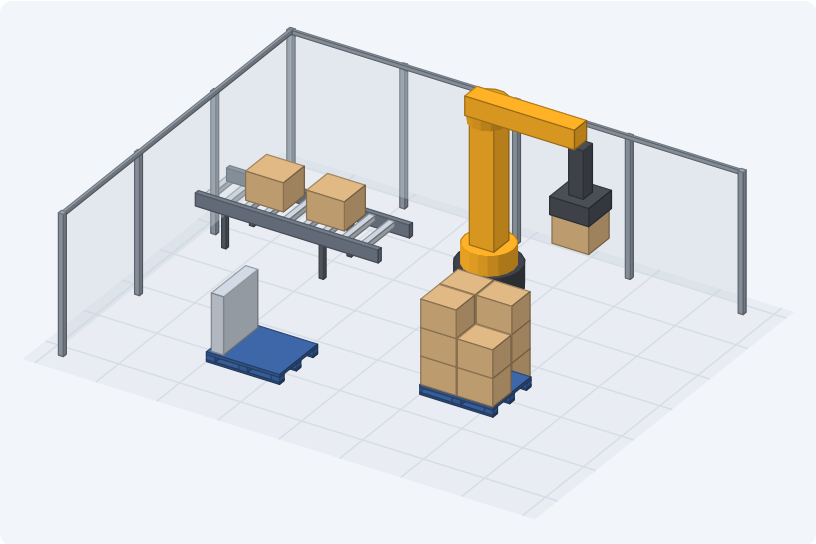
TYPICAL MODULES IN A CONVEYOR SYSTEM

- Transfers and merges
- Vertical lifts
- Weighing and barcode scanning
- Dimension checks
- PLC control with WCS/WMS link

Illustrations show operating principles

Robots and autonomous vehicles

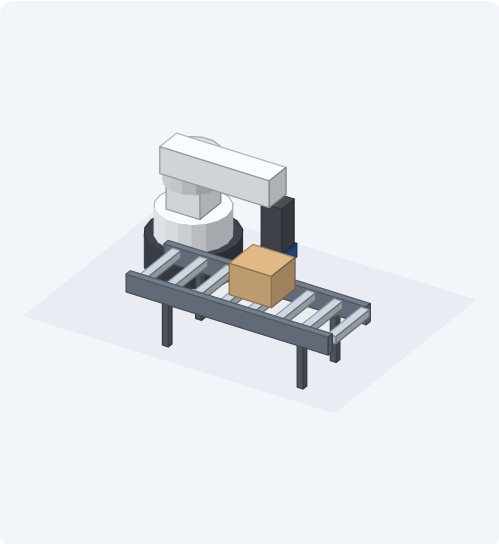
Robots take over heavy, repetitive tasks at the end of the line and in internal transport, freeing people for work that needs judgement and control.



01

Robot palletizer

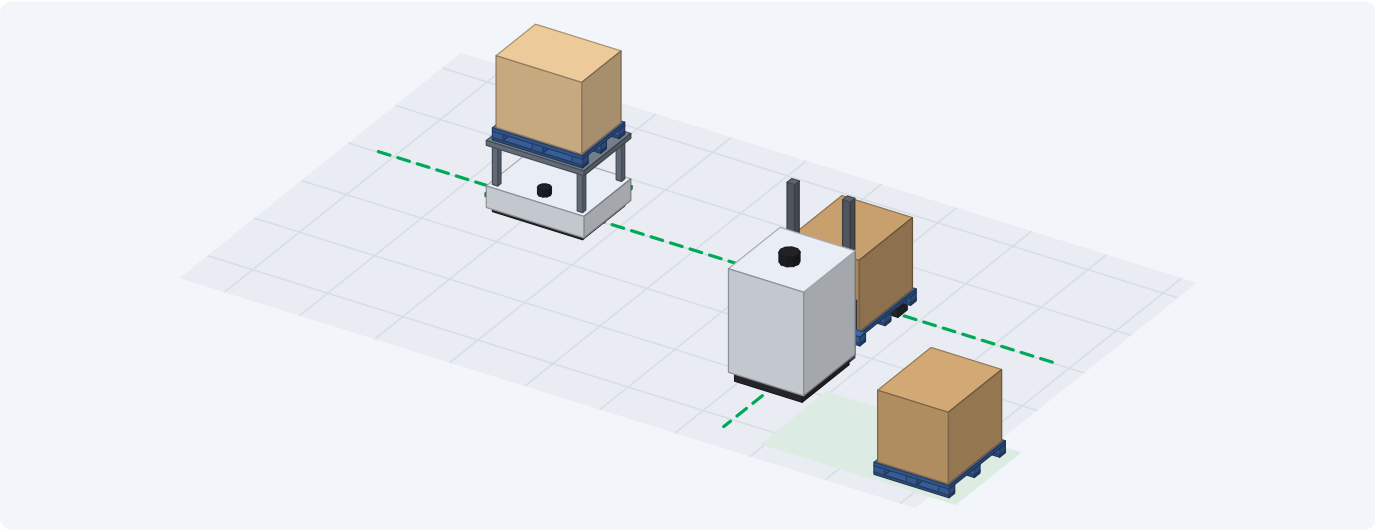
Stacks cases or bags onto pallets in programmed patterns at the end of the line, inside a fenced, safeguarded cell.



02

Cobot

Collaborative robots work alongside people in compact areas; each application needs its own safety risk assessment.



03

AMR · Autonomous mobile robot

Lifts and moves pallets and carts between zones; navigates by sensors and avoids obstacles.

04

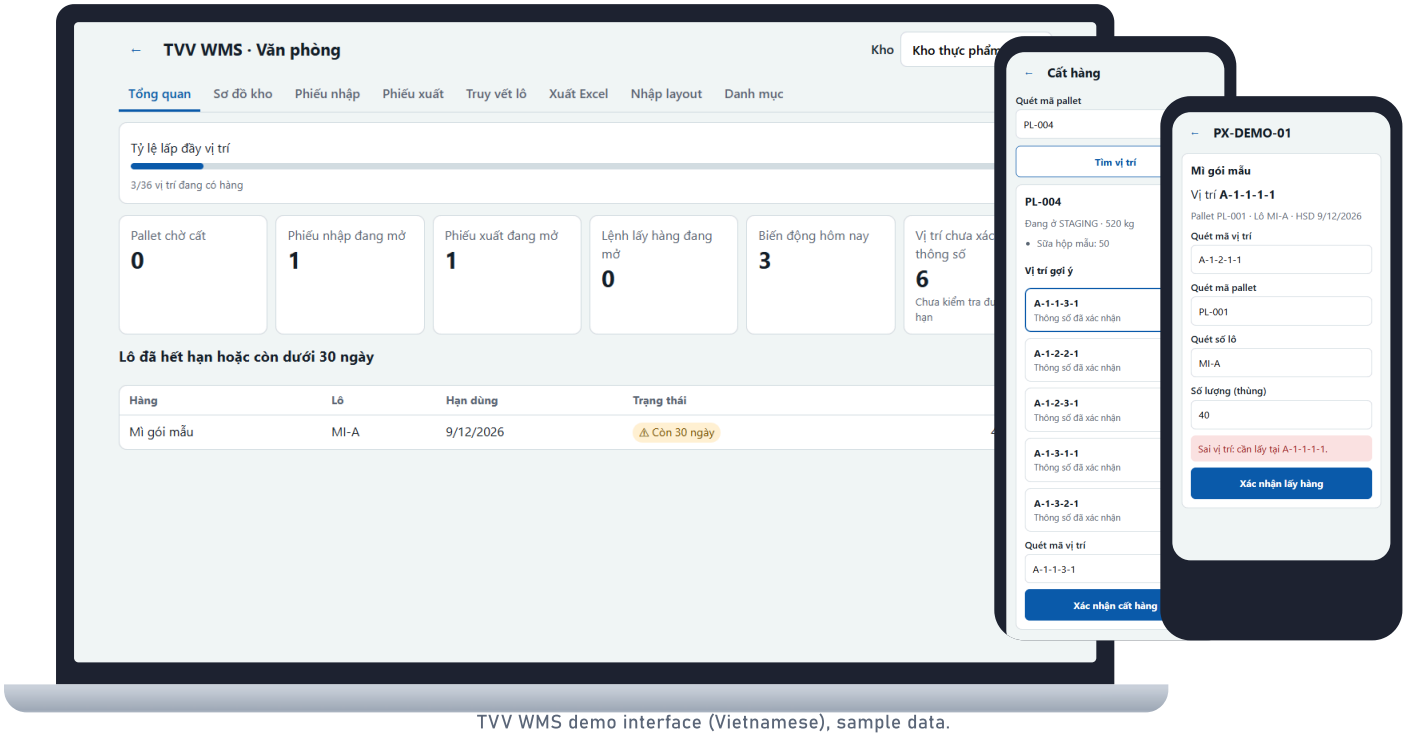
AMF · Autonomous forklift

Picks up and sets down pallets at floor, conveyor or low rack positions; takes tasks directly from software.

Routes, speeds, loads and lift heights are defined by the specific equipment and site of each project.

TVV WMS: warehouse software that comes with your racking

TVV WMS builds its location map directly from the project rack drawings, so data is right from day one. Deploy in the cloud or on your own server.



TVV WMS demo interface (Vietnamese), sample data.

Rack drawing — CAD · Excel

Location map — Row · bay · level

Barcode scan — Receive · store · pick

Inventory — By lot and expiry

Reports — Excel · ERP

Warehouse map from rack drawings

Import the layout from Excel to create locations by row, bay and level.

Barcode-driven operations

Receive, put away and pick on handheld devices.

FEFO allocation

Earliest-expiring lots are allocated first.

Location load control

Warns when an engineering-confirmed limit would be exceeded.

Lot and expiry tracing

Know where each lot is and where it went.

Excel reports

Stock, movements and expiry; easy to share with other systems.

AI AI scoped and developed for each customer's needs

Inventory forecasting
Based on your own movement history.

Slotting suggestions
By pick frequency and expiry date.

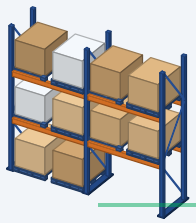
Layout drawing reading
AI-assisted, engineer-approved.

System integration
ERP, robots and automated equipment.

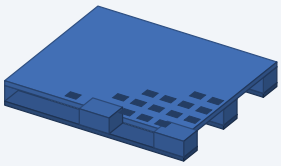
AI features are developed per project and are not part of the demo version.

Why TVV STORAGE SOLUTIONS

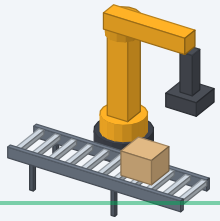
When racking, pallets, equipment and software come from different suppliers, the owner has to make them fit. TVV delivers them together so the system runs as one from day one.



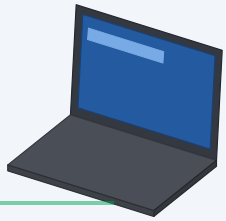
Racking



Pallets



Automation



Software

One integrated system

01 A single point of contact

From survey and design to installation and software; one party is accountable for the whole system.

02 Integrated by design

Racking, pallets, lifting equipment, conveyors and software are designed to fit together.

03 Optimised cost and timeline

Fewer hand-offs between suppliers and fewer late changes during installation.

04 Accurate data from day one

Rack drawings become software locations, with no re-keying.

05 24/7 support

With you throughout operation.

	BUYING SEPARATELY	TURNKEY WITH TVV
Contacts	Several suppliers	**One partner**
Rack, pallet and equipment fit	Owner checks it	**Designed together**
Software data	Re-entered from scratch	**Taken from rack drawings**
After-handover support	Per work package	**24/7 for the whole system**

Support after handover

Warehouses change with production and business. TVV stays involved so your system runs safely and grows when needed.

Maintenance

Periodic inspection of racking and equipment, impact damage checks and part replacement.

Relocation

Dismantle, transport and reinstall racking to a new layout drawing.

Upgrade

Extend, add levels, convert to high-density or automated storage, add software.

24/7 support

Requests handled around the clock throughout operation.

GET STARTED

Request a site survey

Send us your floor plan and product data (see the checklist on page 03). TVV will contact you to arrange a survey and propose the right solution for your warehouse.

HOTLINE
+84 932 681 324

EMAIL
tvvequipmentwarehouse@gmail.com

WEBSITE
tvvgroup.vn

STORAGE SOLUTIONS

COMPLETE WAREHOUSE SOLUTIONS

TVV PRODUCING TRADING CO., LTD

OFFICE	22 Cao Van Ngoc Street, Tan Phu Ward, Ho Chi Minh City, Vietnam
HOTLINE	+84 932 681 324
EMAIL	tvvequipmentwarehouse@gmail.com
WEBSITE	tvvgroup.vn
TAX CODE	0314185601

Images in this catalogue are illustrations of operating principles, not photographs of actual projects. Configuration, dimensions, loads and throughput are confirmed by TVV for each project.

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