Pallet live storage

BITO

www.bito.com

Pallet live storage systems play an increasingly important role in warehousing and storage technology, as users recognise their potential for improving efficiency.

In the past, pallet live storage was mainly installed as a buffer store in the production area as well as in warehouses and dispatch areas. Today, there is a strong tendency towards using the pallet live storage system for order picking because the FIFO principle is strictly maintained. An equally interesting option is push-back pallet racking which allows compact storage according to the LIFO principle.

The system specific compact lane configuration in width as well as in height results in a high storage density and thus in an optimum utilisation of available warehouse volume.

With pallet live storage, floor space utilisation is 60% higher than with conventional racking. Moreover, constant availability of stock avoids idle times.

Product information

Frequent application
- order picking, buffer stores, dispatch route related storage of picked goods, re-distribution centres

Service options
- manually with hand pallet trucks, electric lift trucks, forklift trucks, order picking trucks, stacker cranes; automated servicing possible

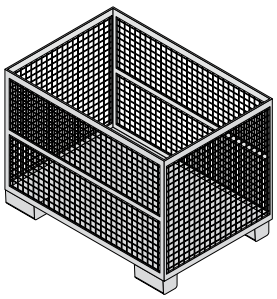
Storage options
- pallets handled short or long side facing

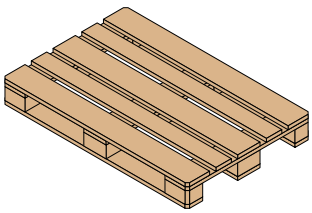
Surface/volume utilisation
- high degree of floor space and medium degree of volume utilisation

Stock rotation frequency
- suited for A and B-items = high to medium stock rotation frequency

Storage units

Storage units	Width x Length
Chep pallet	1000 x 1200 mm
Euro pallet	800 x 1200 mm
Industry pallet	1000 x 1200 mm
Bier pallet	1000 x 1200 mm
Brunnen pallet	1070 x 1100 mm
Four way pallet	1200 x 1200 mm
Düsseldorf pallet	800 x 600 mm
Hygiene plastic pallet	800 x 1200 mm
Hygiene plastic pallet	1000 x 1200 mm
Customer specific pallet	





Information material

For more information on this product, please contact us on

Tel.: +49 (0) 67 53 / 1 22-1 64

or ask for our DVD
“Dynamic storage“

Our **PRODUCT CATALOGUE** provides detailed information on our entire delivery programme.

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System specific solutions

Retrieval by hand pallet truck page 142

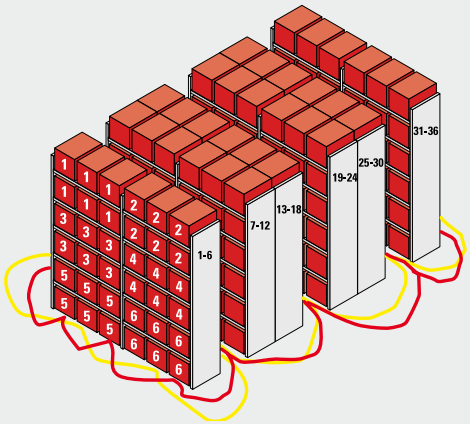
Extractable first pallet position, BITO-type »APP« page 143

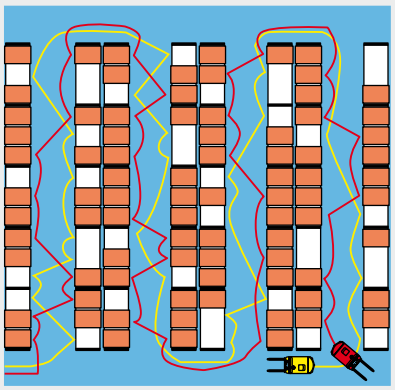
Tiltable roller conveyor page 140, 143

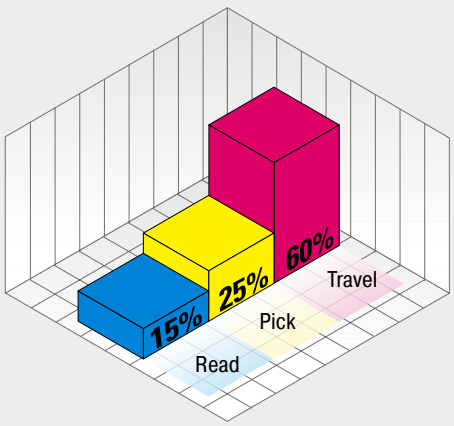
Empty pallet return system, BITO-type »ASP« page 145, 153

Economic evaluation

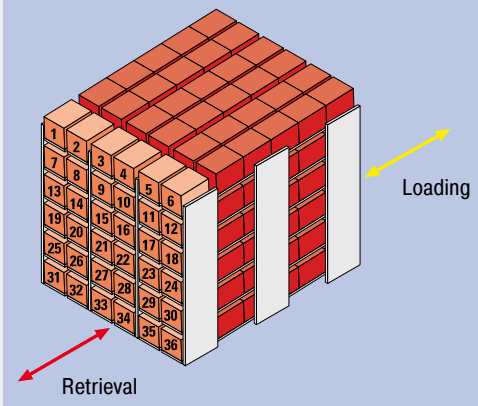
Static pallet racking

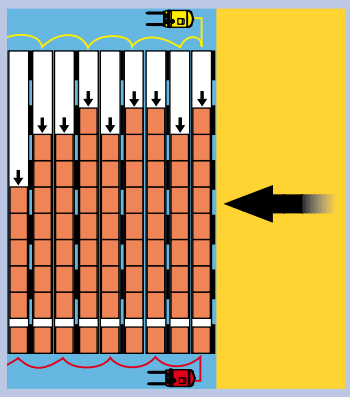


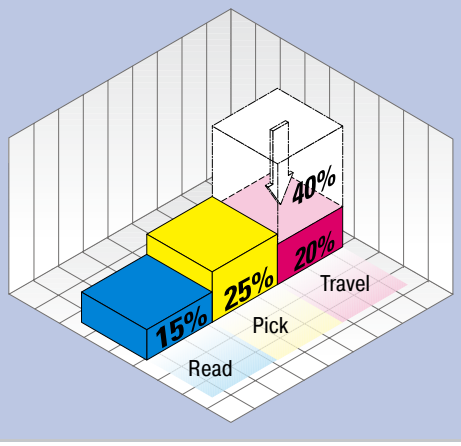




Pallet live storage







Comparison

Our example shows two storage solutions for the supply of 36 different reference lines.

Storage in the pallet live storage installation is definitely more compact and the different items are much easier to find.

All 36 reference lines are in direct access at the picking face. Upon retrieval of a storage unit, the next unit automatically moves into the picking position. Sufficient supply guarantees permanent availability of goods.

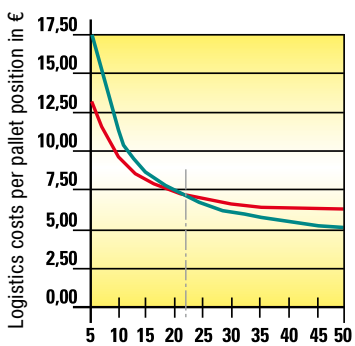
Compact storage and the elimination of unnecessary aisles results in a gain of floor space of up to 60%.

Strictly separated loading and picking aisles prevent that order pickers are disturbed by restocking which increases picking performance.

Short travel times improve productivity – in particular at loading docks where pallets are grouped together according to dispatch route.

Whereas information and picking times are almost the same in both solutions, there is a drastic reduction in travel times.

This saves working time and increases turnover frequency.



Save costs

Stock rotation frequency has a decisive influence on the overall costs per pallet position.

As of a turnover frequency of approximately 20 times a year, the costs per pallet position in a live storage installation are lower than in static pallet racking.

Advantages of the system

General advantages of pallet live storage

- **compact storage maximises use of available warehouse space and reduces the number of aisles**
- **the increase in efficiency over conventional racking can be up to 60%**
- **in contrast to bulk storage live storage provides direct access to all items stored**
- **strict adherence to the FIFO principle eases control of sell-by dates, call-off quantities and production batches**
- **ideal system for fast movers, as there are always sufficient quantities of each item in reserve: no idle times**
- **increased staff efficiency, as loaders and order pickers do not disturb each other**
- **separate loading and picking aisles allow use of specific service vehicles**
- **shorter in-house travel routes, as the goods move automatically to the order picking side**

Specific advantages of BITO pallet live storage

- **the load carrying structure is based on the well established BITO pallet racking system**
- **bolted beam connectors allow to adjust flow levels at any required height and incline**
- **specifically designed and effective safety accessories and special components**
- **in accordance with customer needs, lanes can be equipped with roller tracks or roller conveyors**

BITO Pallet live storage

This system operates according to the **FIFO principle** (first in - first out). In the loading aisle, the pallets are fed into the lanes of each racking block, travel gravity-driven to the opposite side and are retrieved in the picking aisle.

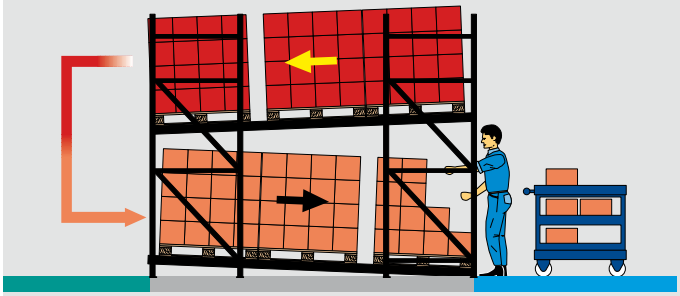
Benefits:
- ideal for partially or fully automated warehouses
- high degree of volume utilisation
- separate aisles for loading and order picking
- compatible with computer-controlled paperless order picking systems
- order-based preparation of dispatch routes

BITO Push-back pallet racking

In this system, the forklift truck pushes the pallets into the lane against the incline. Retrieval is based on the **LIFO principle** (last in - first out). While taking out the first pallet in the picking aisle, the subsequent pallets in the lane travel smoothly to the front at the same speed the first pallet is taken out. As this system operates without braking devices and load separators, goods can be stored at low cost.

Benefits:
- space-saving storage, as only one aisle is required
- very good utilisation of the available warehouse volume
- in contrast to drive-in racking, all reference lines are always accessible at the picking face
- particularly appropriate for a broad range of products

1 Contraflow lane configuration



The upper level is used as a product buffer and provides supply for the floor level. Manual order picking and loading are done from the same racking side.
The opposite racking side is reserved for product relocation.

Your advantages:
- FIFO principle (first in - first out) is maintained

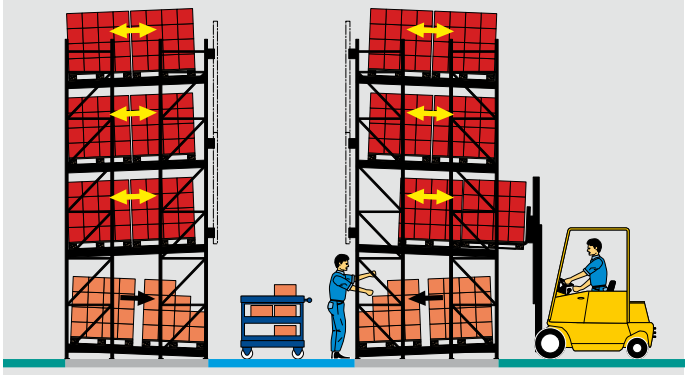
2 Single-sided picking tunnel

- contraflow lane configuration
- suited for large throughput references

The two levels on top serve as supply buffer for the floor level where individual storage units are picked in the picking tunnel.

Your advantages:
- FIFO principle (first in - first out) is maintained
- safe working environment as aisles are separated
- loading does not interfere with order picking

3 Push-back pallet buffer

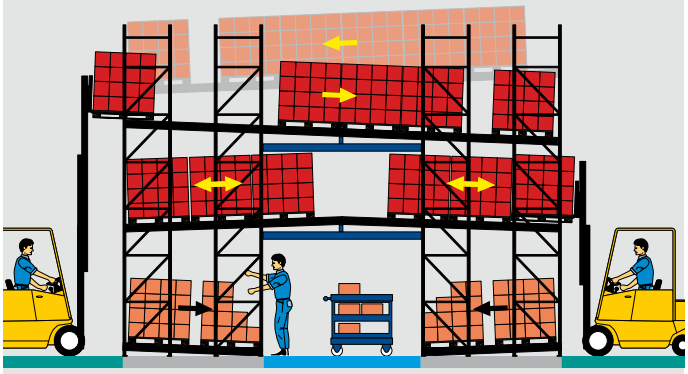


- cost-efficient buffering
- suited for large throughput references

The short lanes of the buffer levels favour push-back storage which is an economic solution as no braking system is required.

Your advantages:
- safe working environment as loading and picking aisles are separated
- highbay buffer store allows optimum utilisation of warehouse height
- huge buffer quantities ensure that order pickers do not run out of stock
- compact storage on a small floor surface

4 Central picking tunnel



- suited for huge quantities per reference

The push-back and live storage levels on top of the picking tunnel are used as buffer store and ensure constant product availability in the floor level lanes.
Contraflow live storage levels in the pallet buffer provide supply for both sides of the picking tunnel.

Your advantages:
- maximum utilisation of the available warehouse volume
- safe working environment as loading does not interfere with order picking

Picking zone | Loading zone | Buffer stock | Picking stock

5 Man-operated stacker crane loading

- manual picking of individual storage units
- suited for references stocked in large quantities
- stacker crane loading for frequent replenishment

The order picking lanes on all three tiers are immediately replenished with the help of stacker cranes.

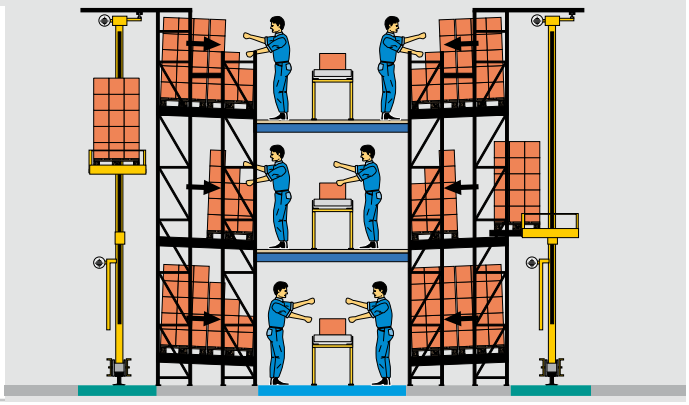
Your advantages:
- pallets are handled long side facing for improved access to goods
- fast restocking ensures constant product availability
- maximum utilisation of available headroom
- short order throughput times due to simultaneous order picking on several tiers

6 Automatic stacker crane loading

- manual picking of individual storage units
- suited for references stocked in large quantities
- automatic stacker crane loading for frequent replenishment
- reference oriented order picking (batch picking)

Automatic stacker crane servicing allows very fast restocking of all three tiers. There is no need for an extra operator to manoeuvre the stacker crane.

Your advantages:
- pallets are handled long side facing for improved access to goods
- fast restocking ensures constant product availability
- maximum utilisation of available headroom
- reduced lead times due to simultaneous order picking on several tiers
- automated, computer controlled replenishment directly from the buffer

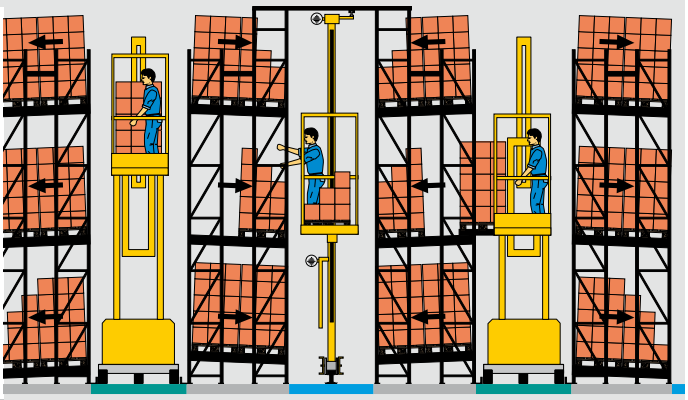


7 Automatic stacker crane loading

- manual picking of individual storage units
- suited for small picking quantities per reference
- stacker crane loading for frequent replenishment

The stacker cranes/order picking trucks are man-operated. The order picking vehicle allows easy access to all goods in the aisle.

Your advantages:
- pallets are handled long side facing for improved access to goods
- fast restocking ensures constant product availability
- maximum utilisation of available headroom
- excellent utilisation of storage volume

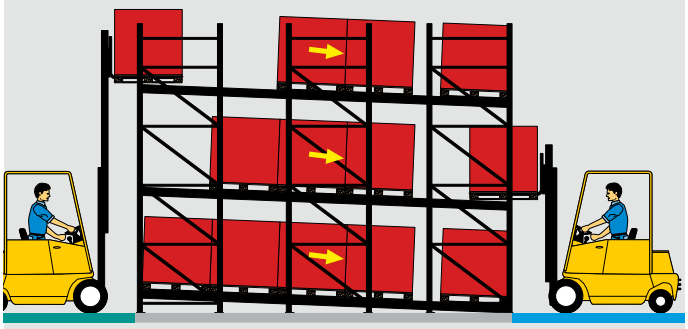


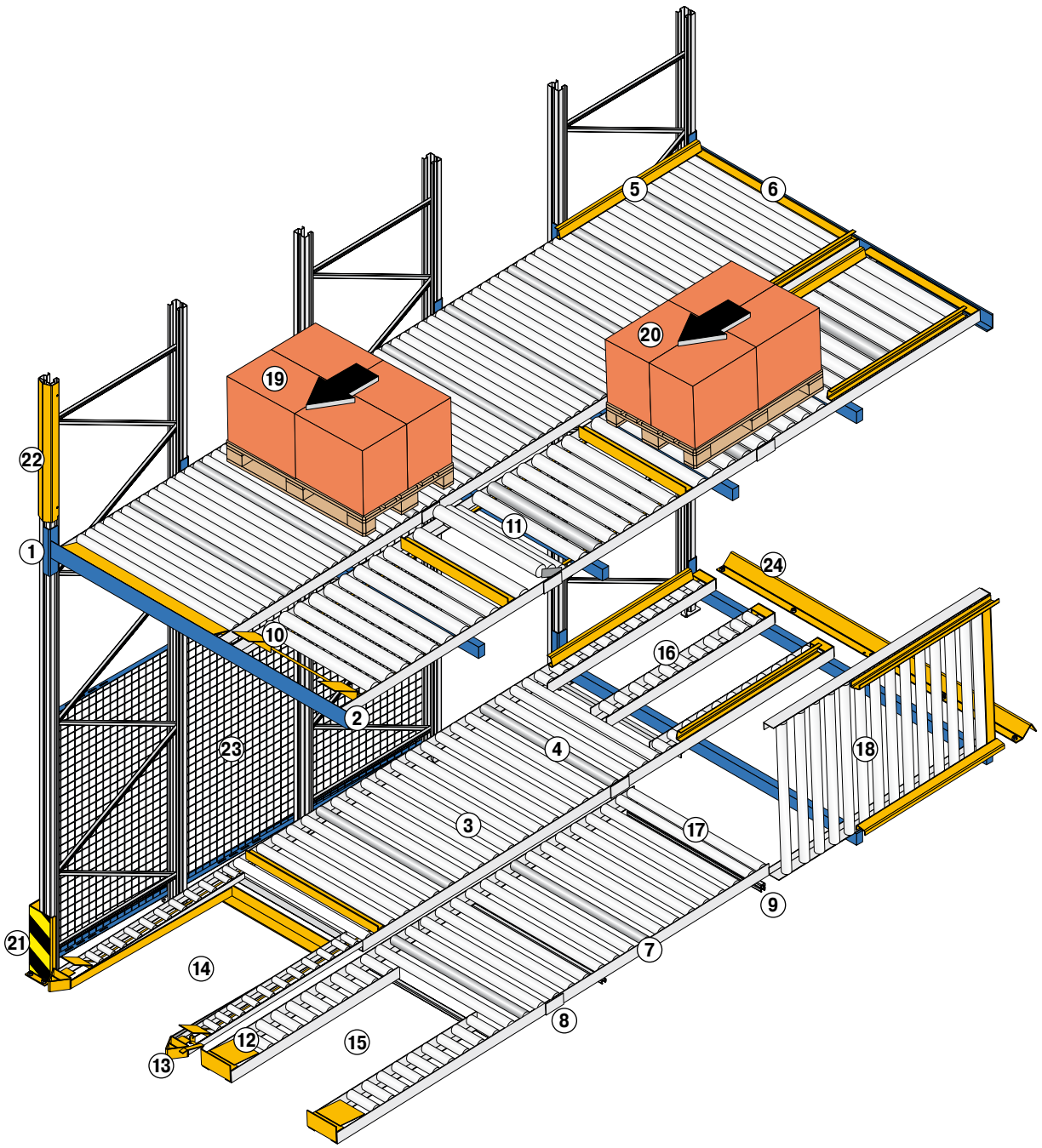
8 Retrieval of complete pallet loads

- loading and retrieval of complete pallet loads (f. ex. grouped together according to despatch routes)
- suited for picking large quantities per reference and a high stock turnover frequency

Separate loading and picking aisles ensure that order pickers are not disturbed by restocking which in turn increases productivity.

Your advantages:
- short travel routes between picking point and final dispatch area (f. ex. lorries in front of a loading dock)
- good overview of products on stock and permanent product availability, as goods automatically move to the picking face





1 Beam with bolted connectors
allows continuous height adjustment of lanes

2 L-shaped beam
- protects roller conveyor lane
- low height construction

3 BITO Roller
with steel ball bearing

4 BITO Braking roller
exerts a smooth and uniform braking effect on the pallets

5 In-feed guide

6 Roller protector

7 Side section

8 Joining plate for side sections

9 Floor beam

10 Load separator with full width activator

11 Mid-lane separator
used in long lanes to absorb lane pressure on the load separator at the picking face

12 Speed reducing end stop
for lanes without load separator

13 Hand/foot operated lever for separator

14 Low height picking unit for hand pallet truck retrieval

15 Twin track picking unit

16 Triple track replenishment unit

17 Lane for “mixed“ load carriers
Euro and industry pallets

18 Tiltable roller conveyor

19 Pallet handled long side facing

20 Pallet handled short side facing

SAFETY COMPONENTS

21 Column guard
to protect corner uprights

22 Upright protector

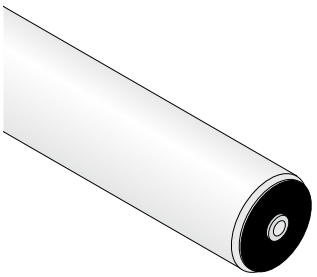
23 Wire-mesh side cladding

24 Truck wheel stopper

③ BITO Roller

Maintenance free, smoothly operating ball bearings provide for a low friction resistance and ensure a troublefree pallet start at the loading side.

- **high load capacity**
- **easy assembly**

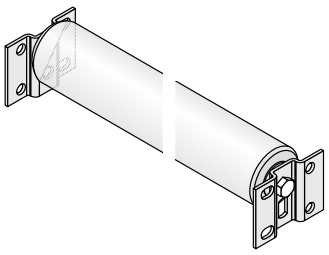


maintenance free

④ BITO Braking roller

For different pallet weights. Due to the optimised slot position on the supports, the braking roller does not need height levelling. As a rule, there is one braking roller per pallet position.

- **easy assembly, no height levelling required**
- **high load capacity**
- **maintenance free operation and minimal wear and tear for a long service life**

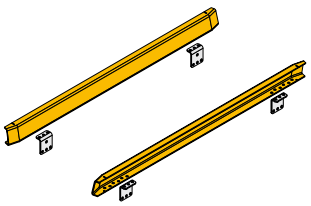


annual inspection recommended

⑤ In-feed guide

The in-feed guide is mounted directly to the roller conveyor side sections.

- **convenient in-feeding and pallet centering**
- **easy assembly**

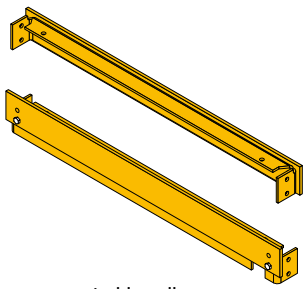


epoxy-coated in yellow, RAL 1003

⑥ Front/rear roller protector

Avoids potential damage of the rollers from lift trucks. Damage to the rollers can also be avoided by mounting robust L-shaped beams at the the picking/loading side of each lane.

- **particularly robust component**
- **efficient roller protection**



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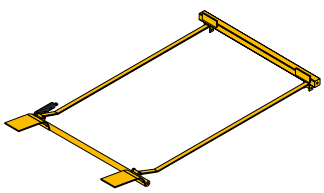
⑩ Load separator with activator

Mechanical device to separate the first pallet from the other pallets in the lane in order to eliminate line pressure. In the automatic version, the separator drops as soon as the first pallet is removed. This mechanism can also be released by a hand or foot operated lever.

- **safe retrieval**
- **the next pallet moves automatically to the picking face**

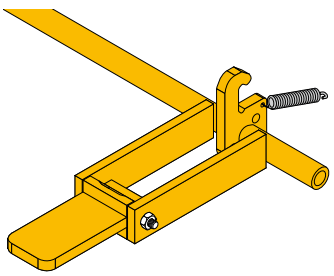


epoxy-coated in yellow, RAL 1003

⑬ Hand/foot operated lever for load separator

The lever is linked to the activator at the picking face. Only upon operation of the lever do the subsequent pallets move forward.

- **retrieval of individual storage units/items off the first pallet**
- **subsequent pallets can only move forward after operating the lever**
- **solid construction**



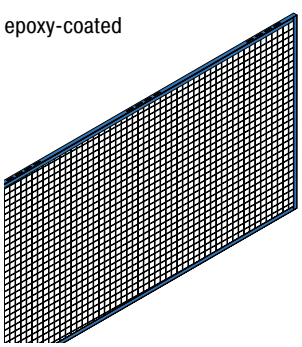
epoxy-coated in yellow, RAL 1003

㉓ Wire-mesh side cladding

Mounted to the side of racking rows to prevent access to the lanes.

- **conforms to the latest security regulations**
- **prevents accidents**
- **mesh width 50 x 50 mm**

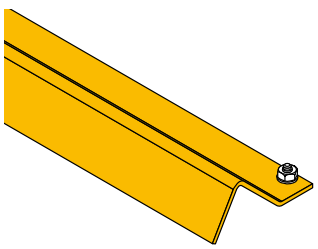
epoxy-coated



㉔ Truck wheel stopper

This angled section is anchored to the floor in front of the racking's loading/order picking front in order to fix the optimum distance between service truck and racking.

- **keeps a fixed distance between service truck and racking**
- **protection of racking components against collision damage**



epoxy-coated in yellow, RAL 1003

VET-CONCEPT
Gute Nahrung für Vierbeiner

VET Concept
Pet food

Features

- **picking tunnel giving access to carton and pallet live storage lanes**
- **pallet buffer on top of the tunnel as well as in a separate live storage racking and in pallet racking**
- **cantilever racking for double sided use**

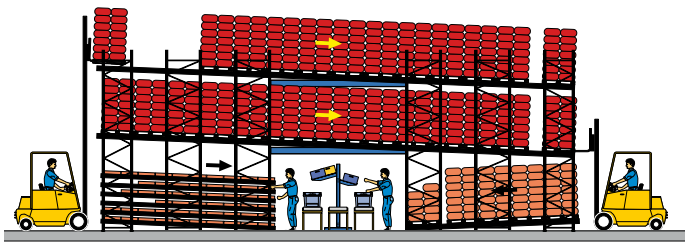
Function

VET-Concept in Föhren produces well-balanced pet food. To allow immediate access to the products while maintaining the FIFO principle, the goods are stocked in carton and pallet live storage lanes which are inclined towards the central picking tunnel. The lanes are constantly restocked from the pallet buffer areas.

The products are supplied in BITO plastic containers with pick opening, in factory packaging units as well as in sacks of manageable size stocked on Euro-pallets. Picking is aided by picking lists. Picked goods are placed into BITO multi-purpose containers sized 600 x 600 x 320 mm. As soon as an order has been completed, the containers are conveyed to the packing stations.

Benefits

- short travel routes contribute to the high picking performance
- short order throughput times
- separate aisles for loading and retrieval allow operators to work undisturbed
- 6 metre deep lanes keep a sufficient quantity of products in reserve
- good utilisation of the headroom
- adherence to the FIFO principle



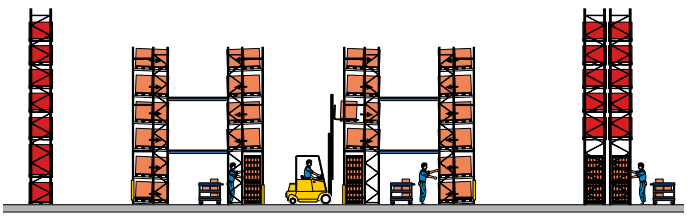
Stute Verkehrs-GmbH
Logistic services supplier

Features

- facility combines mezzanines, pallet live storage and static shelving
- order picking directly off the pallet

Function

The Stute Verkehrs-GmbH in Bremen is a fully-owned subsidiary of the Kuehne + Nagel Group who has grown into one of the world's major logistics suppliers of freight services by road, rail, air and sea. Within the Kuehne + Nagel organisation, Stute accounts for contract logistics ranging from inhouse logistics services, outsourcing solutions to the concept-to-completion realisation and operation of complex logistics centres. Their customers mainly come from the automotive industry and their suppliers, from the steel industry, the chemicals industry as well as from aviation and mechanical engineering.
In order to cope with frequent changes in their product lines and permanently varying lot sizes, the logistics centre in Nuremberg needed a storage system capable of adjusting to strong fluctuations. The company's responsiveness to customer requirements has now been optimised with a multi-tier pallet live installation with lanes for double deep storage. The facility incorporates static shelving blocks on the ground floor for manual picking. This solution stocks a large product range a small surface area and provides flexibility to cope with fluctuating order volumes.



Benefits

- simultaneous order picking on several tiers
- order picking directly off the pallet
- accommodation of a huge range of product lines
- random storage
- good floor space utilisation

Plzensky Prazdroj
Brewery

Features

- push-back pallet racking
- pallet live storage racking used to centralise stocks for export

Function

The Czech brewery Plzensky Prazdroj in Plzen has a long tradition in beer-brewing. Today, the trade mark unites renowned breweries such as Pilsner Urquell, Master, Gambrinus or Radegast. In order to reduce the number of depots as well as their visitor tour related transport activities, the brewery decided to merge all local depots into one central depot. This depot features two storage systems: a LIFO-operated push-back pallet racking installation for small order volumes and a compact FIFO-operated pallet live storage facility with 1.905 pallet positions. The new storage facilities for palletised loads tripled storage capacity. Catering for small and large order volumes, the storage installations allow the brewery to react very flexibly to customer requirements and to speed up order throughput. Moreover, the reduced picking error rate improves delivery accuracy.

Benefits

- storage capacity has been tripled
- reduced order throughput times
- improved delivery accuracy
- peak periods can be easily managed
- handling times and effort have been cut down

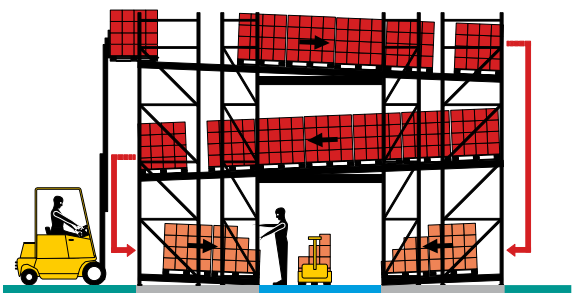
Getränke Mayer
Distributor of beverages

Features

- **installation with order picking tunnel**
- **picking of unit loads off the pallet**
- **live storage pallet buffer**

Function

Order picking installation operating according to the FIFO-principle with a live storage pallet buffer on top. The loading aisles are used for restocking as well as for relocating the goods from the buffer into the feeder lanes. In the picking tunnel, unit loads are collated order-based.



Benefits

- optimum utilisation of the warehouse volume
- goods are always available in sufficient quantities
- the picking tunnel provides a safe working environment and allows undisturbed working

dm-drogerie markt GmbH + Co. KG
Distributive trade

Project realised in cooperation with
swisslog

Features

- live storage lanes for double deep storage of Euro pallets handled long side on, pallet weight ranges between 70 and 1.000 kg

Function

The drugstore chain dm-drogerie markt is one of the major suppliers of drugstore products in Europe. At their distribution location in Weilerswist, the huge order throughput is handled with a pallet live storage system. Stacker cranes equipped with tiltable telescope forks feed the pallets into the roller conveyor lanes with a 4% incline. The pallets move gravity-driven to the picking face where operators manually pick cartonised unit loads directly off the pallet. When all cartons have been picked, the operator will pull the empty pallet out of the lane into the aisle. This will automatically activate the load separator: the pallet stop which separates the picking pallet from the second pallet in the lane will hinge down, allowing the next pallet to move to the picking face.

Benefits

- high picking performance
- short in-house travel routes
- automated replenishment

ASSIST GmbH
Wholesaler of care products

Features

- **installation with picking tunnel**
- **servicing with narrow aisle trucks**
- **pallet live storage buffer**

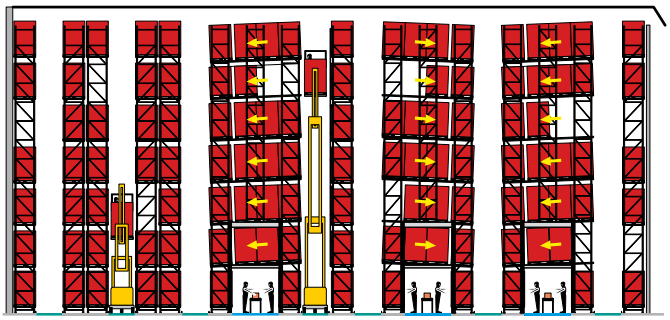
Function

The static pallet positions are replenished by the live storage lanes on top which are inclined either to the right-hand or the left-hand loading aisle in order to feed the picking places on both sides of the picking tunnel according to the FIFO-principle.

Picked goods are placed onto a powered roller conveyor lane in the middle of the picking tunnel. On the short side of the racking blocks, P&D stations facilitate handling of fully loaded pallets.

Pallet loading and retrieval is done by narrow aisle trucks with telescopic forks. For this reason, the roller conveyor lanes are split at the loading side.

The particularity of this installation is that the order picking tunnels and the narrow service aisles of the rail-guided VNA-trucks are very close together. For work safety, light barriers have been installed in the aisles.



Benefits

- optimum utilisation of warehouse space with compact storage
- storage according to the FIFO principle in the live storage lanes
- high degree of flexibility to respond to product range modifications
- many picking positions on a small storage surface
- high levels of work safety due to separate loading and picking aisles
- operator friendly layout of the picking aisles allows convenient working

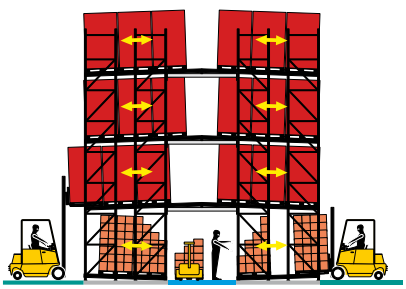
ALCAR Autoteile GmbH
Wholesaler of rims

Features

- **installation with picking tunnel**
- **retrieval of individual storage units off the pallets on the floor level**
- **push-back pallet buffer**

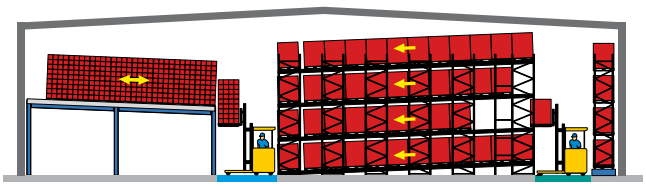
Function

Orders are picked off the pallets in the order picking tunnel on the floor level. Each lane is 2 pallets deep. The buffer stock is located on the 3 levels on top in 3 pallet deep push-back lanes.



Benefits

- high picking performance due to short travel routes
- separate loading and picking aisles allow undisturbed working
- immediate replenishment from the buffer stock on top
- immediate picking supply from the pallet behind the picking pallet
- tunnel construction provides high storage capacity



Features

- pallet live storage racking with 800 pallet positions
- push-back pallet racking (mezzanine floor) for 330 pallets
- pallet racking on spill trays for 148 pallets
- servicing with various stacker types

Function

The company supplies products and services for hospitals and outpatient care.

In the production area, a pallet live storage racking serves as buffer store for raw materials in big bags and sacks. The push-back pallet racking is located on a platform and stocks various types of casks and cans on lanes with a 4% incline. Due to the mezzanine construction, additional storage surface is gained on the ground level. This allowed to integrate underneath a pallet racking installation with spill trays for the storage of hazardous goods.

Benefits

- batch storage
- space can now be used to a better degree than with previous block storage
- lift truck travel routes have been considerably reduced
- very good utilisation of warehouse space
- ground level can be used in whatever way is required at the moment
- hazardous goods are stocked close to the production area

TUCANO Vertriebs GmbH
Beverage distributor

Features

- **tiltable roller conveyor lanes on the ground level**
- **easy cleaning if damaged packages have soiled the floor underneath**
- **avoids hygiene problems, particularly in areas of food and beverage storage**

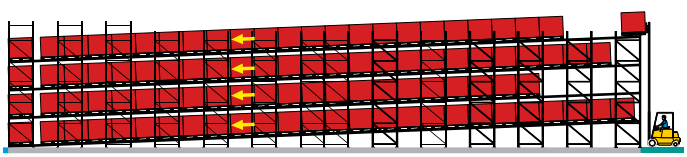
Function

The distribution company Tucano Vertriebs-GmbH is a subsidiary of the beverage producer Mineralbrunnen Überkingen-Teinach AG headquartered at Bad Überkingen. The company counts among the biggest suppliers of brand fruit juices.

The distributor's dispatch depot has been fitted out with roller conveyor lanes with a length of 31.6 metres on which the pallets with beverage cartons move gravity-driven to the picking face. The modular built of the installations allows to realise fast and easy extensions or modifications of the facility in response to market developments.

Benefits

- optimum utilisation of the available headroom
- constant availability of goods for the order pickers
- no disruption in operations due to soiled areas underneath the roller conveyor lanes
- roller conveyor lanes can be supplied in any intermediate length



Unilever
Food manufacturer

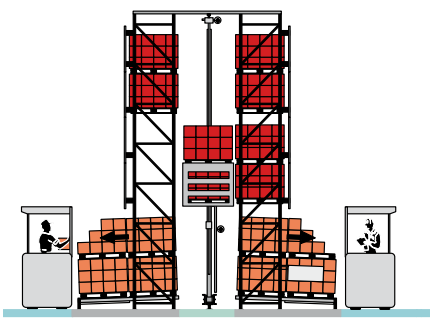
Features

- **retrieval of individual storage units**
- **automated loading with stacker cranes**

Function

The automated pallet live storage installation with a static pallet buffer on top is used for order picking.

The live storage lanes on the floor level are replenished automatically by stacker cranes from the static pallet buffer stock on top. Placed on the roller conveyor lanes on the ground level, the pallets move unassisted to the picking face where individual storage units are picked manually with the help of order picking stackers.



Benefits

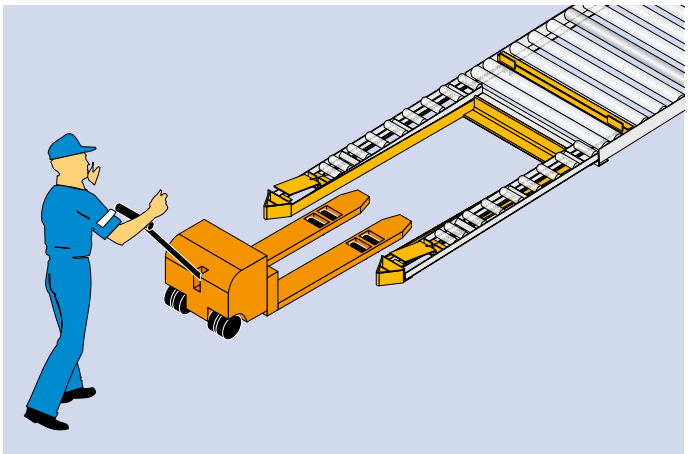
- higher productivity on account of short travel routes
- link-up with an in-house conveyor system
- compact and safe storage, immediate overview of products on stock and good utilisation of available storage space
- service vehicles with a high operating frequency ensure that all product lines are constantly available
- the warehouse management system allows permanent stock control
- FIFO principle is strictly observed
- the number of service vehicles and operators can be adapted to requirement

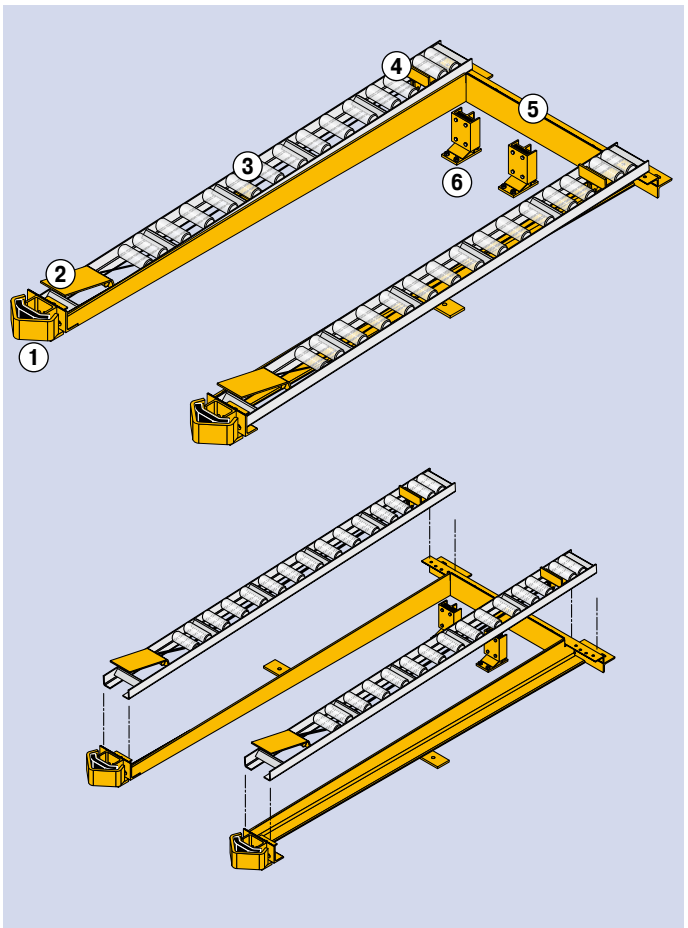
Picking unit for hand pallet trucks – standard version

If entire pallets are to be picked from the floor level, retrieval by hand pallet truck has the advantage that it is independent from lift truck availability and can be done whenever required.

Retrieval by hand pallet truck is restricted to long-side on pallet handling. In order to allow driving into the lane, the first pallet position is not equipped with full width roller conveyors, but - depending on the pallet weight - with two or three roller tracks. These roller tracks have a reduced height so that pallets can be retrieved by hand pallet truck with a standard lift height of 185 mm.

A robust inner frame protects the tracks from damage.





Picking unit for hand pallet trucks – heavy-duty version

This particularly robust version is ideally suited for tough applications. Servicing with electricity powered lift trucks and similar service vehicles is no problem. Additional components such as the fork stoppers protect the rollers of the subsequent roller conveyor/ roller track unit from damage.

- **suited for rough handling**
- **long service life**
- **ideal for electricity powered vehicles such as electric pedestrian stackers**
- **particularly robust components protect conveyor rollers and roller tracks**
- **roller tracks can be removed to allow cleaning underneath**

1 Triangular roller track nose
equipped with a rubber buffer for truck forks, helps in-feeding

2 Activator
When the first pallet is picked, the activator causes the load separator to drop so that the other pallets in the lane move forward.

3 Roller track
can be removed to allow cleaning underneath

4 Separator with pallet stop
holds back all other pallets in the lane until the first pallet is removed

5 Collision barrier
robust steel frame to protect the conveyor rollers/roller tracks of the unit behind

6 Fork stoppers
solid make, equipped with rubber buffer

Extractable first pallet position

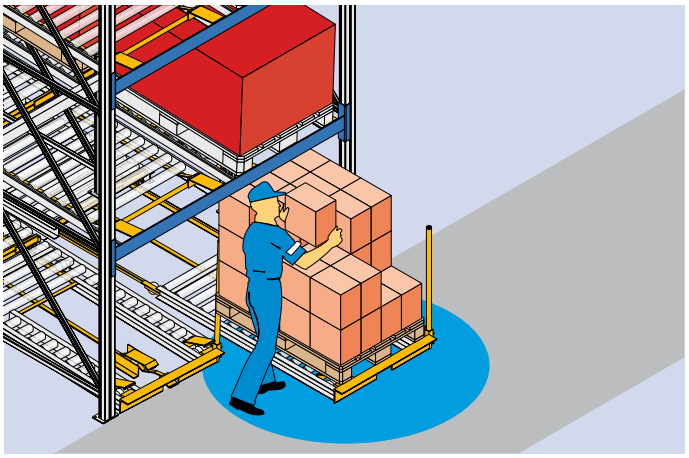
As of a certain turnover frequency per order line, order picking off the pallet is the most economic solution.

In the case of small-sized and/or heavy-weight storage units, a picking depth of 800 mm may already exceed the ergonomically critical limit, especially, if the distance between the levels is small.

The extractable first pallet position, BITO-type »APP«, is an ideal solution. The front pallet position in the live storage racking is designed as an independent unit on wheels, which can be pulled out into the aisle with the help of a pull bar. Goods can now be picked – ergonomically favourable – from three sides. After the items have been picked, the pallet position is pushed back into the racking. This enables order pickers to handle pallet loads of up to 1000 kg without any effort. Manually operated load separators as well as a separate locking and unlocking mechanism make this construction absolutely safe.

- **easy product picking without head bumping, in particular if products are accessed from the side**
- **easy manoeuvring of the extractable unit**

Pulling out the pallet position allows convenient order picking directly off the pallet. After picking, the pallet position is simply pushed back into the racking.



Tiltable roller conveyor

Even if stocked products are handled with all necessary care, damage to packaging units by forklift trucks can not be excluded. Spilt products can soil the floor underneath the roller conveyors.

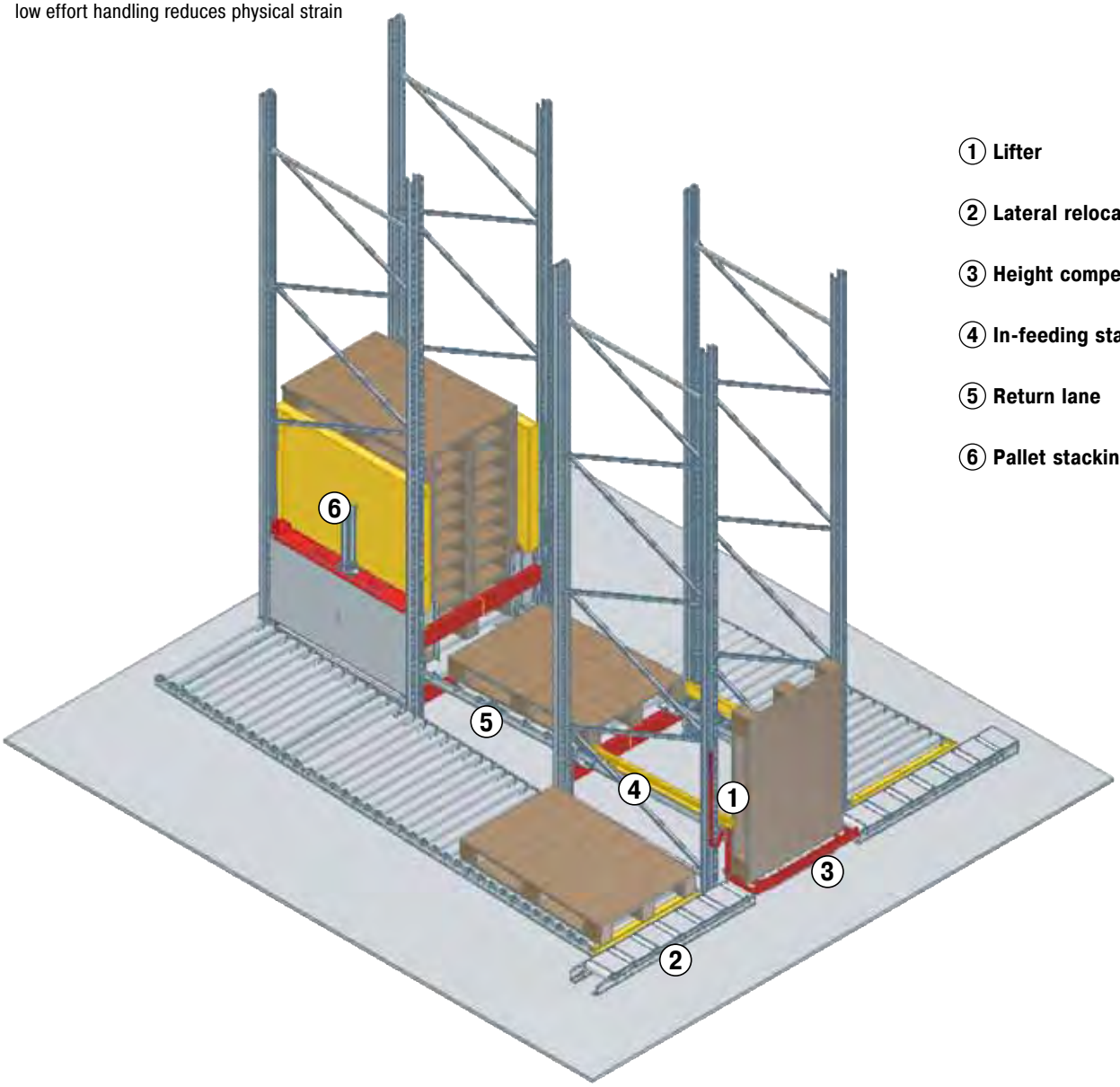
Special attention to this problem has to be given in (fresh) food areas.

As a solution, BITO has developped roller conveyor lane units which can be tilted up for thorough cleaning of soiled floors.

- **avoids hygiene problems, particularly in food storage areas**
- **prevents damage to rollers by broken packaging units and their contents**
- **no disturbances in operation due to soiled areas underneath the roller conveyor lanes**

Empty pallet retrieval

- **ergonomic empty pallet retrieval**
  A purpose-built lifter reduces the lifting load to 10 kg maximum (Euro pallet = 20-25 kg).
- **space saving solution allows to reduce picking aisle width**
  Empty pallets are pulled up into vertical position. Standing on their narrow side, the pallets are then pushed over the lateral relocation lane to the return lane.
- **convenient pallet in-feeding into return lane**
  The full pallet wide height compensator in front of the return lane ensures easy and guided pallet in-feeding.
- **automatic pallet stacking mechanism**
  allows to stack up to 15 pallets high
  empty pallets can be retrieved individually at any time
  retrieval of pallet stacks as required
  stacking mechanism is activated pneumatically or electrically
- **efficient order picking**
  order picking is interrupted for a very short time only
  picking aisles are not obstructed by empty pallets
  no extra handling required for pallet stacking
  low effort handling reduces physical strain



① **Lifter**

② **Lateral relocation lane**

③ **Height compensator**

④ **In-feeding station**

⑤ **Return lane**

⑥ **Pallet stacking mechanism**

Empty pallet handling

As a rule, removing empty pallets in an often narrow order picking aisle disturbs the work flow considerably. Empty pallet removal is a problem which should be solved in the planning phase, because integrating a solution into an existing order picking installation can often only be realised at the expense of other benefits and goes along with considerable extra costs.

BITO provides four solutions:

1 Vertical pallet return

The empty pallet is taken out of the order picking lane, placed standing on its narrow side onto a separate return lane with elevated guide sections and pushed back to the loading side. There should be several return lanes integrated into the picking side in order to minimise the distance over which the empty pallet has to be carried manually.

LANCASTER, cosmetics manufacturer

2 Horizontal pallet return

This solution provides a low-height roller conveyor return level underneath the order picking lane.
The empty pallet is pulled out in flow direction at the order picking face and without turning or pushing it sideways, it can immediately be fed into the return lane underneath.

RAVENSBURGER, manufacturer of games

3 Return lane for pallet stacks

Empty pallets are pulled out of the order picking lane, placed standing on their narrow side onto a lateral roller conveyor lane in front of the picking positions and pushed to the return lane onto which they are placed lying flat. Several empty pallets can be stacked on top of each other. As soon as a stack has been formed, it is pushed to the loading side for retrieval.
It is possible to integrate several return lanes into the picking side.

HALFORDS, supplier of parts and accessories to the automotive industry

4 Empty pallet return system, BITO-type »ASP«

In this solution, the first pallet position is a separate unit. By a lever movement, the hinged end of the first pallet position drops and allows the empty pallet to slip onto a sloped chipbord level or to move via a roller conveyor lane with inverse incline to the loading side, where it can be retrieved by a replenishment truck. By re-actuating the lever, the hinged first pallet position returns to its original position. The order picker can now operate the load separator so that the next picking pallet moves to the picking face.

MAIER´S, publisher

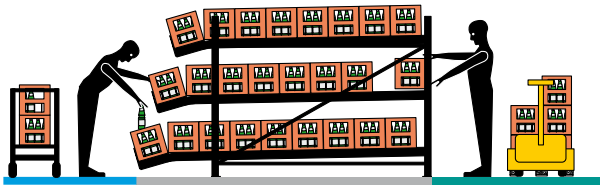
Lanes with inclined picking tray facilitate picking of individual bottles, straight lanes are suited for picking complete cases.

Roller conveyor lanes for beverage cases

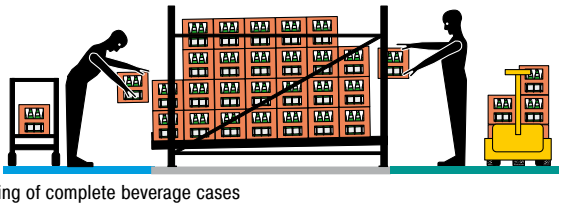
Available in three options, these roller conveyor units allow to pick complete beverage cases as well as individual bottles. Straight lanes allow to pile cases. Additionally, all options can be equipped with guide rails at the lane sides.

Due to the good utilisation of the available storage volume, the high quantity of supplied beverage cases and the fact that all storage units automatically move to the picking side, order pickers do not run out of stock.

- **high storage capacity providing huge buffer stock. In contrast to beverage dispensers, this installation is maintenance free and does not need frequent replenishment.**
- **good overview of all reference lines on stock**
- **short travel routes due to very compact stock supply**
- **supply of individual cases (not palletised)**
- **order picking of individual bottles**
- **goods are picked by final customer**

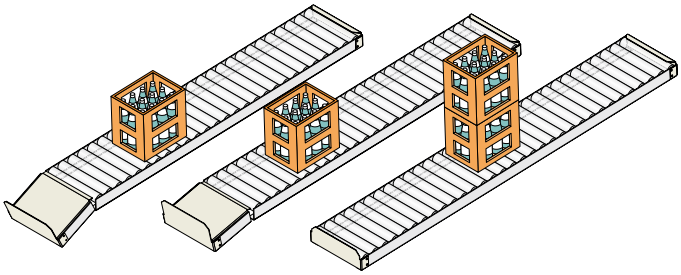


Picking of individual bottles



Picking of complete beverage cases

The loading side of the lanes is equipped with a push-back stop which tilts into the lane for ease of replenishment.



Roller track system

In comparison to the roller conveyor system which is ideal for long lanes, the roller track system is the more economic solution for short lanes.

BITO system specific solutions such as the push-back rail system for two pallet deep storage are very convincing, both in terms of their functionality and their good price/performance ratio.

The roller track system is not limited to pallet storage. Lanes with a particularly narrow roller pitch ensure the smooth flow of units with a different skid/feet design such as wire-mesh box pallets.

Advantages of the BITO roller track system

Roller tracks are ideal for live storage in short lanes with a low incline and without braking devices as well as for push-back pallet racking.

BITO roller tracks are available in two track height options and can be supplied with three types of rollers which makes them suitable for a broad range of applications and for use in many industries.

- **three different roller types**
- **with steel axle**
- **once assembled into the track, the rollers can not fall out any more; no additional securing elements are needed**
- **high load capacity**
- **cost efficient two pallet deep storage**
- **push-back rail system** (refer to page 136)
- **high quality ball bearings provide for excellent travel characteristics**
- **load capacities of 65 kg to 130 kg per roller**
- **flanged rollers safely guide storage units**

Advantages of BITO roller conveyors

Roller conveyors combine the advantages of both the roller track system and full width roller conveyor lanes by featuring a broad surface for pallet skids and at the same time the narrow roller pitch of roller tracks.

- **suited for long side or short side on pallet handling**
- **narrow roller pitch – 48 mm for pallets handled long side facing and 96 mm for pallets handled short side facing**
- **load capacities of 160 kg per roller**
- **smoothly operating ball bearings**
- **ideally suited as feeder lanes, f. ex. in front of loading docks**
- **suited for pallets of different widths such as Euro pallets (800 mm wide) and industry pallets (1000 mm wide)**

Roller types

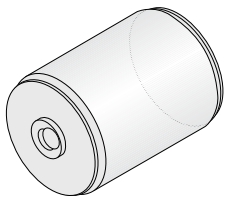
There are 3 roller types available:

- **cylindrical steel rollers**
- **cylindrical plastic rollers**
- **flanged plastic rollers**

All rollers have a steel axle which can be gently pressed into the track section's edge indentations out of which they can only be removed mechanically with the help of tools. This guarantees that the roller remains seated in its original location without the need of additionally securing the steel axle.

- **load capacities of 65 kg to 130 kg**
- **flanged rollers provide optimum guidance to storage units**
- **no start-up resistance**
- **self-locking steel axle prevents rollers from falling out**

1



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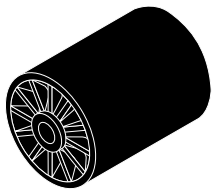

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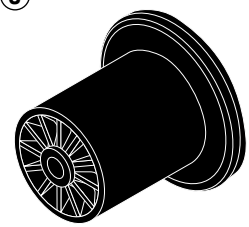
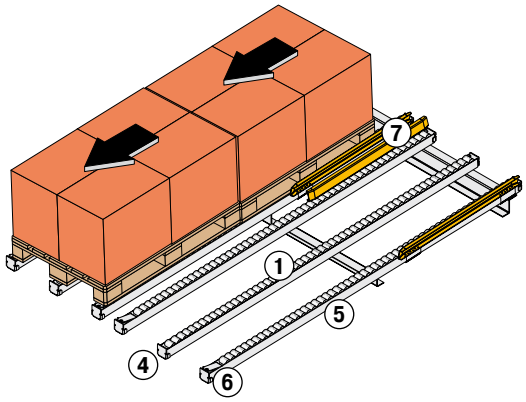
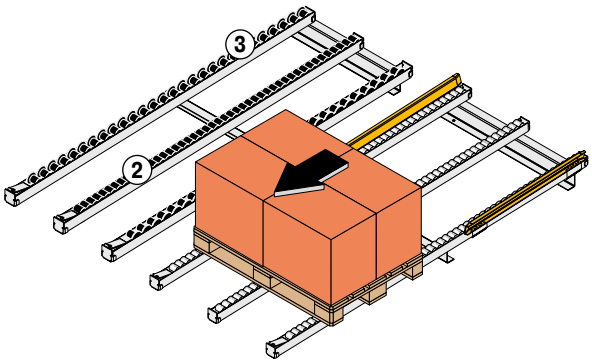


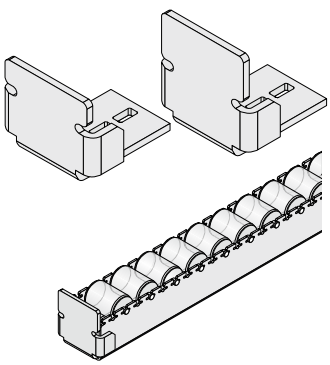




4 Roller protector

Mounted at the ends of roller tracks to protect the track section and the rollers from damage. The roller protector is simply pushed onto the track profile and is bolted, together with the track section, either directly to the static racking parts or anchored to the floor.

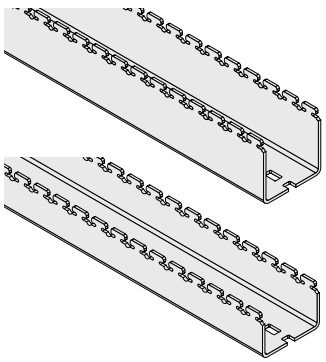
- **easy push-on fitting**
- **protects the roller track from damage**
- **end stop for pallets**



5 Roller track section

Roller track sections are available in two height options.

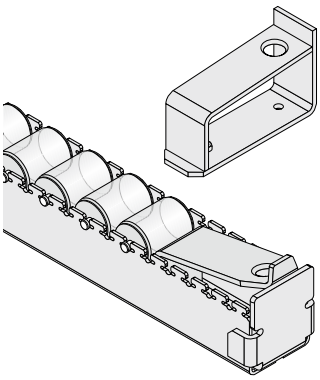
- **particularly robust component**
- **special shape of edge indentations prevents rollers from falling out**



6 Speed reducing end stop

This component combines the advantages of a roller protector and a speed reducing end stop providing a gentle braking effect and a smooth pallet stop.

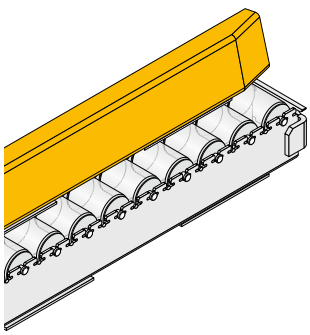
- **pallets travel smoothly to the end of the lane**



7 In-feed guide

Directly bolted to the roller track section, the in-feed guides allow convenient in-feeding and pallet centering.

- **easy pallet in-feeding**
- **protects roller flanges from damage during stock replenishment**



LTW Lagerhaus und Transport GmbH
Contract warehousing

Features

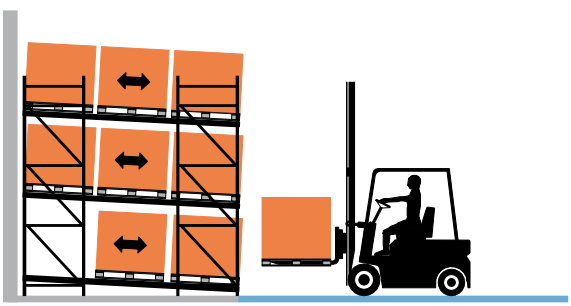
- push-back pallet racking
- order picking with lift trucks

Function

The installation is located in a coldstore and serves as a buffer stock for slow movers which are stored in relatively small quantities.
In order to facilitate cleaning of the warehouse floor, the ground level is fitted with roller tracks. The two upper levels are equipped with full-width conveyor rollers.

Benefits

- compact, clear and safe product presentation providing access to all items
- only one servide aisle is required which ensures a better utilisation of the high cost coldstore area



IVECO
Automobile industry

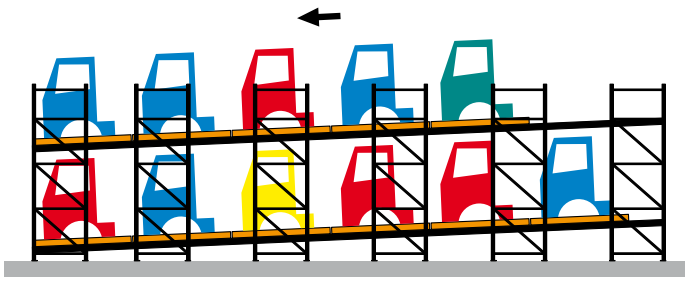
Features

- **pallet live storage**
- **servicing by reach trucks with tiltable mast**
- **retrieval of driver cabins**
- **customer specific steel rack**

Function

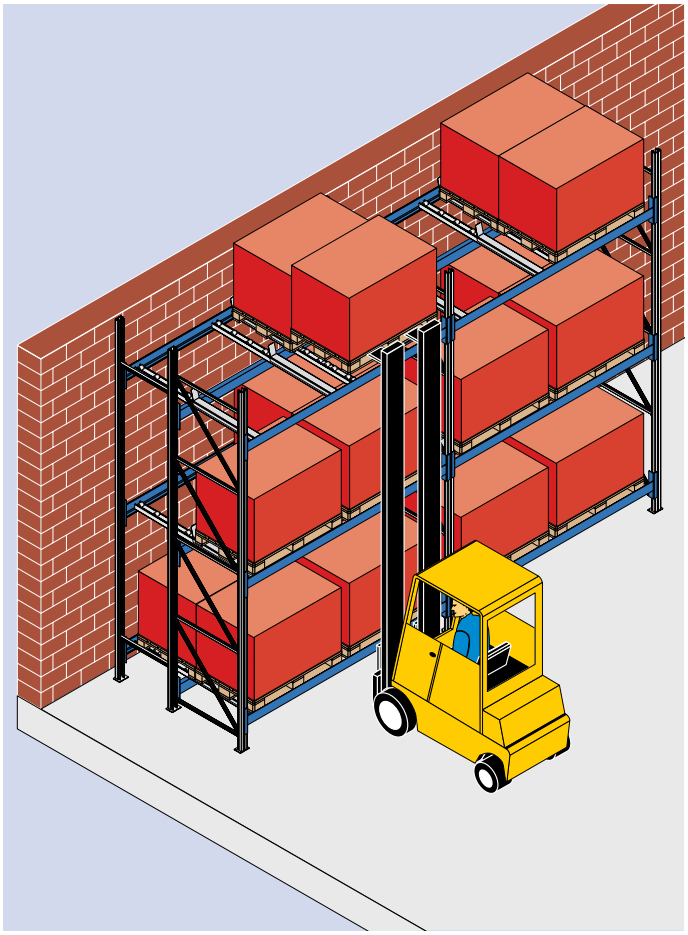
The huge range of vehicles designed, manufactured and marketed by IVECO Magirus AG is manufactured in six locations in Europe and includes fire fighting and multi-purpose emergency vehicles and equipment. The production site in Ulm stocks lorry driver cabins in live storage installations to supply the production lines.

The live storage facility provides compact storage of a large variety of cabin types. Upon retrieval of a cabin, the other cabins in this lane move unassisted on conveyor rollers to the picking side. The speed of the forward movement is braked continuously. A speed reducing end stop ensures that each storage unit is gently stopped at the picking side.



Benefits

- undisturbed working in separate loading and picking aisles
- short replenishment routes
- compact, easy-to-view and safe storage along with a very good utilisation of storage space
- the FIFO principle is strictly adhered to



Push-back rail

This **BITO-designed variation to the push-back prinicple** features push-back pallet racking equipped with a push-back rail.

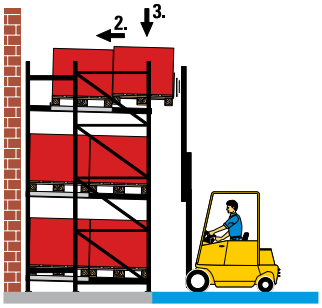
While maintaining all advantages of the push-back principle, this variation allows **low cost and efficient** short side on pallet in-feeding and also easily accommodates pallets with unfavourably shaped skids or feet.

The carefully designed configuration of roller tracks and push-back rails guarantees that pallets are safely located on the rollers or the rails.
The first pallet is placed onto the push-back rails. When the second pallet is fed into the lane, the first pallet is pushed back – together with the push-back rails which glide smoothly over the rollers. The second pallet is seated directly onto the roller tracks.

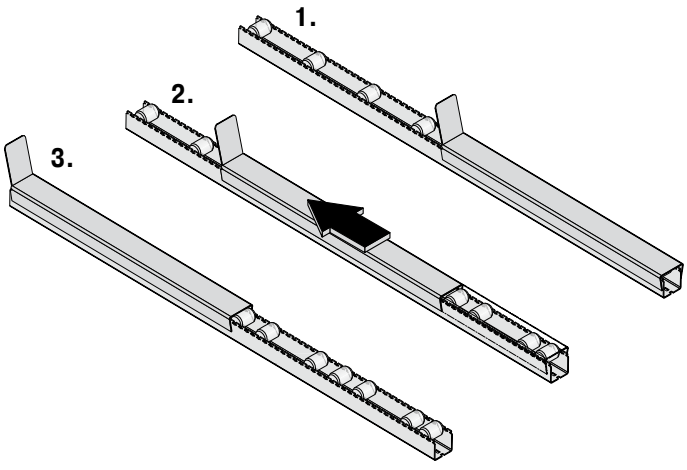
Due to the use of ball-bearing rollers, the installation operates with a very small lane incline. This means that service trucks do not need as much push-in drive as would be required for conventional systems.

- **space-saving storage according to the LIFO principle**
- **particularly efficient for 2 pallet deep storage and short side on handling**
- **reduced lane incline makes this solution ideal for low building heights**
- **optimum utilisation of the available warehouse height**
- **constant availability of pallets at the picking side**
- **optimum adaptation to all types of pallet skids or feet**
- **system also accepts pallets with poor travel characteristics**

The first pallet is placed onto the push-back rails.



It is pushed back into the lane by the second pallet which is placed onto the rollers of the roller tracks.



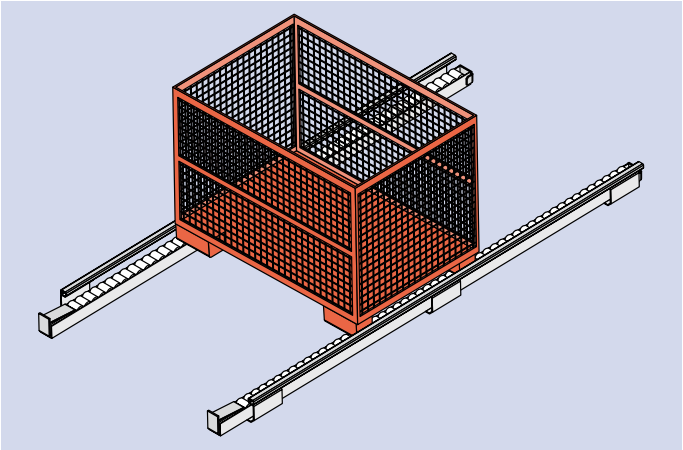
Short side on handling of wire-mesh box pallets

Due to the narrow feet of the wire-mesh box pallet, each pallet foot travels on two roller tracks mounted next to each other. Moreover, the rollers of each track are set off against each other.
Guide rails can be mounted to the track section sides with the help of adapters.

- continuous flow movement despite narrow pallet feet

- order picking lanes feature a very slight incline (no acceleration)

- ideal for 2 to 3 pallet deep storage



Mechanical separator

This mechanically operating component keeps back the second pallet behind the picking pallet thus avoiding line pressure.
Only after all storage units have been picked off the first pallet will the order picker lift the lever of the mechanical separator. The opposite end of the separator goes down and allows the second pallet to move to the picking face.

- system suited for 2 pallet deep storage

Empty pallet return system, BITO-type »ASP«

This system is designed for shallow depth racking with two pallets per lane handled long side facing. After all items have been manually picked off the pallet, the first pallet position can be dropped which allows the empty pallet to move to the lane underneath and return to its “point of departure“ at the loading side. A load separator holds back the second pallet until the first pallet position is returned to its original position. By a lever movement, the load separator is lowered to let the second pallet move into the order picking position.

- convenient picking of individual items off the pallet

- no manual handling of empty pallets

- fast return of the empty pallet to the loading side