

CONVEYOR SYSTEMS FOR PALLETS

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Logistics operations require a continuous flow of materials, as pallets and/or boxes must be taken from a storage or production position or from an overflow warehouse to shipment or production areas.

This transport can be done manually if the loads are lightweight, or by employing support equipment for heavy loads (forklifts, pallet trucks, stackers, etc.) that require human operation. When these movements are repetitive and consume resources that make their handling expensive, the support of automated elements is necessary, such as conveyors for example.

Conveyors are static transport devices that have a series of rollers, chains and belts. Electric-powered motors move the pallets or boxes in a regulated and continuous manner.

In the logistics sector, storage solutions that reduce material handling and minimise labour costs are becoming increasingly more important. Such systems reduce

accidents, mistakes and final handling costs.

These transport systems are applicable to all sizes of warehouses, not only the large automated warehouses in which they provide the ideal connection between the stacker cranes and the entry, dispatch and handling of the load units. The advantage rests in the fact that by using a conveyor system, a constant flow of products can be achieved and many different combinations can be executed, something which is practically impossible with manual systems as other factors come into play, such as human intervention.

Recently, the standardisation of this product has led to a drop in its price, which makes its installation more affordable in any warehouse or factory where different work stations need to be connected.

This catalogue describes all items that are part of the transport chain, from the most visible parts, such

as the mechanics and electricity, to those which cannot be seen but are equally important such as the control of all the different components.

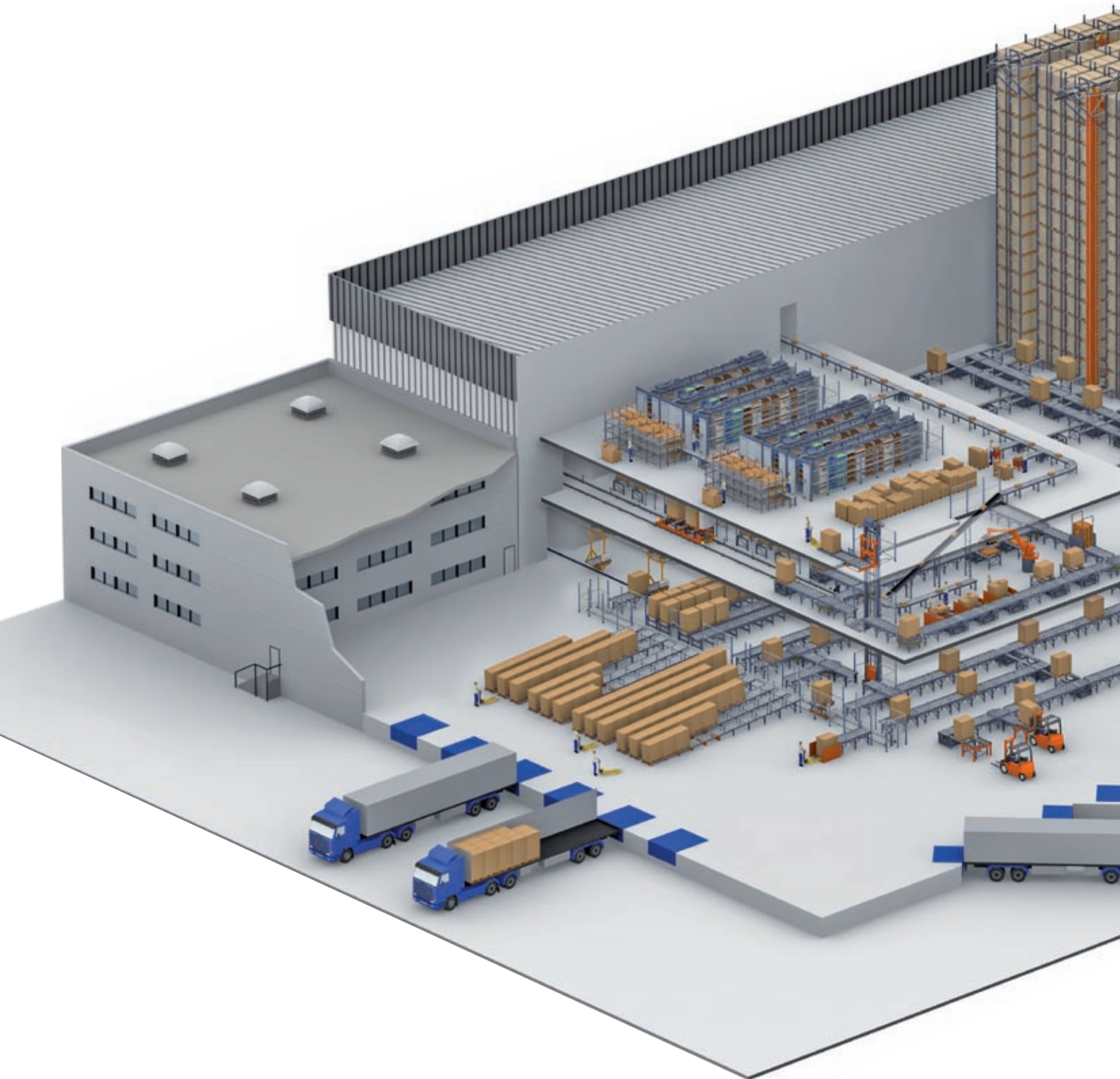
All the solutions set forth in this catalogue are part of real solutions that have been applied and are used as the basis for our examples. However, each warehouse will have a specific custom solution, which must be carefully studied for each case.

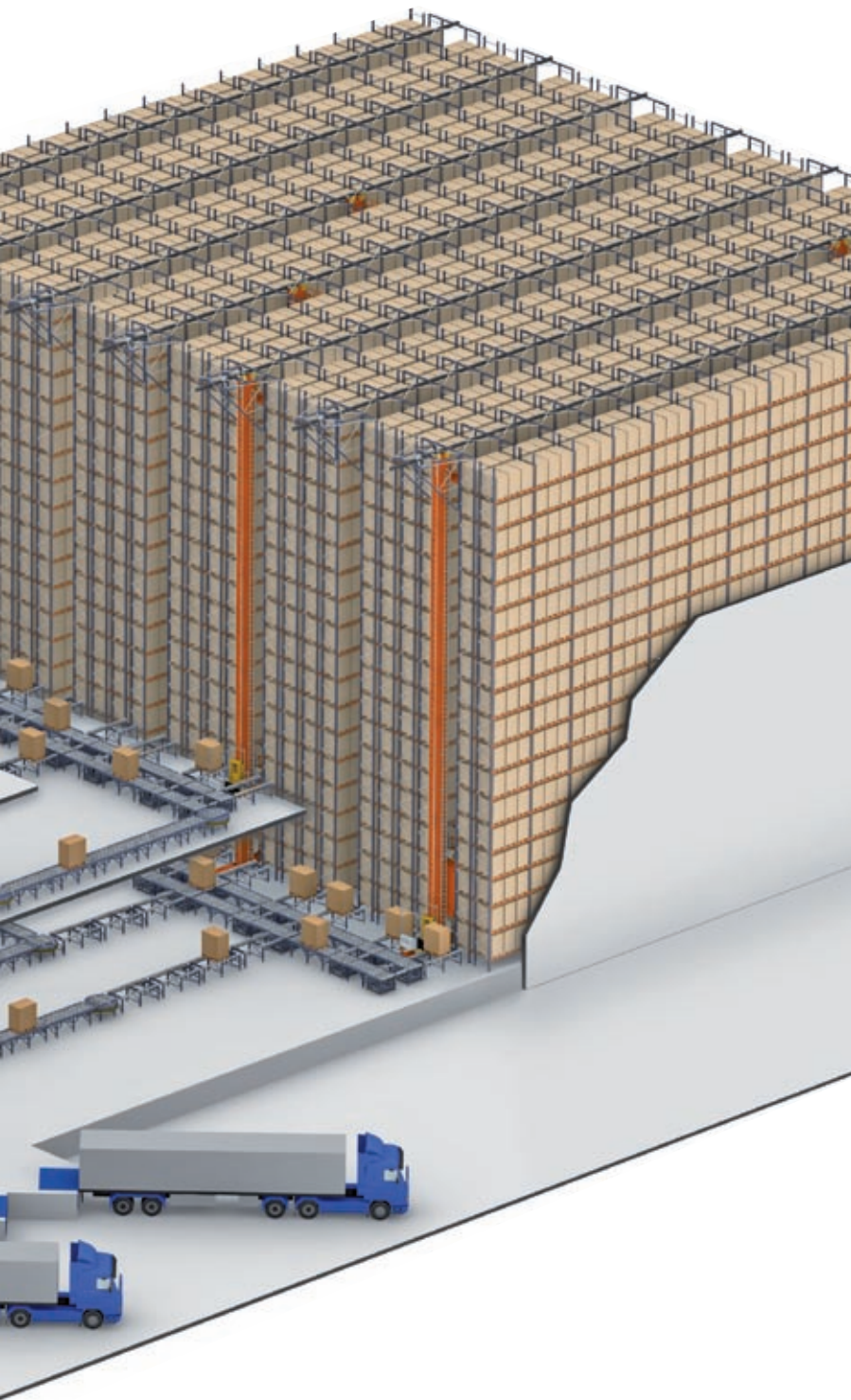
Thanks to more than 50 years working in partial and complete warehousing solutions, Mecalux's Technical Department has extensive logistics experience, and our specialist are happy to share this knowledge with customers in order to optimise their installations.

The catalogue is divided into three parts:

- Conveyors for pallets
- Conveyors for boxes
- Operations logic

CONVEYORS FOR PALLETS





SUMMARY

AUTOMATED PALLET CONVEYORS

Automated Transport System

Entry and Exit Area with Forklifts

- > Roller conveyor
- > Chain conveyor
- > Mixed transfer
- > Turntable conveyor
- > Roller conveyor for front loading
- > Chain conveyor for side loading
- > Loading with pallet trucks

Accumulation Systems

- > Automated accumulation
- > Dynamics due to gravity
- > Shuttle cart

Picking Areas

- > Manual picking area
- > Automatic picking area
- > Pallet stacker / dispenser
- > Lift table

Lifting Systems

- > Shuttle cart
- > Single lift
- > Double lift
- > 0 height roller conveyor

Transport via Electrified Monorail

Complements

- > Conveyor protection
- > Entry inspection posts
- > Pallet lifters
- > Hydraulic table
- > Pedestrian stairs and corridors
- > Safety enclosures
- > Horizontal safety net



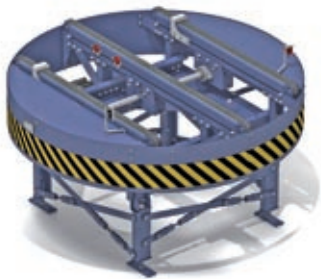
FROM THE SIMPLEST TO THE MOST COMPLEX SOLUTIONS

Transporting pallets with roller and chain conveyors allows for an infinite number of routes, from a simple straight section only a few metres long to much more complex routes, which link different areas and plants and that have different functions.

All transport circuits have at least one starting point and one destination point.

The simplest transport solution that can be implemented is illustrated by this image. It depicts a straight section of a roller conveyor, which has an entry conveyor -or source point- at one end, where the forklift places the pallet. The middle part is comprised

of conveyor sections over which the pallet moves until it reaches the exit conveyor or destination point. This same solution can be replicated with chain conveyors, depending on how the pallet is handled. With a roller conveyor, the pallets move in the same direction as the pallet runners, whereas with the chain conveyor the pallets move in a different position, perpendicular to the runners.



Using these two types of conveyors, other routes can be designed, which are described below.

"L" circuit with conveyors and rollers on both sides

A table is placed at the intersection which turns and positions the pallet in the same direction of circulation.

With this solution, the connecting angle does not have to be 90°.

The same circuit can be also be done using chain conveyors.



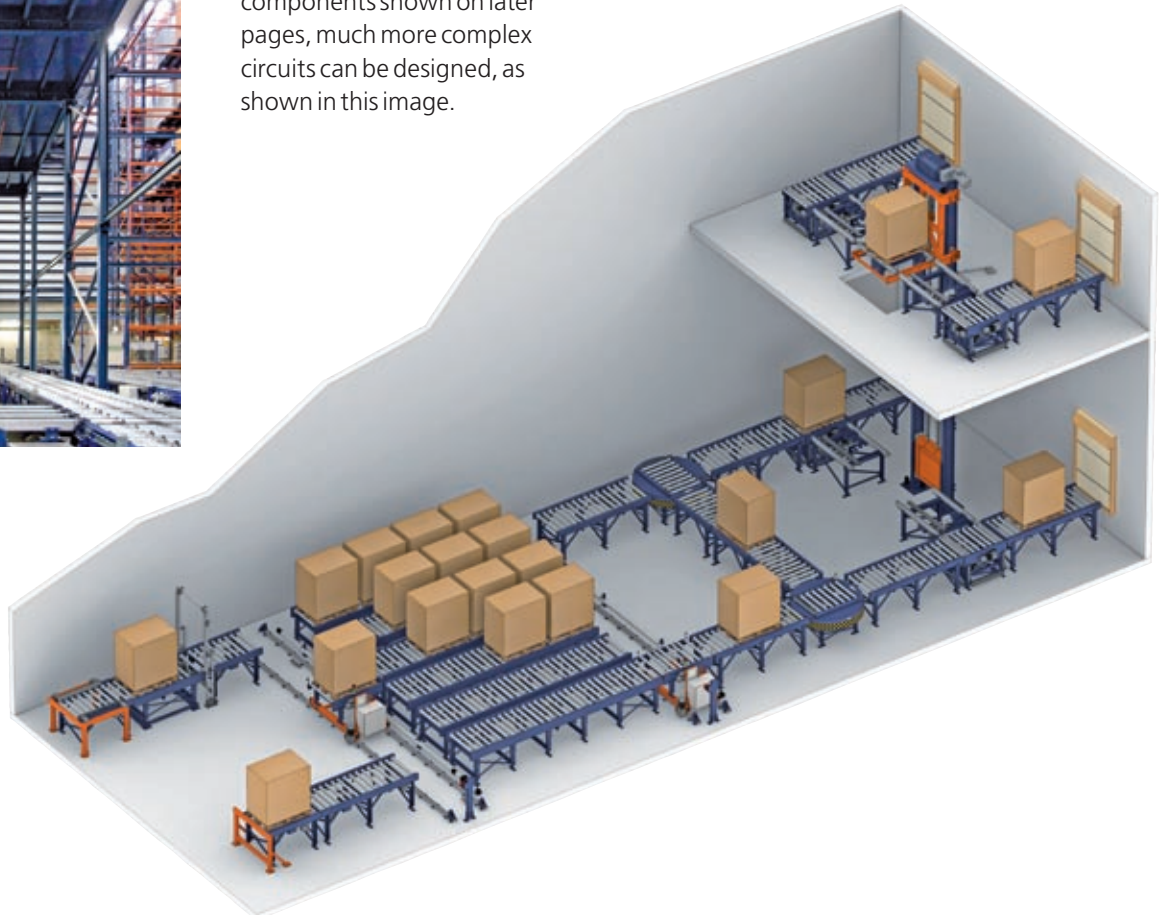
'L' route, with one side of rollers and the other with chains

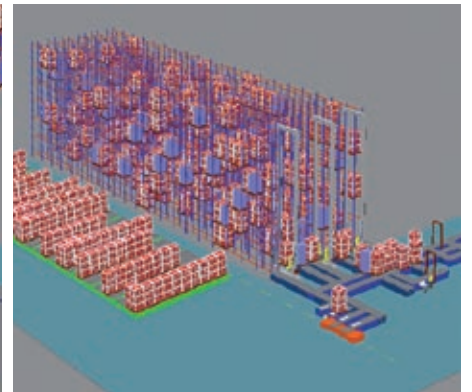
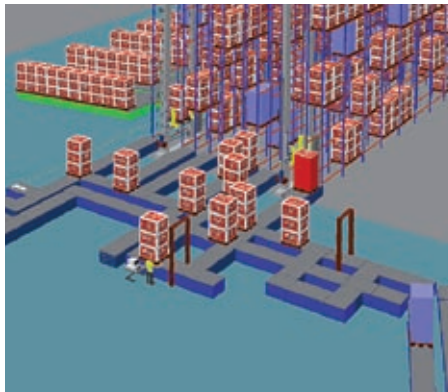
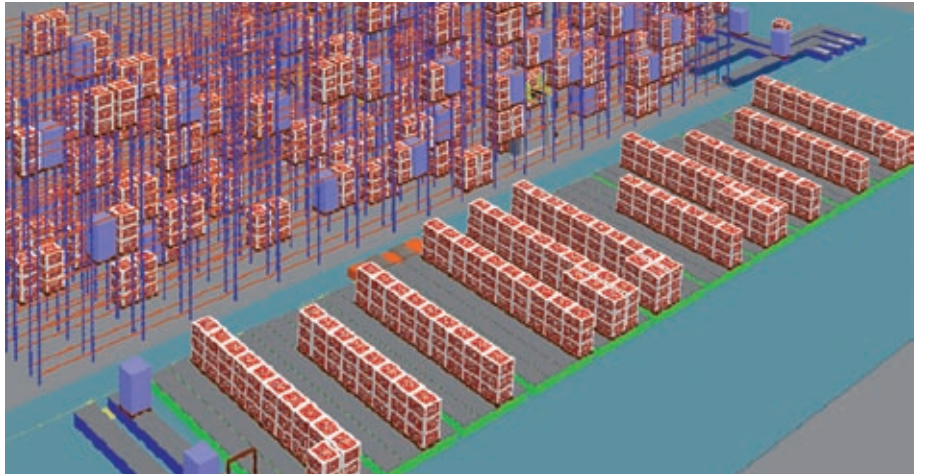
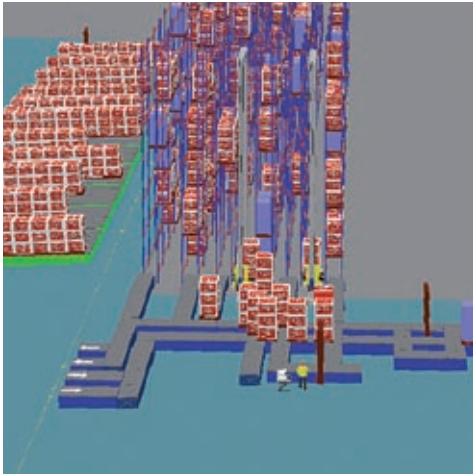
A mixed conveyor forming a cross is placed at the intersection.

In this case, the connection angle must be 90°.



By joining different Mecalux components shown on later pages, much more complex circuits can be designed, as shown in this image.





Optimal distribution of circuits is essential, taking into account all entry and exit points, connections to work stations and, principally, the flows, to avoid any bottlenecks. When the solutions are complex, a thorough analysis is recommended that simulates the entire circuit and its flows.

Powerful simulation tools are employed to design ideal transport systems, optimising routes and processes to guarantee the most efficient and profitable solution. This also means that clients can see how their installations will operate before they are implemented.





Standardised Products

Mecalux has a wide range of components connected to the transport of load units. Maximum standardisation has been sought in measurements and components, with the aim of facilitating production, assembly and future startup. This means that delivery periods are short, costs are affordable and future modifications or expansion of circuits are easy.

Standard conveyors have been designed for the most common pallets, Europallets. There are also other specific conveyors for other pallet types.

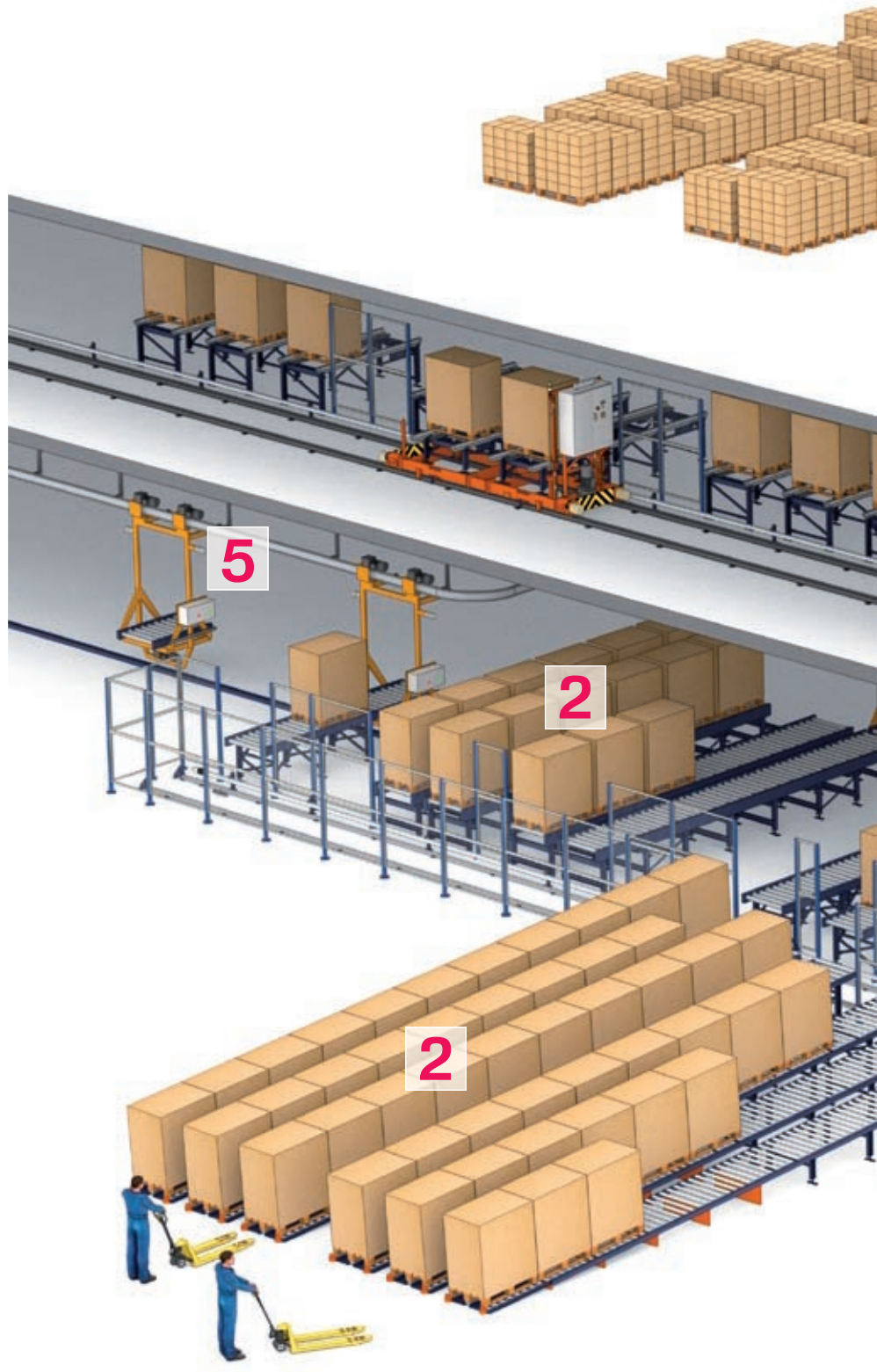
The different combinations that employ standardised modules are explained below, as well as their main features.

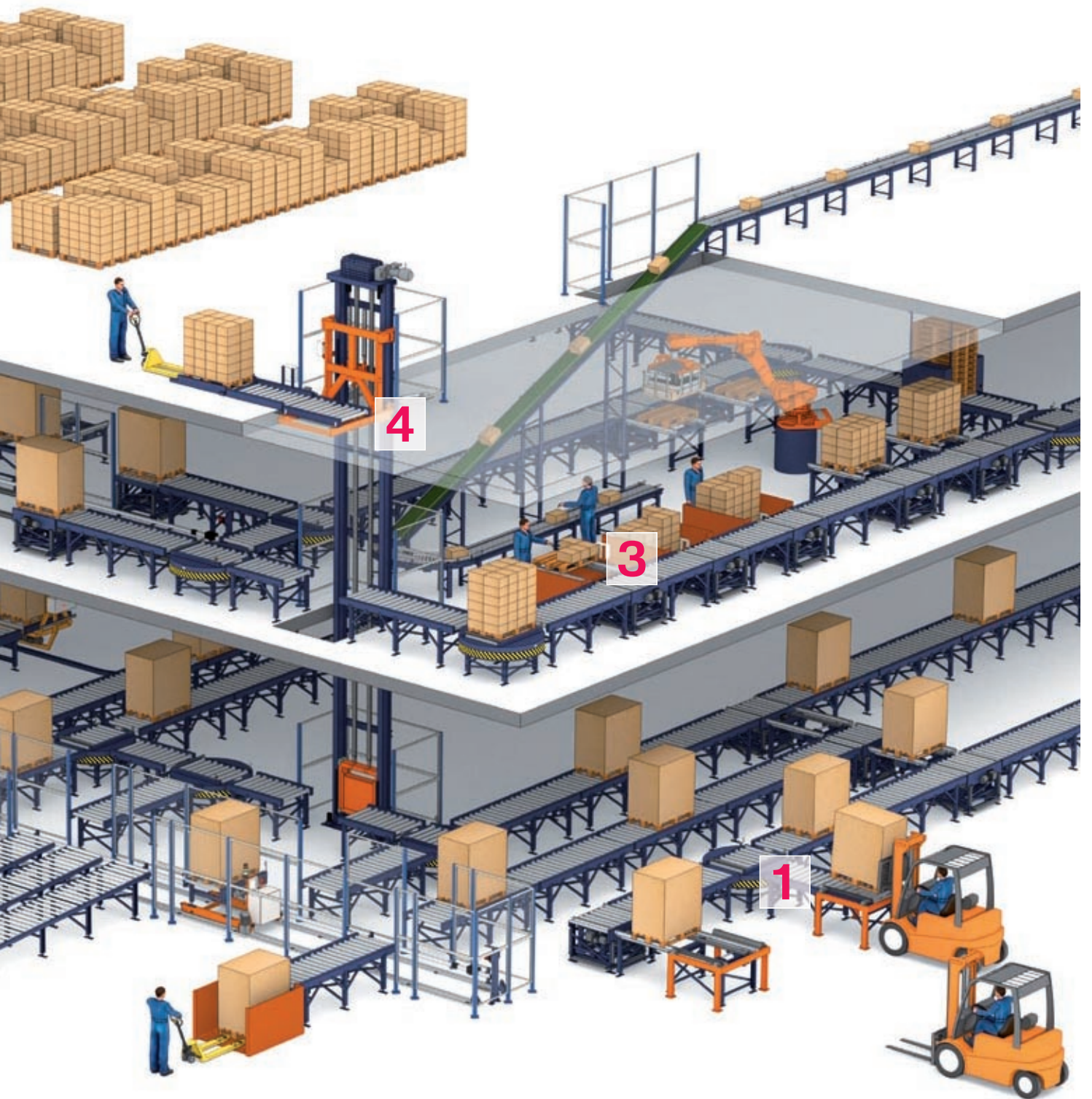
AUTOMATED TRANSPORT SYSTEM

This illustration shows a combination of elements which involve different solutions for transport and lifting of goods. These components will be handled separately in the coming pages. Components in the diagram:

1. Entry and exit area with forklifts
2. Accumulation and sorting system
3. Picking areas
4. Lifting systems
5. Transport via electrified monorail

All the components within the transport circuit will be explained in this catalogue.





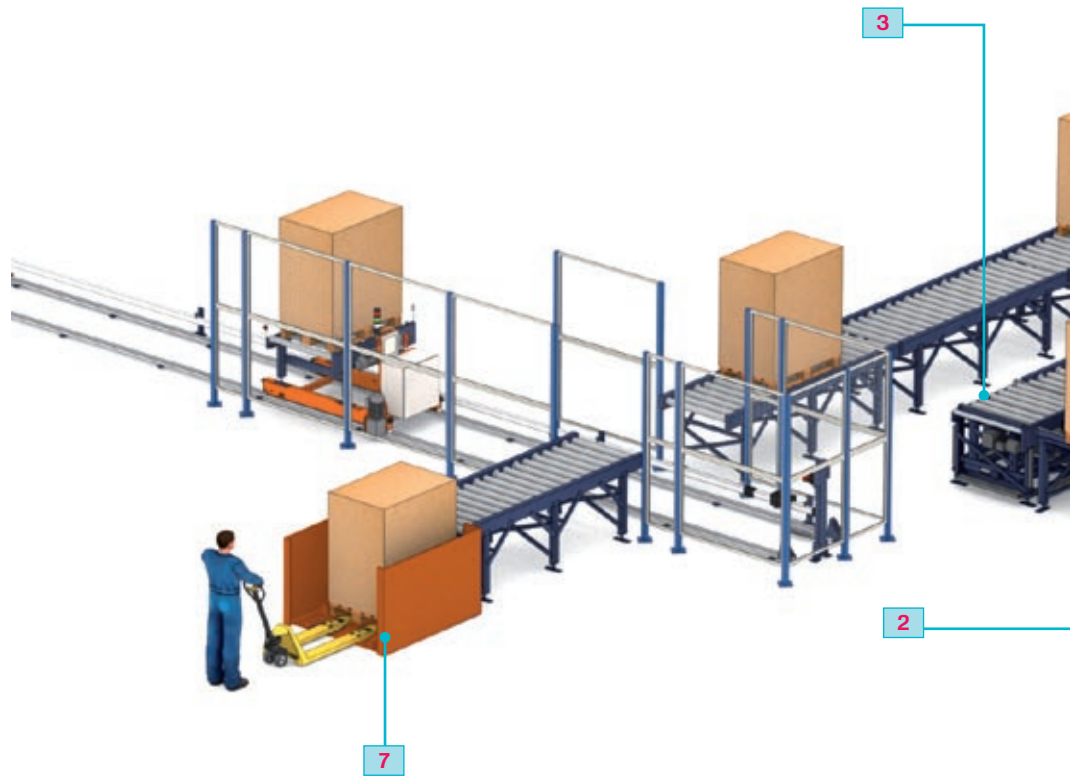
1

ENTRY AND EXIT AREA WITH FORKLIFTS

This is comprised of a series of connected elements, seeking the optimal solution for transporting pallets from reception, or from any point of the warehouse, to another point automatically and safely. The needs will determine which type of conveyors should be used for each section.

Basic Components

1. Roller conveyor
2. Chain conveyor
3. Mixed transfer
4. Turntable conveyor
5. Roller conveyor for front loading
6. Chain conveyor for side loading
7. Roller conveyor with lift for side loading



Roller Conveyor

Used to transfer pallets in the same direction as their runners. These are the most common components for internal pallet transport systems, due to their simplicity and variety of sizes, where they can easily cover long distances.



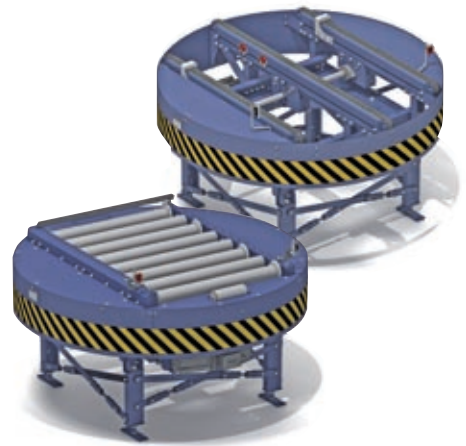
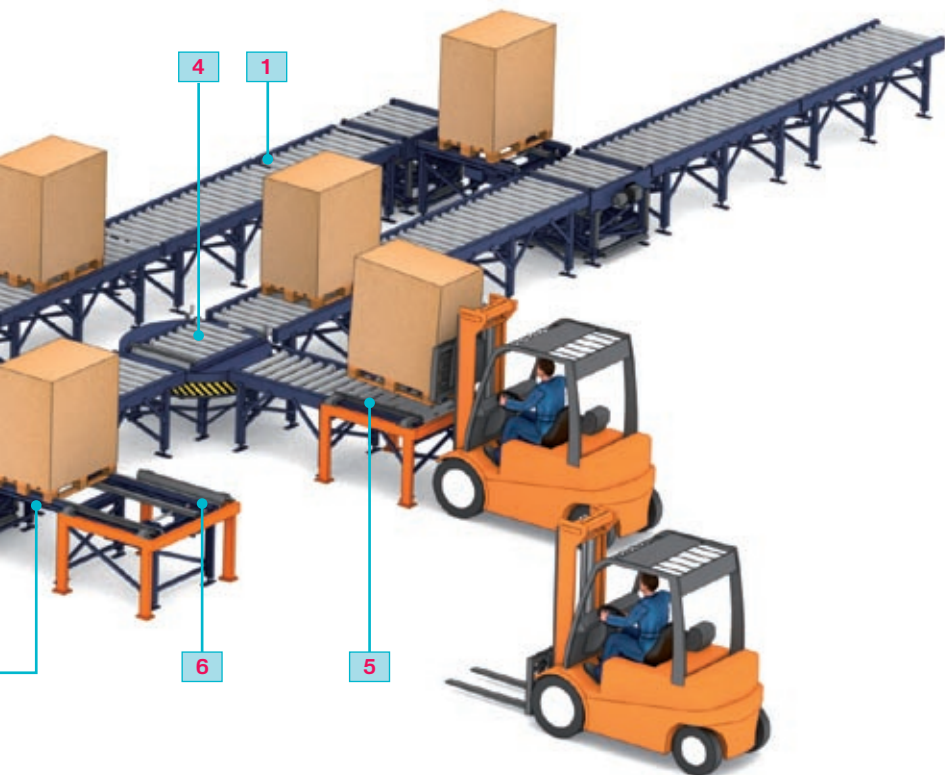
Chain Conveyor

Used to transfer pallets transversally to their runners. This is the perfect complement to roller conveyors, as the combination of both devices makes it possible to turn pallets by 90° or 270°.



Mixed Transfer

This conveyor has both rollers and chains, enabling changes of direction of 90° and 270°. The rollers are fixed to a bench and the chains are placed on an eccentric lifting frame, where the pallet moves from rollers to chains, or vice-versa, without having to turn the pallet.



Turntable Conveyor

A roller or chain conveyor with turning capacity, which transfers the load units between unaligned conveyors. It can position the pallet at any angle with respect to the entry direction.



Chain Conveyor for Side Loading

Depending on how the pallet is picked up and the direction it needs to move, the pallet may have to be placed onto the chains transversally (bottom runners perpendicular). It can also be placed onto one of the longitudinal sides of the conveyor and not frontally. In this case, protective equipment must be used to reduce the chance of hitting the conveyors.



Roller Conveyor for Front Loading

Input posts must be protected so that the forklift does not hit the conveyors. The positioning height is the same as the transport height, as the support medium lets the load be placed at the same height as the conveyor. There are two types: with rollers and with chains.



Loading with Pallet Trucks

This support medium requires the load to be at zero altitude, so an LX conveyor must be installed (see section entitled Lift Systems) to raise the pallet to the transport height.

2

ACCUMULATION AND SORTING SYSTEM

These systems allow accumulation of pallets with the aim of having a buffer for shipments or flow regulation.

There are two types, depending on whether they are automatic or gravity-controlled.

1. Automated accumulation
2. Live storage (or gravity storage)

It is common to install a shuttle cart, as a complement to the sorting systems.



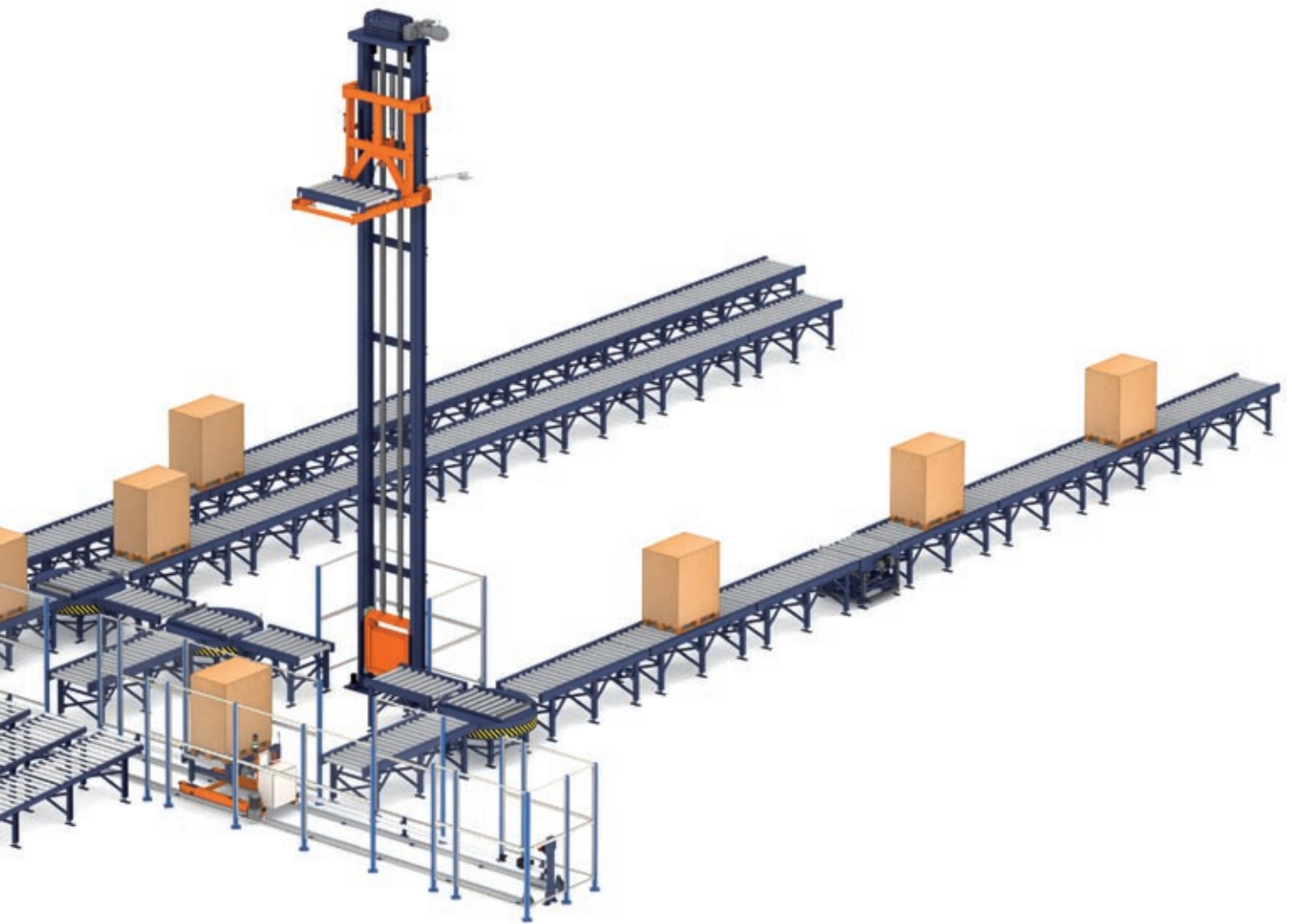
Automated Accumulation

Thanks to roller and chain sequential accumulation conveyors, a buffer can be created to regulate the entry and exit of pallets, either to put them into the warehouse or to prepare them for dispatch or any other route planned in the logistics system. Rollers can operate in a single turning direction or two-way (reversible).

Live Storage

Traditional system of gravity accumulation that does not require motors for the pallets to move along its surface. The proper combination of a suitable inclination, rollers and speed regulators creates an accumulation buffer.

These are suitable when pallets are collected on manual handling systems (forklifts, pallet trucks, etc.). In general, they are used in dispatch areas for pre-loading (each channel or every two or more make up a destination, a route or part of an order).



Shuttle Cart

When a limited number of units has to be moved from one point of the warehouse to another in a straight line, there is an option to use a transfer cart or shuttle cart.

This component is best suited to non-continuous transport systems, as it requires waiting points with accumulation in order to use it

(whether it is fitted with roller or chain conveyors). Furthermore, one or two pallets can be transported at a time.

Shuttle carts are common in sorting goods in accumulation conveyors.

3

PICKING AREAS

This may well be the most critical area in a warehouse. Its proper design will make the implementation of conveyors a success and reduce the cost of material handling.

There are several components that facilitate work as well as reduce costs, allowing operators to make use of a greater number of lines.

Picking can be done manually or automatically.

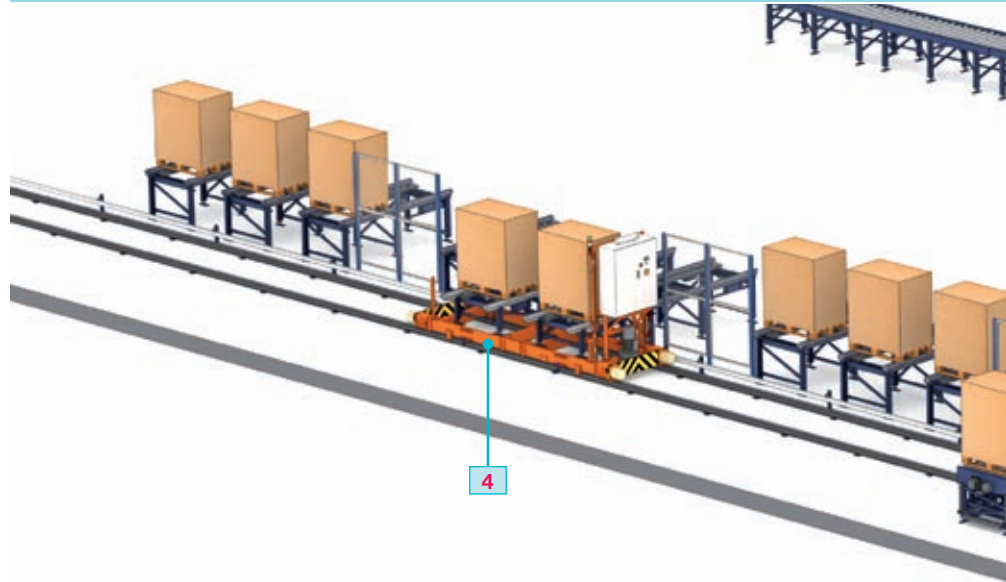
Basic Components of a Manual Picking Area

1. Conveyors
2. Pallet stacker / dispenser
3. Manual picking area
4. Shuttle cart (optional)
5. Lift table



Manual Picking Area

Manual picking is particularly appropriate for products with medium to low rotation, or when automatic preparation is not the best solution. Pallets are placed onto the transport circuit and the operator picks up the material to then place it into another container or pallet, which in turn will be sent to the consolidation or dispatch area.



Basic Components of an Automated Picking Area

1. Conveyors
2. Pallet stacker / dispenser
4. Shuttle cart (optional)
6. Picking robot



Automatic Picking Area

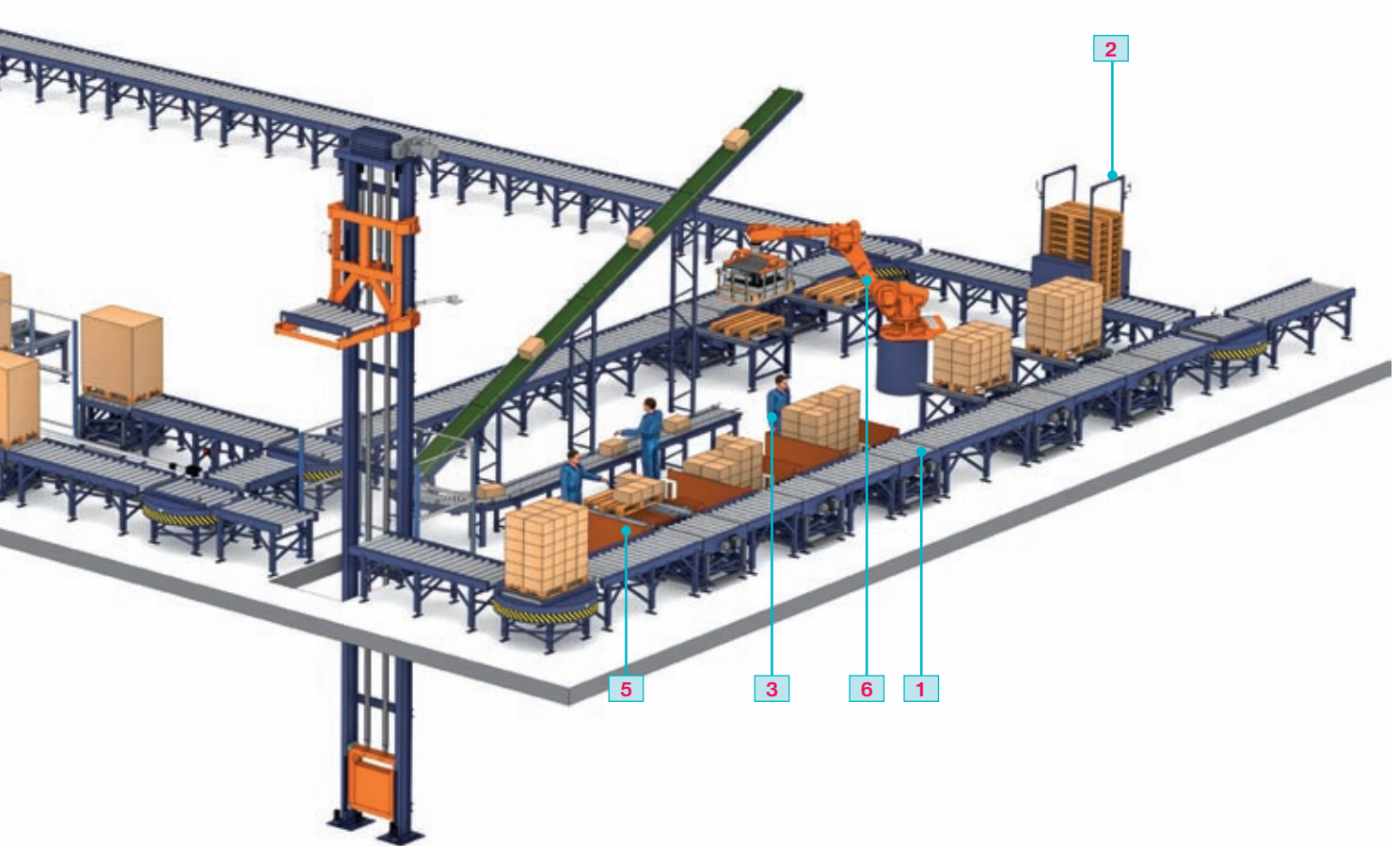
Manual operations are replaced with robots that can perform picking by layers or by individual boxes without human intervention, decreasing handling costs and order preparation mistakes.

This system is used for single product stock, which the robot picks layer by layer and places in an organised manner onto the picking pallet to be dispatched.

There are three types of robots, depending on the number of orders to prepare:

- anthropomorphic
- two axis platform robot
- three axis platform robot

The transport circuit is different for each type of robot.



Pallet Stacker/Dispenser

When automated conveyor systems require empty pallets to be brought in or piled, pallet stackers will often be used which pile the pallets up into a stack by using a lifting system.

In the same way, the task of unstacking empty pallets is done by depositing and releasing the pallets onto conveyors one at a time.

Lift Table

The installation of this component is highly recommended in manual picking areas, so that the handling height can be adjusted to each operator and be fully ergonomic. This makes it easier for operators to perform handling tasks.

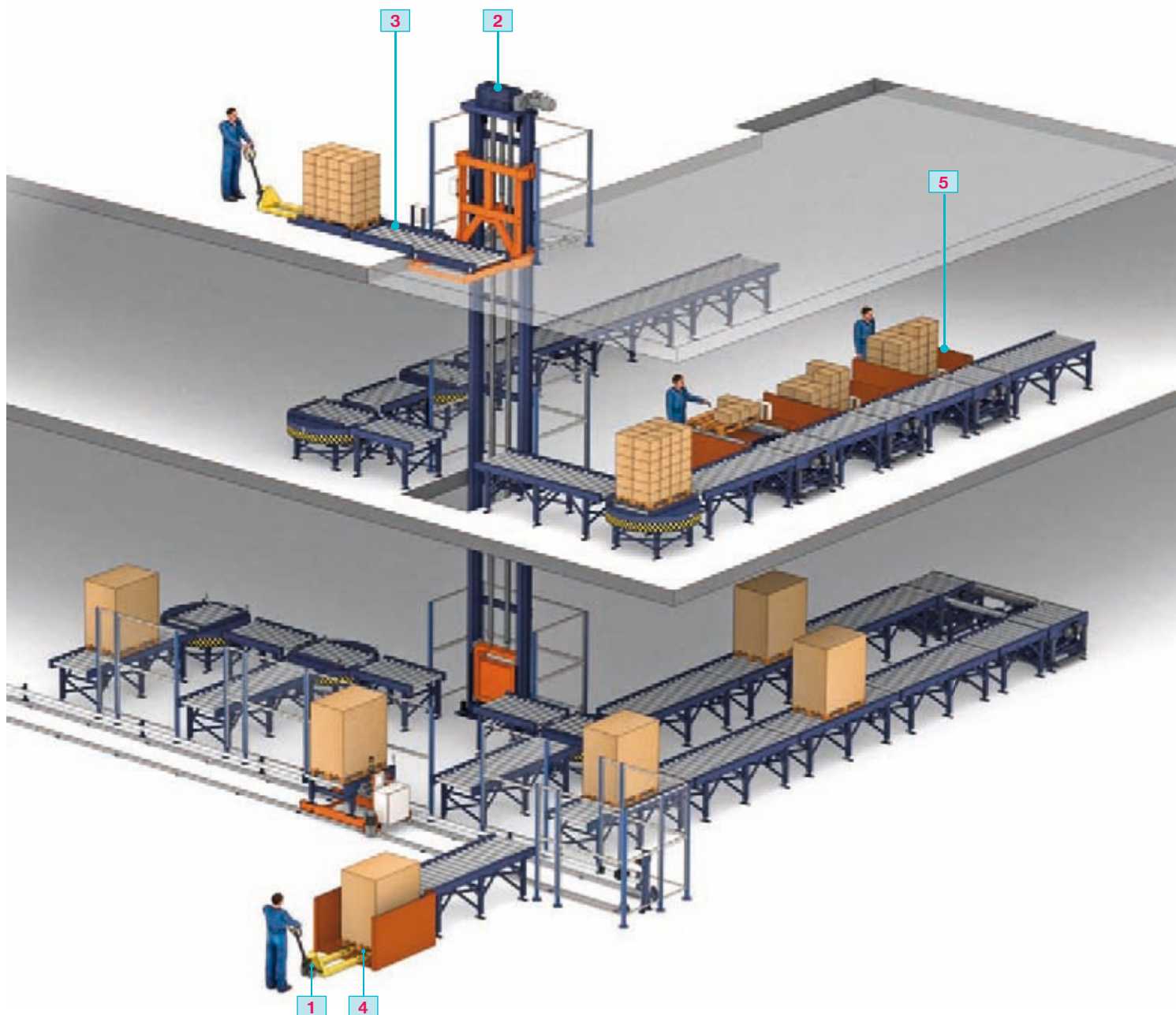
Using hydraulic pistons, these tables lift the pallets to the exact position required.

4

LIFTING SYSTEMS

Pallet transport is not always done at the same height. A single area may require working at a certain height and at zero altitude. To be able to change the pallet transport height, components that are specially designed for this purpose are required, which lift them to the necessary height and even to different floors.

1. Ground level pallet truck
2. Single lift
3. 0 height roller conveyors
4. Roller conveyor with openings for entries and lifting
5. Roller conveyor on hydraulic scissor lift table





Shuttle Cart

Manual shuttle jacks are basic equipment and due to their simplicity and efficiency are widely used for the horizontal transfer of unit loads on pallets.

By manually activating the hydraulic pump, the forks, which support the load, are raised slightly from the ground, making the shuttle coast with very little effort. Electric models with motors make it even easier to transport loads.

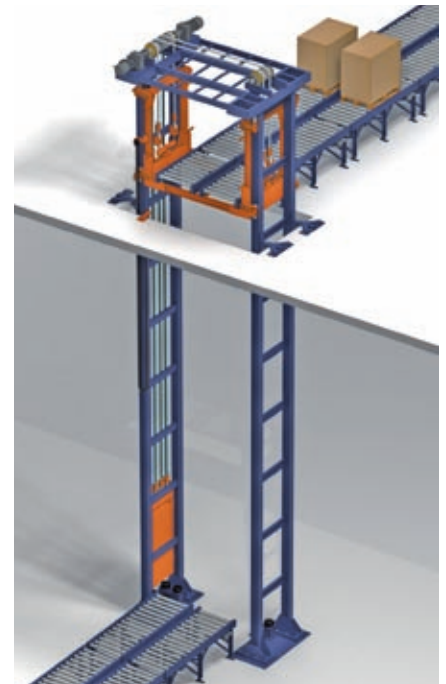
The shuttle jack places the load onto the conveyors at a very low height, therefore equipment is required to lift the pallet to the transport level height (lift table or conveyor).



Single Lift (SL)

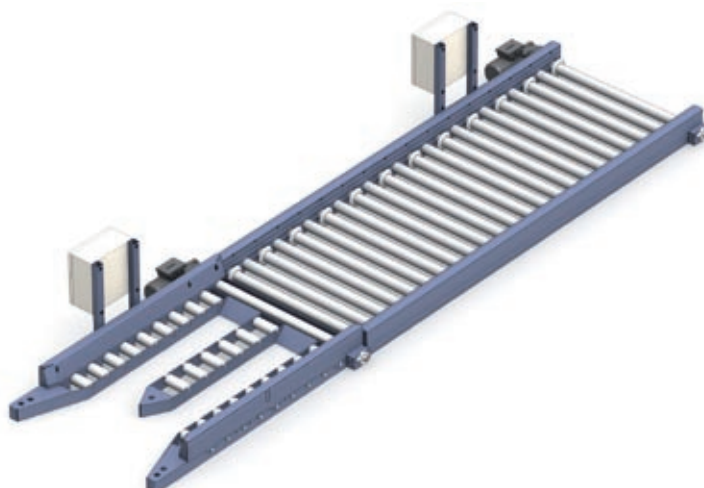
A vertical transport system for load units, based on a lifting device that employs counterweights and a traction system.

Used in installations where loads are transported at different heights. This allows vertical recirculation.



Double Lift

The double pallet lift has the same basic operation as the single lift. The only difference is the fact that the conveyor section lets two loads instead of one be deposited, doubling the number of pallets moved.



Zero Height Roller Conveyor

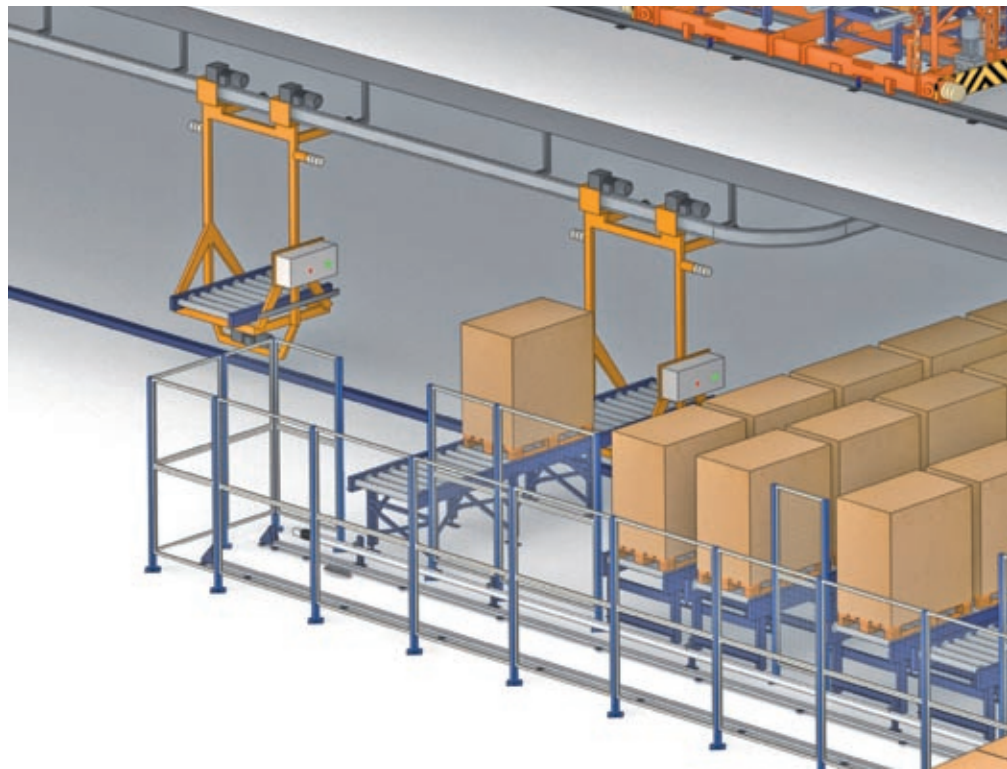
Makes it possible to load pallets at 0 height with shuttle jacks. Situated at the entry or exit points of transport systems, loads are transferred at a height of 80 mm. This conveyor eliminates the need for forklifts.

5 TRANSPORT WITH ELECTRIFIED MONORAIL

An alternative transport system to roller or chain conveyors is an electrified monorail. This system consists of installing an 'I' shaped profile attached to a higher structure or to the ceiling, on which independently moving hanging carts transport pallets.

Electrified monorails are always assembled in combination with roller or chain conveyors placed at the stations or stopping points where the carts pick up or drop off the pallets.

Each cart can transport one or two pallets. One or two roller or chain conveyors are placed on each cart to transfer the pallet from the stations to the carts.



The main advantage of the electrified monorail system with hanging carts is the displacement speed, which can be up to 100 m/min. For this reason, it is common to install them for long and medium distances, or when minimum pallet transfer time is needed between loading and unloading points.

The entire system is powered by and communicates via copper lines that are part of the rails.





Curves and different types of crossovers are just some of the items that facilitate the adaptation of the electrified monorail circuit to the exact needs of the working zones. They divert or take the carts to the points where they are needed or to parallel routes, creating short cuts, waiting areas, diagnosis stations and maintenance areas.

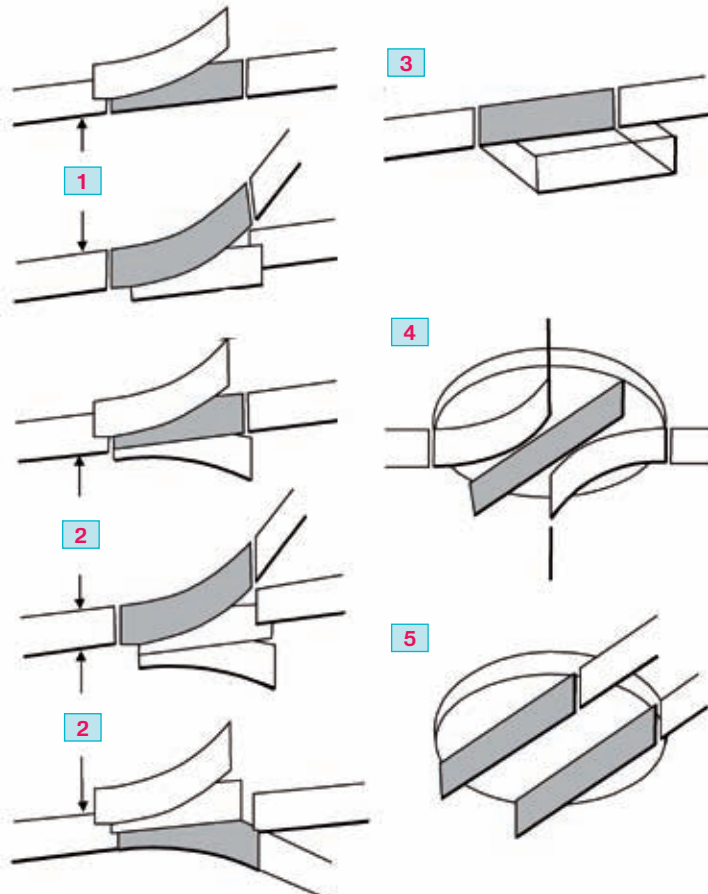
The number of carts may vary depending on the size of the circuit and the flows required. Carts may be added to the circuit when flows increase or also parked so that only the number needed at any given time are circulating.

Once the carts are on the circuit, they receive orders from the system, which are accepted by the cart closest to the point where it is needed, based on predetermined parameters. Each cart has individual control equipment, which obeys orders from the centralised system, making it follow the most suitable route to its destination.

Another remarkable advantage of transport by electrified monorail is the fact that people on foot or operating handling equipment can cross the circuit, after installing the suitable safety devices.

Electrified Monorail Switches:

1. Entry and exit turn-off
2. Three-rail switch
3. Parallel switch
4. Turntable
5. Turntable with two rails



ROLLER CONVEYOR

When pallets circulate with the bottom runners in the direction of movement, roller conveyors must be used. This is the most common component in internal pallet transport systems and can cover long distances.

Their robust design provides great reliability in all work settings. The environmental conditions set forth in the technical specifications are those accepted by the standard model, although these can be expanded with the installation of suitable protective items.

Transport speed can vary between 10 m/min, if there is no frequency converter (which makes it possible to move 208 pallets/hour in a straight line) and 20 m/min for those that have a converter and move a maximum of 381 pallets/hour.

Flow requirements and, at times, the type of load to be moved, can make the installation of frequency converters advisable. For example, this component is essential with unstable loads, as it must be employed to control stopping and acceleration.



Technical Data / Roller Conveyor	
Pallet width	800/1,000/1,200 mm
Max. load unit weight	1,500 kg
Minimum length	1,340 mm
Maximum length	5,348 mm
Transport height	600/900/1,000 mm
Roller diameter	80 mm
Speed	10-20 m/min.
Brake	Optional
Mechanical stop at endpoint	Optional
Pallet guide	Guide collars and/or wheels
Environmental conditions	Max humidity: 70% Ambient temperature: 0°C and 40°C Freezing temperature (optional): -30°C and 0°C



ROLLER CONVEYOR WITH ACCUMULATION

To decrease the price for all conveyors, a linked roller system can be added which, with the help of a single motor, allows several pallets to be accumulated, reducing material and maintenance costs.

These types of conveyors can handle up to four Europallets and their speed is limited to 10 m/min.

Another of its advantages is that there can be a greater number of pallets accumulated on the circuit.



Technical Data / Roller Conveyor with Accumulation

Pallet width	800/1,000 mm
Max. load unit weight	4 x 1,500 kg
Available length	5.350 mm
Transport height	600/900/1,100 mm
Roller diameter	80 mm
Speed	10 m/min.
Two-way movement	Optional
Pallet guide	800 mm outside collar for pallets 1,000 mm inside collar for pallets
Environmental conditions	Max humidity: 70% Ambient temperature: 0°C and 40°C Freezing temperature (optional): -30°C and 0°C



HALF-PALLET ROLLER CONVEYOR



When a load unit is the size of a half pallet (600 x 800 mm), chain conveyors must be fitted with two additional central chain lengths so that they can transport two half pallets in parallel.

If these half pallets move over rollers, they will have a smaller diameter and will be placed closer together.



TR05 (Half Pallet Rollers)

Half pallets move over rollers with a 60 mm diameter where the rollers are placed closer together, in comparison with the space between rollers on conventional conveyors.

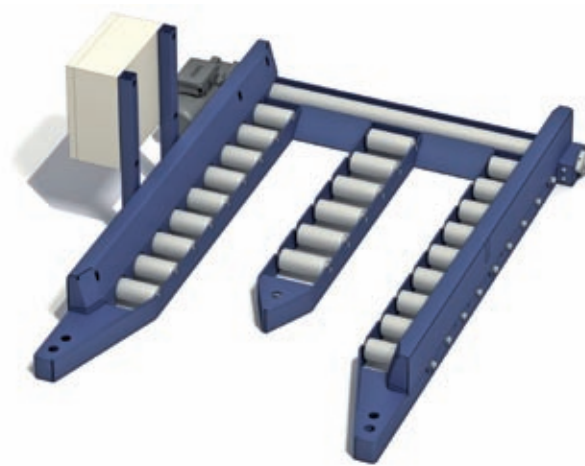


ROLLER CONVEYOR WITH OPENINGS FOR ENTRIES



Allows pallets to be placed on the conveyor circuit using pallet trucks.

It does not have a lift system, therefore this point of the conveyor must be equipped with a lift table or a lift.



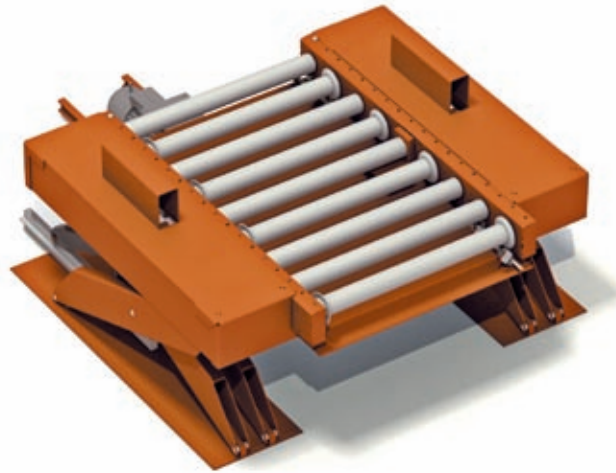
Technical Data / Roller Conveyor with Openings for Entries

Pallet width	800/1,000/1,200 mm
Max. load unit weight	1,500 kg
Available length	1,514 mm
Transport height	80 mm
Roller diameter	60 mm
Speed	10 m/min.
Pallet guide	via guide vanes
Environmental conditions	Max humidity: 70% Ambient temperature: 0°C and 40°C Freezing temperature (optional): -30°C and 0°C



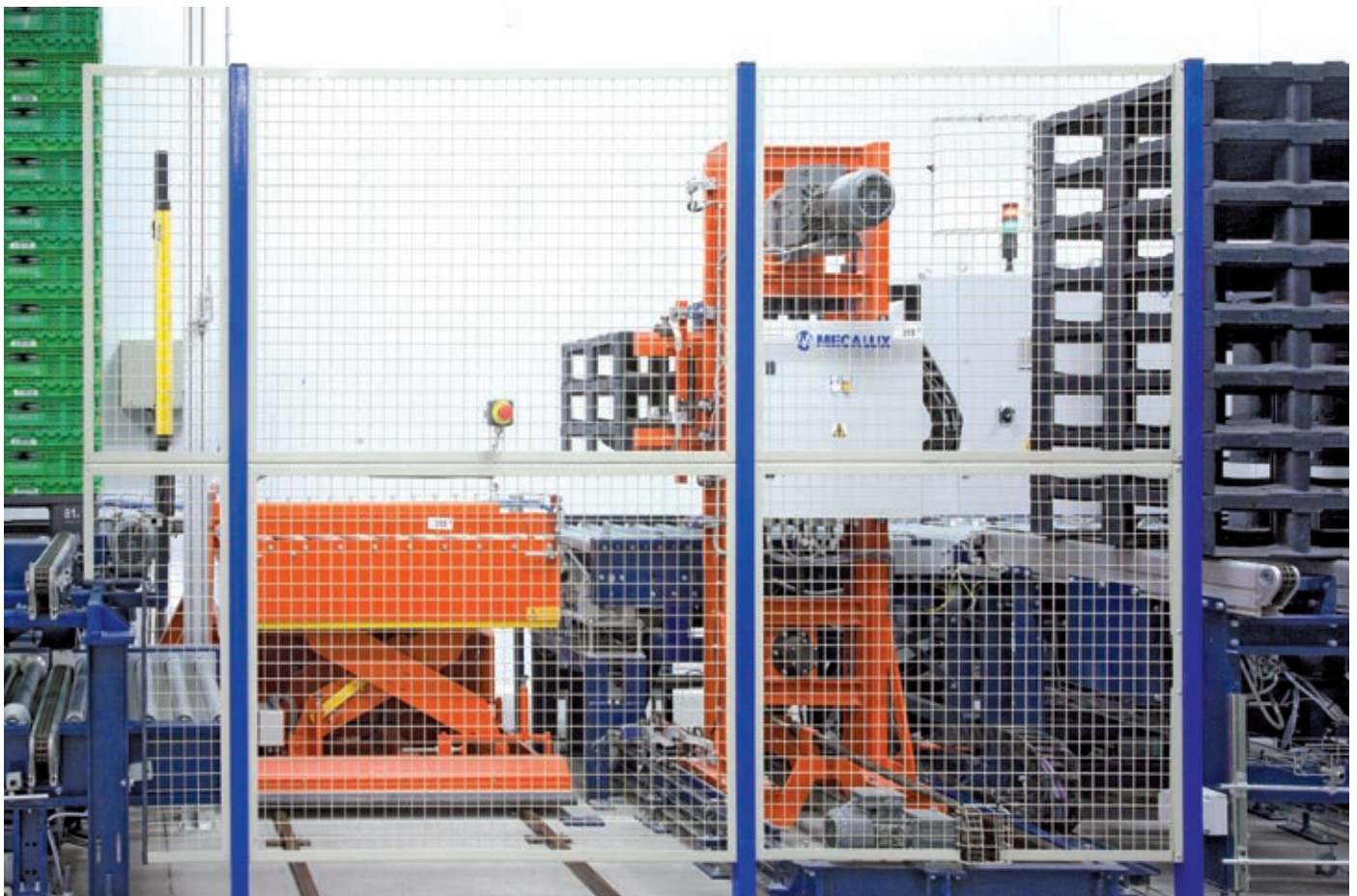
ROLLER CONVEYOR ON HYDRAULIC SCISSORLIFT TABLE

This conveyor is used to work with pallet jacks. Pallets can be placed on the lift at ground level and the conveyor lifts them to the transport height.



Technical Data / Roller Conveyor on Lift Table

Pallet width	800 / 1,000 mm
Max. load unit weight	1,500 kg
Available length	1,675 mm
Top transport height	600/900/1,100 mm
Min. transport height	80 mm
Roller diameter	60 mm
Speed	10-20 m/min.
Pallet guide	via guide vanes
Environmental conditions	Max humidity: 70% Ambient temperature: 0°C and 40°C Freezing temperature (optional): -30°C and 0°C



TWO SECTION CHAIN CONVEYOR

These conveyors move pallets in a transverse direction to the runners.

They are often installed in conjunction with roller conveyors.



Technical Data / Two Section Chain Conveyor

Pallet width	800/1,000 mm
Max. load unit weight	1,500 kg
Available length	998-2,918 mm
Transport height	650/950/1,150 mm
Speed	10-20 m/min.
Mechanical stop at endpoint	Optional
Guide vanes	Optional
Environmental conditions	Max humidity: 70% Ambient temperature: 0° C and 40 °C Freezing temperature (optional): -30° C and 0 °C



CHAIN CONVEYOR WITH MORE THAN TWO SECTIONS

When the quality of the pallet is poor, a third section must be installed on the conveyor to prevent any further deformation or warping of the pallets. This option can also be employed to transfer pallets lengthwise for short sections.

If half pallets will be moved with the conveyor, four sections will be installed to ensure the proper movement of the pallets deposited on it.



Three Section Conveyor



Four Section Conveyor



Technical Data / Chain Conveyor with More Than Two Sections

Pallet width	3 sections: 800/1,000 mm 4 sections: 800 mm (half pallets)
Max. load unit weight	3 sections: 1,500 kg 4 sections: - Full pallet: 1 x 1,500 kg - Half pallet: 2 x 500 kg
Available length	998-2,918 mm
Transport height	650/950/1,150 mm
Speed	10-20 m/min.
Mechanical stop at endpoint	Optional
Guide vanes	Optional
Environmental conditions	Max humidity: 70% Ambient temperature: 0° C and 40° C Freezing temperature (optional): -30° C and 0° C



MIXED TRANSFER

This conveyor has both rollers and chains, enabling changes of direction of 90° and 270°. The rollers are fixed to a bench and the chains are placed on a lifting frame. The height of the chain conveyor is always 50 mm higher than the rollers, to facilitate proper operation.

As with chain conveyors, mixed transfers can be done with three or four chain sections, when this is required.



**Mixed Transfer
with Rollers and Two
Section Chains**



**Mixed Transfer
with Rollers and Three
Section Chains**



**Mixed Transfer
with Rollers and Four
Section Chains**



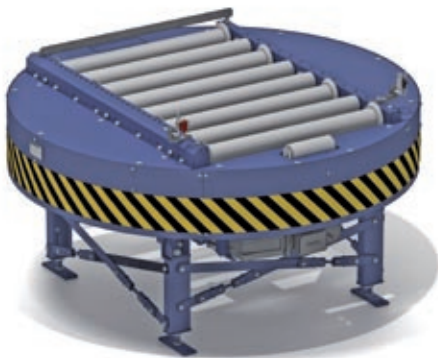
Technical Data / Mixed Roller-Chain Transfer

Pallet width	2 sections: 800/1,000 mm – 3 sections: 800/1,000 mm – 4 sections: 800 mm		
Max. load unit weight	2 sections: 1,500 kg – 3 sections: 1,500 kg – 4 sections: full pallet 1 x 1,500 kg – half pallet 2 x 500 kg		
Available lengths	2 sections: R: 1,350–C: 1,275/1,475 mm	3 sections: R: 1,350–C: 1,275/1,475 mm	4 sections: R: 1,350–C: 1,275 mm
Roller-chain transport height	2 sections: R: 600–C: 650 mm R: 900–C: 950 mm R: 1,100–C: 1,150 mm	3 sections: R: 600–C: 650 mm R: 900–C: 950 mm R: 1,100–C: 1,150 mm	4 sections: R: 600–C: 650 mm R: 900–C: 950 mm R: 1,100–C: 1,150 mm
Roller diameter	80 mm		
Conveyor speed	10 - 20 m/min.		
Environmental conditions	Max humidity: 70% Ambient temperature: 0° C and 40° C Freezing temperature (optional): -30° C and 0° C		

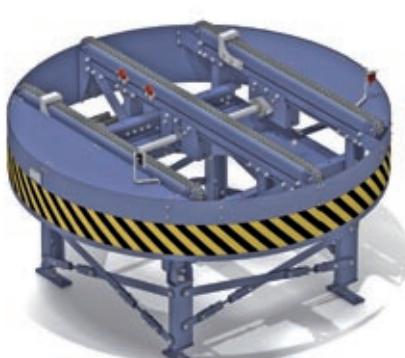
TURNTABLE CONVEYOR

A turntable conveyor is a roller conveyor or chain conveyor with the ability to turn, allowing load units to be transferred between unaligned conveyors, also making it possible to place the pallet at any angle with respect to its entry direction.

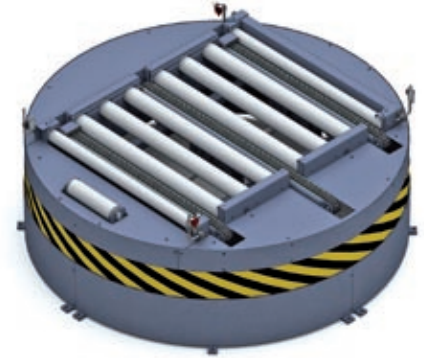
Turntable conveyors can be made up of just rollers, just chains or a mixture, with rollers and three chain sections.



Roller Turntable Conveyor

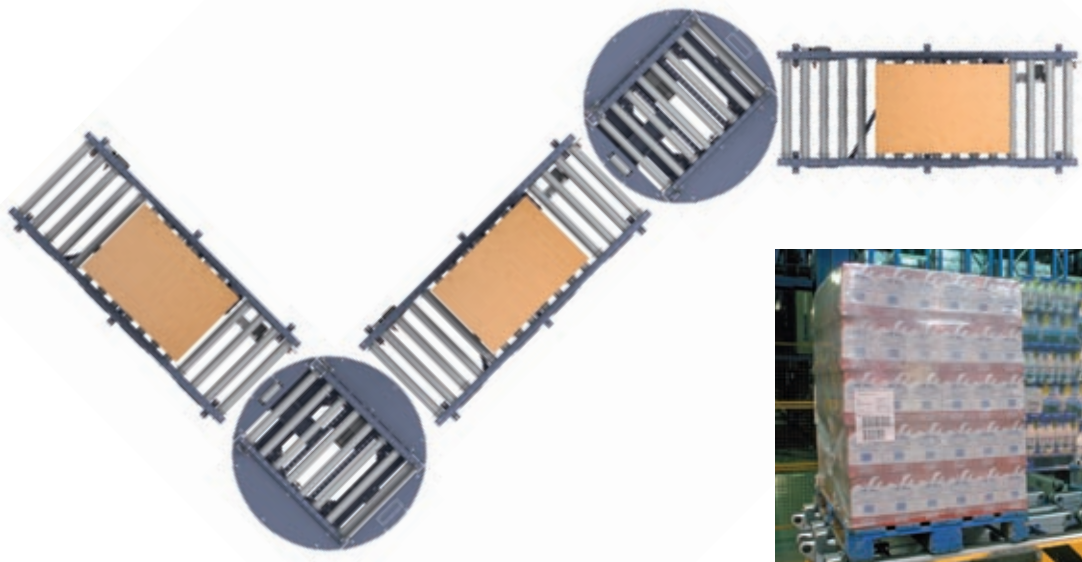


Chain Turntable Conveyor



Mixed Transfer Turntable Conveyor

Technical Data/Turntable Conveyor			
	Roller Turntable Conveyor	Chain Turntable Conveyor	Mixed Transfer Turntable Conveyor
Pallet width	800/1,000 mm	800/1,000 mm	800/1,000 mm
Max. load unit weight	1,500 kg	1,500 kg	1,500 kg
External diameter	1,730/1,830 mm	1,850 mm	1,730 mm
Transport height	600/900/1,100 mm	650/950/1,150 mm	650/950/1,150 mm
Roller diameter	80 mm	80 mm	–
Conveyor speed	10-20 m/min.	10-20 m/min.	10-20 m/min.
90° turning time	4 s	4 s	4 s
Environmental conditions	Max humidity: 70% Ambient temperature: 0°C and 40°C Freezing temperature (optional): -30°C and 0°C		



TRANSFER CART OR SHUTTLE CART

These components are designed for use with non-continuous load unit transport systems. Their implementation may be suitable when dynamic requirements are not high.

They are also used to organise and sort pallets in accumulation and waiting areas.

The cart moves on rails in a straight path, linking various intermediate points. The length can be adjusted to the exact distance needed. If necessary, the rails can be embedded into the ground to prevent the formation of a physical barrier.

For greater productivity with respect to cycles, loads or speed, shuttles can be employed with different configurations and can even transport two loads at the same time.

They always have another transport element on board, so it is common to find roller carts and chain carts with both two and three sections.

This tends to be a more economical solution than a continuous conveyor route, although the final decision is dependent on the number of pallets that it would transport. Flow analysis will recommend whether or not to install this system.





Technical Data / Chain Shuttle Cart

Pallet width	800/1,000 mm
Max. load unit weight	CSC-1L: 1 x 1,500 kg CSC-2L: 2 x 1,000 kg
Conveyor width	1,563/ 1,507 mm
Transport height	600/900/1,100 mm
Roller diameter	60-80 mm
Corridor length (min./max.)	10-120 mm
Conveyor speed	10-20 m/min.
Max. transfer speed	140 m/min.
Max. transfer acceleration	1.2 m/s ²
Fixed mechanical stop	Optional
Environmental conditions	Max humidity: 70% Ambient temperature: 0° C and 40° C Freezing temperature (optional): -30° C and 0° C



Technical Data / Roller-Chain Shuttle Cart

Pallet width	800/1,000 mm
Max. load unit weight	CSC-1L: 1 x 1,500 kg CSC-2L: 2 x 1,000 kg
Conveyor width	1,490 mm
Transport height	650/950/1,150 mm
Corridor length (min./max.)	10-20 mm
Conveyor speed	10-20 m/min.
Max. transfer speed	140 m/min.
Max. transfer acceleration	1.2 m/s ²
Fixed mechanical stop	Optional
Environmental conditions	Max humidity: 70% Ambient temperature: 0° C and 40° C Freezing temperature (optional): -30° C and 0° C

GRAVITY OUTPUT ROLLERS

This traditional system of gravity accumulation does not require motors for the pallets to move along its surface. Proper combination of a suitable inclination, rollers and speed regulators create an accumulation buffer.

These are suitable when the pallets are collected on manual handling systems (forklifts, pallet trucks, etc.).

When forklifts are employed, there is no need to install split rollers or openings, although these items are essential when pallet trucks are used.

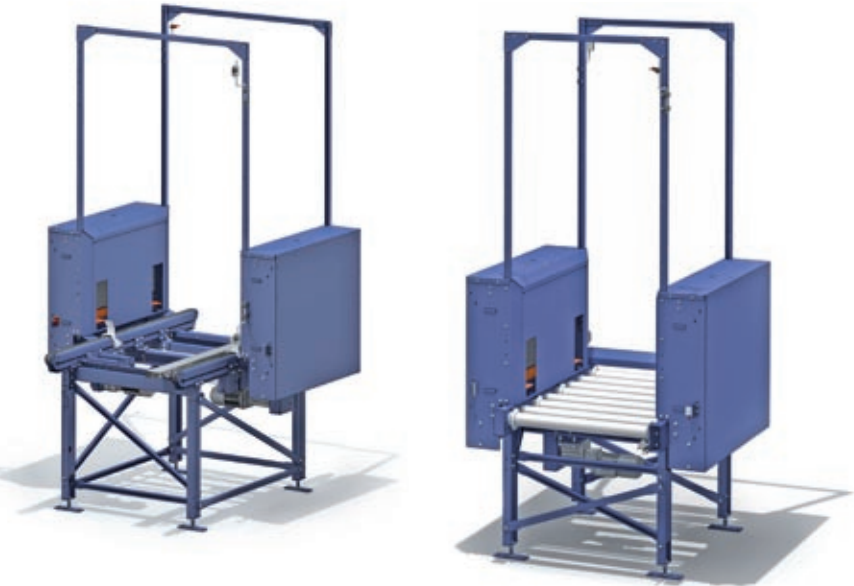
This system is used in loading bays to prepare the routes. Loading may be automatic when conveyors or shuttles are used, or manual when forklifts are employed.



EMPTY PALLET STACKER

When automated transport systems require delivery or removal of empty pallets, a pallet stacker must be installed. Using a lift system, it deposits the stack of empty pallets onto a new pallet, then lifts the entire stack.

For the unstacking of empty pallets, the stack is deposited on the conveyor and the pallets are lifted off, one-by-one.



Technical Data / Empty Pallet Stacker

	Roller Pallet Stacker (Half pallet)	Roller Pallet Stacker (Europallet)	Chain Pallet Stacker
Pallet width	Half pallet	Europallet	Europallet
Max. load capacity	350 kg	350 kg	350 kg
Max. load height	2,159 mm	2,070 mm	2,070 mm
Max. stacking capacity	13 pallets	14 pallets	14 pallets
Average cycles	200 empty pallets/hour		
Transport height	600/900/1,100 mm	600/900/1,100 mm	650/950/1,150 mm
Conveyor	Half-pallet roller conveyor	Europallet roller conveyor	Two section chain conveyor
Available length	1,340 mm	1,340 mm	1,800 mm
Roller diameter	60 mm	80 mm	–
Conveyor speed	10-20 m/min.		
Environmental conditions	Max humidity: 70% Ambient temperature: 0°C and 40°C Freezing temperature (optional): -30°C and 0°C		

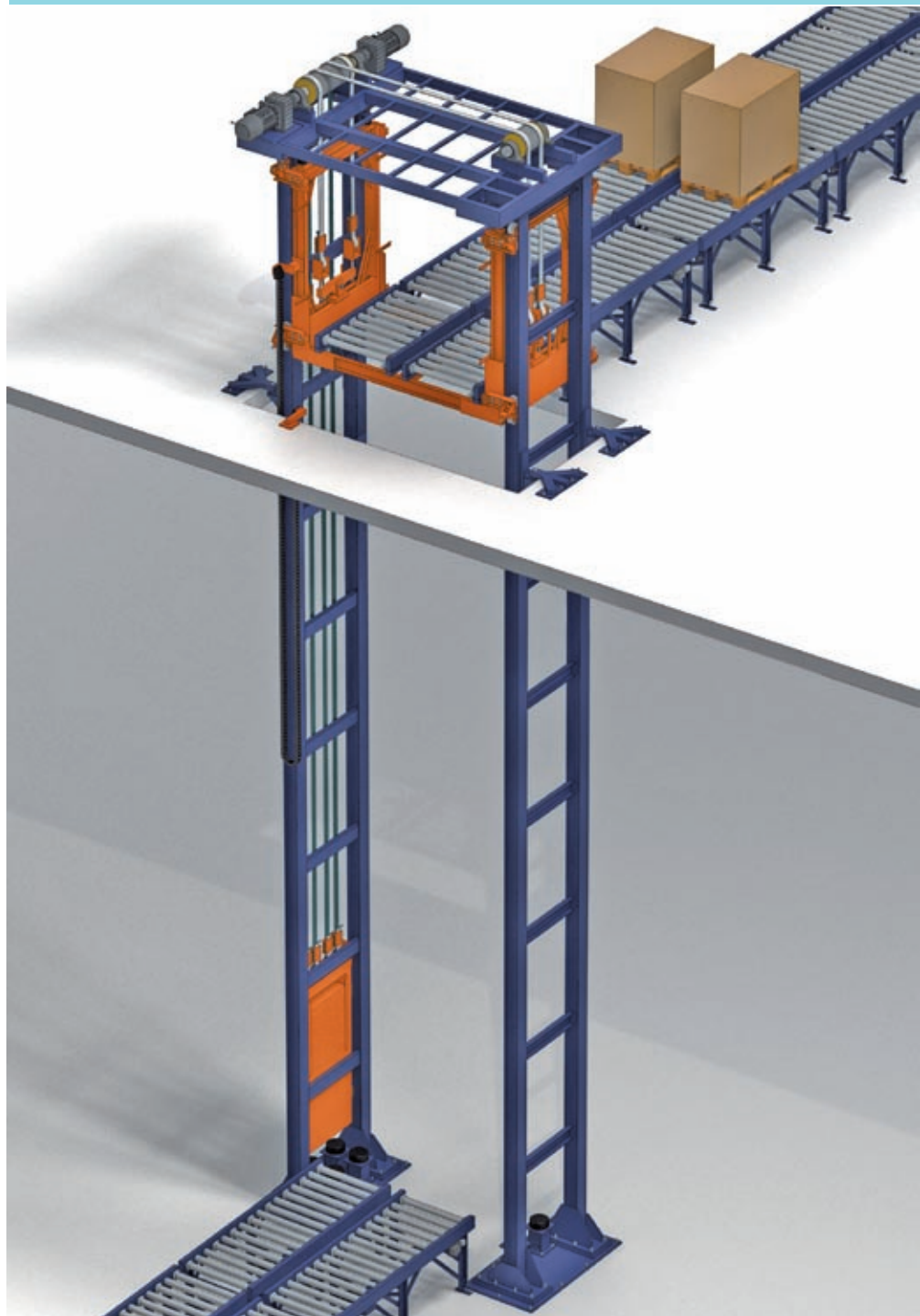


PALLET LIFT

A pallet lift is used for the vertical transport of one or two pallets at a time. The lifting movement is done with counterweights and a traction system, which raises and lowers the loads to a pre-determined height.

This component is used when loads need to be transported vertically, with a minimum height change of 600 mm and a maximum of 9000 mm. It is designed for a pallet with a maximum capacity of 1500 kg.

The conveyor leading to the lift must be the same type as the lift's entry-exit unit.



Technical Data / Pallet Lift

Pallet width	800 / 1,000 mm
Max. load unit weight	1,500 kg
Column length (min / max)	4.800 / 12.000 mm
Transport height rollers (R) – chains (C)	R: 600 – C: 650 R: 900 – C: 950 R: 1,100 – C: 1,150
Conveyor speed	10-20 m/min.
Max. lift speed	60 m/min.
Lift acceleration	0.6 m/s ²
Conveyor types on board	Rollers/chains
Environmental conditions	Max humidity: 70% Ambient temperature: 0°C and 40°C Freezing temperature (optional): -30°C and 0°C



CONVEYOR PROTECTION

To prevent damage to the entry and exit of conveyors when placing and removing pallets with a forklift, metal protective devices are installed on the conveyors. They are fastened to the floor and separated from the conveyor, so that if they happen to be hit by the forklift, the overall good operation of the system will not be affected.



Entry Protection



Exit Protection



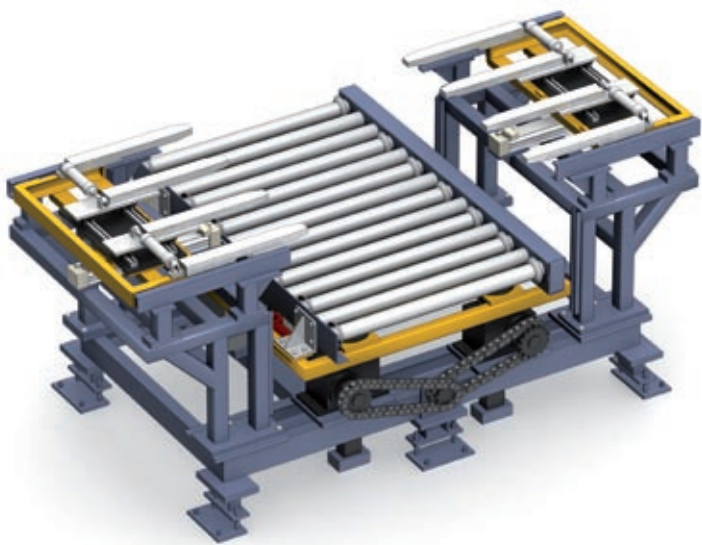
INSPECTION POST

Inspection posts are situated at the entry to the circuit where controls must be carried out to assure that the sizes, weights or condition of the pallets suit the requirements of the system.

Their purpose is to ensure that only pallets in optimal condition enter the conveyor circuit. More specifically, they ensure that the condition of the pallet stoppers and runners are correct, that the volume of the load is less than a maximum measurement and does not exceed these by more than accepted limits and that the pallet and load as a whole does not exceed the maximum accepted weight.

This system is absolutely essential when the transport system is being used to place pallets in an automated warehouse.





PALLET LIFTERS

When the pallets moving through the transport system are not high quality, slave pallets must be placed under them. To carry out this task automatically, a pallet lifter is required that raises them and places the slave pallet underneath as support. When this pallet is removed, the operation is done in reverse: the slave pallet is freed up when the pallet enters the warehouse.



HYDRAULIC TABLE

In order to respect operators' ergonomic positions at the picking stations, these tables are essential. They permit the height of the goods to be adjusted to the proper handling position as the pallets are pulled off the line for the different order preparation operations.

Hydraulic tables can also be used to circumnavigate small changes in altitude in a transport circuit. Lift altitudes range from 100 mm to 2000 mm.

Chain or roller conveyors can be assembled on top of these tables, in accordance with the required application and function.

STAIRS AND CORRIDORS OVER CONVEYORS

Pedestrian stairs and corridors are available between roller and chain conveyors so that authorised personnel can move safely among them.

The images on this page show a few examples.



SAFETY ENCLOSURES

In order to prevent any accidents involving people becoming trapped, and in cases where the risk analysis deems it necessary, safety fences can be installed. They are vertical mesh panels and doors with access control devices.

They can also be installed in conjunction with electronic safety barriers to block passage through open areas.



HORIZONTAL SAFETY NET

For conveyors that face onto corridors with moving machines, horizontal nets can be installed to cover open holes and prevent access.

They are complemented by warning and prohibition signs. Risk analysis carried out at each installation will dictate what the signs must say.





OPERATIONS LOGIC

CONTROL

The programme that governs the control system follows logical sequences, previously parameterised, which take into account the route, the number of conveyors, the type of tables, the photocells and all other components that make up the circuit.

The control system makes the pallet or box advance, stop, turn, etc. To carry out these functions, photocells are placed on the conveyors that allow the exact location of all boxes and pallets to be monitored at all times. The control system is notified so that it can transmit the next order.

All options presented in this catalogue require this control programme. Its simplicity or complexity will depend on the size and routes of the conveyor circuits.

The control programme should not be confused with the management programme (WMS), which operates at a higher level. Normally a conveyor does not require a management programme as such, except when connected to a complex installation where it receives multiple source and destination orders. This is precisely what takes place in the headers of automated warehouses.

The control programme can be installed on a PC and use the Mecalux Galileo programme, or on a PLC. At small or straightforward plants, they tend to be installed on a PLC, whereas a PC is more convenient at more complex installations.

The great advantage of using a PC with Galileo is that it provides all information on the conveyor circuit by using the visualisation programme.

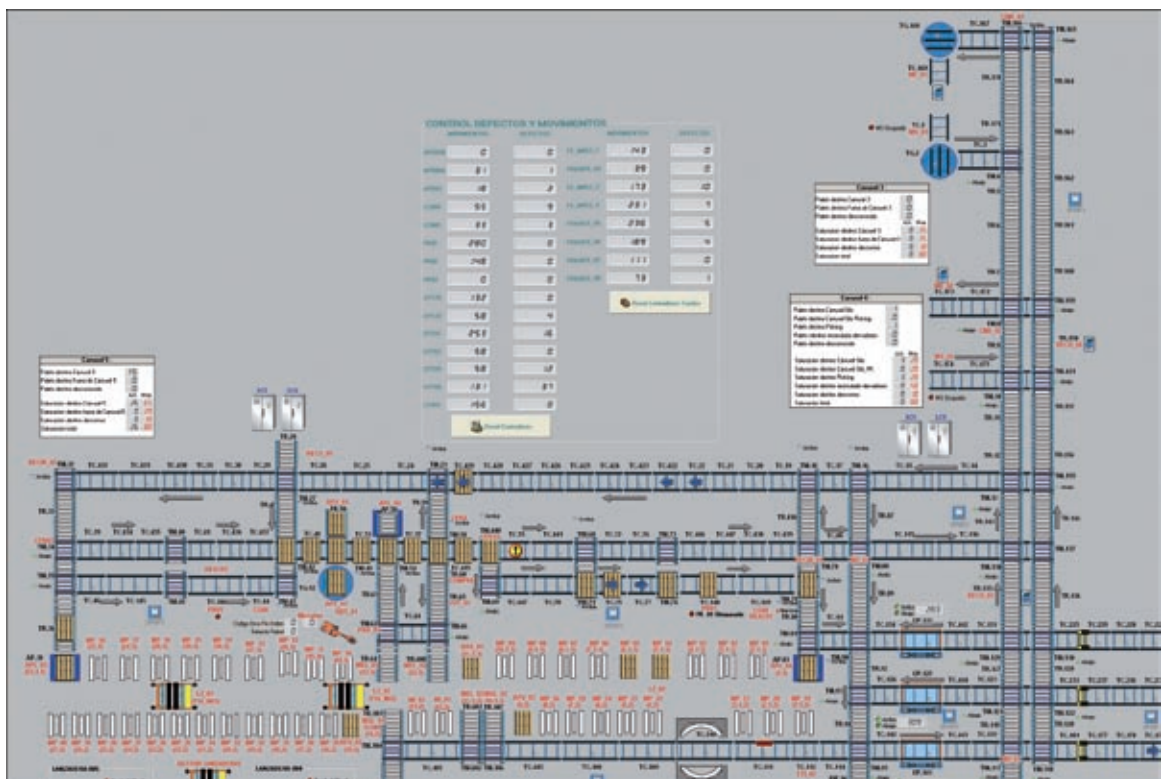
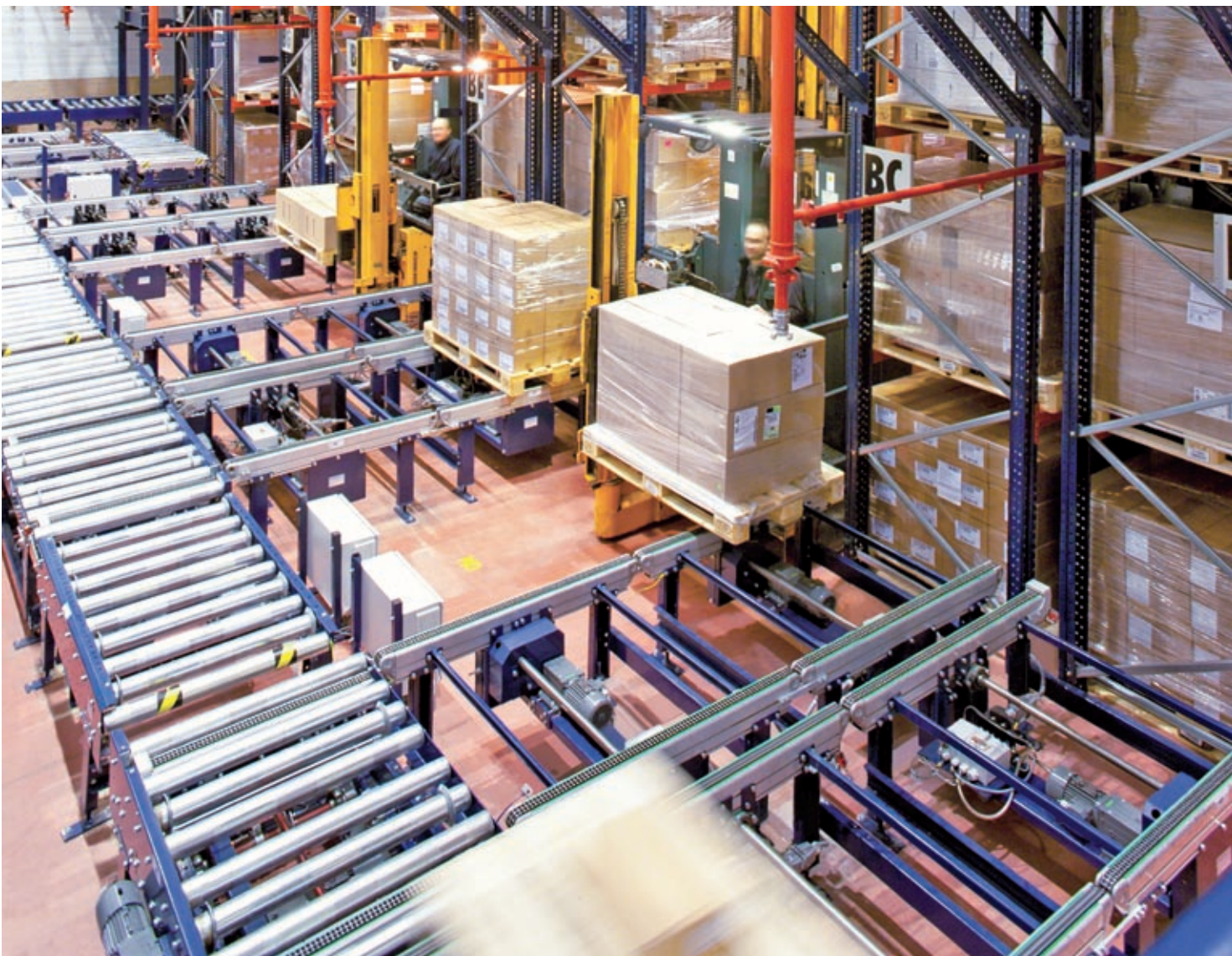
Control and Power Components

Each conveyor has modular power boxes and signals. Their purpose is to control and power the signals on each conveyor. These boxes are connected to the main power cabinet and to the control PC or PLC.

A single power cable and another cable for signals connect the conveyors. Such a simple assembly allows modifications and expansions to be done easily and quickly. In larger installations, the conveyors are connected in series and by areas.

The central cabinet is in charge of distributing the power to each of the modular boxes, while the PC or PLC controls the installation, depending on the number of conveyors.

Area consoles and emergency push buttons complete the list of control components in an automated transport system.





MANAGEMENT

The most complex circuits must also have a control process; management software that directs the boxes from the starting points to the end points, using the criteria in place at each installation (destination, order, sequencing, etc.).

Easy WMS is a powerful warehouse management system that manages all typical operations in reception, warehousing, transport, order preparation and dispatch.

General Characteristics

This software has been designed using the latest technological standards, databases with renowned international recognition and the most suitable programming languages for this type of software.

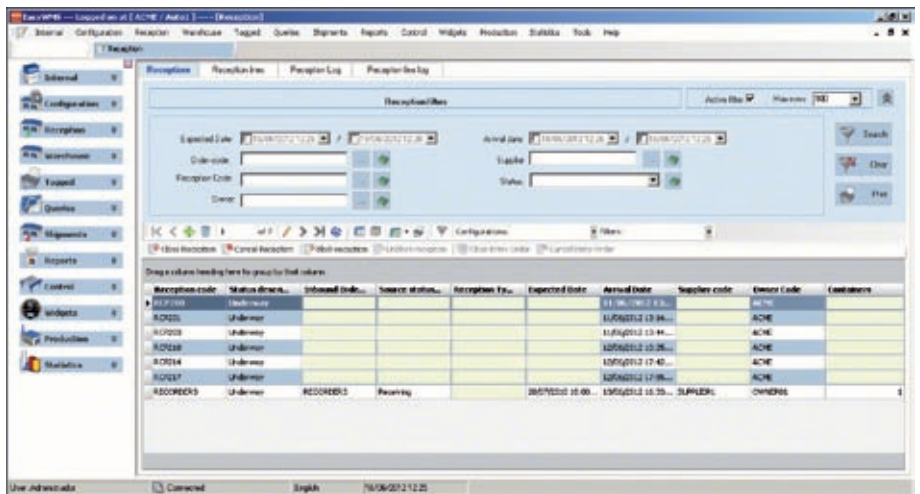
Mecalux, aware of the high level of demand with respect to the computer applications employed in the industrial arena, has created a software development centre, which is responsible for programming Easy WMS and its maintenance and updates.

Software Functions

Easy WMS was designed under the premise of facilitating its use in all types of warehouses, taking into account their particular features and special characteristics.

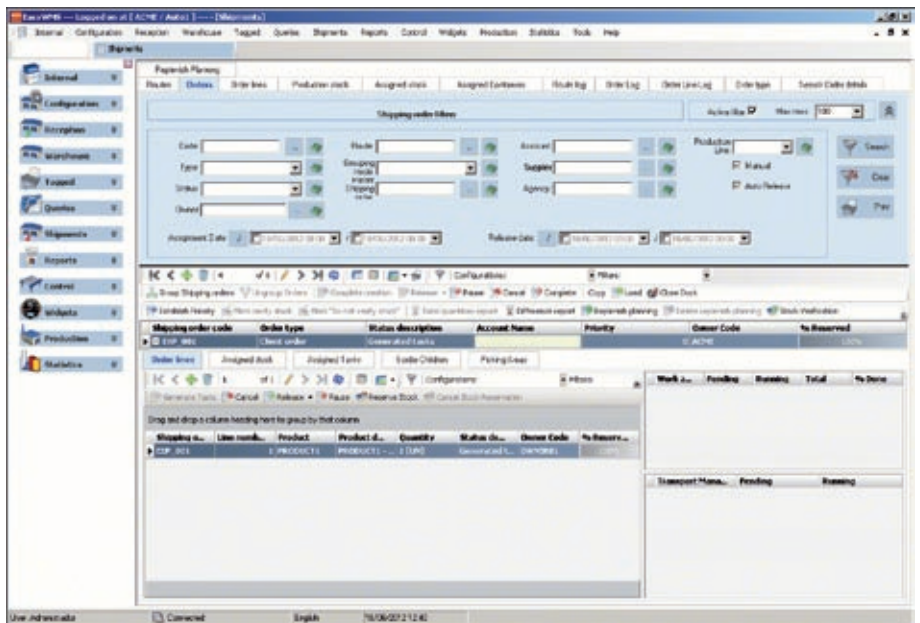
When defining the main software functionalities, the practical and operative nature necessary in a high productivity setting has been taken into consideration. For this reason, a user-friendly presentation was sought for the graphic interface, custom report generation and interaction with operators.

Easy WMS lets you perform the following functions with great ease:



- Entry Management: During reception processes, EasyWMS guides users to conduct all associated tasks simply and securely. Single and multiple reference containers can be dealt with, and the necessary logistics variables can be obtained for each article (batch, expiry, serial number, weight, quality, etc.).

- Warehousing Management: After goods have been received, they must be stored. EasyWMS is a powerful management tool, able to define every last detail about the placement of a product within a warehouse. This process is based on rules and strategies for the location of materials, always taking into account the physical and logistic characteristics of the product in question.



- Exit Management: To carry out the output of materials, Easy WMS provides a practical system to prepare orders, which uses concepts for both individual output orders and orders grouped into distribution routes. These orders can be entered manually or imported from the company's ERP.

For more productive work, several grouping modes for the output orders are also provided, as well as the possibility of sequencing their release automatically. This is all done with the aim of completing the greatest number of picking operations possible with the least number of movements of the stacking crane and from the same work station.

- Stock Management: Easy WMS provides total control of all warehoused stock, where you can find out information on all stock and its condition in real time. These figures can be corrected and adjusted at any time. Easy WMS also manages and handles the article master, where all main data on all stored articles can be added, deleted or changed. Specific logistics details can also be applied to products for reception, storage and dispatch management.

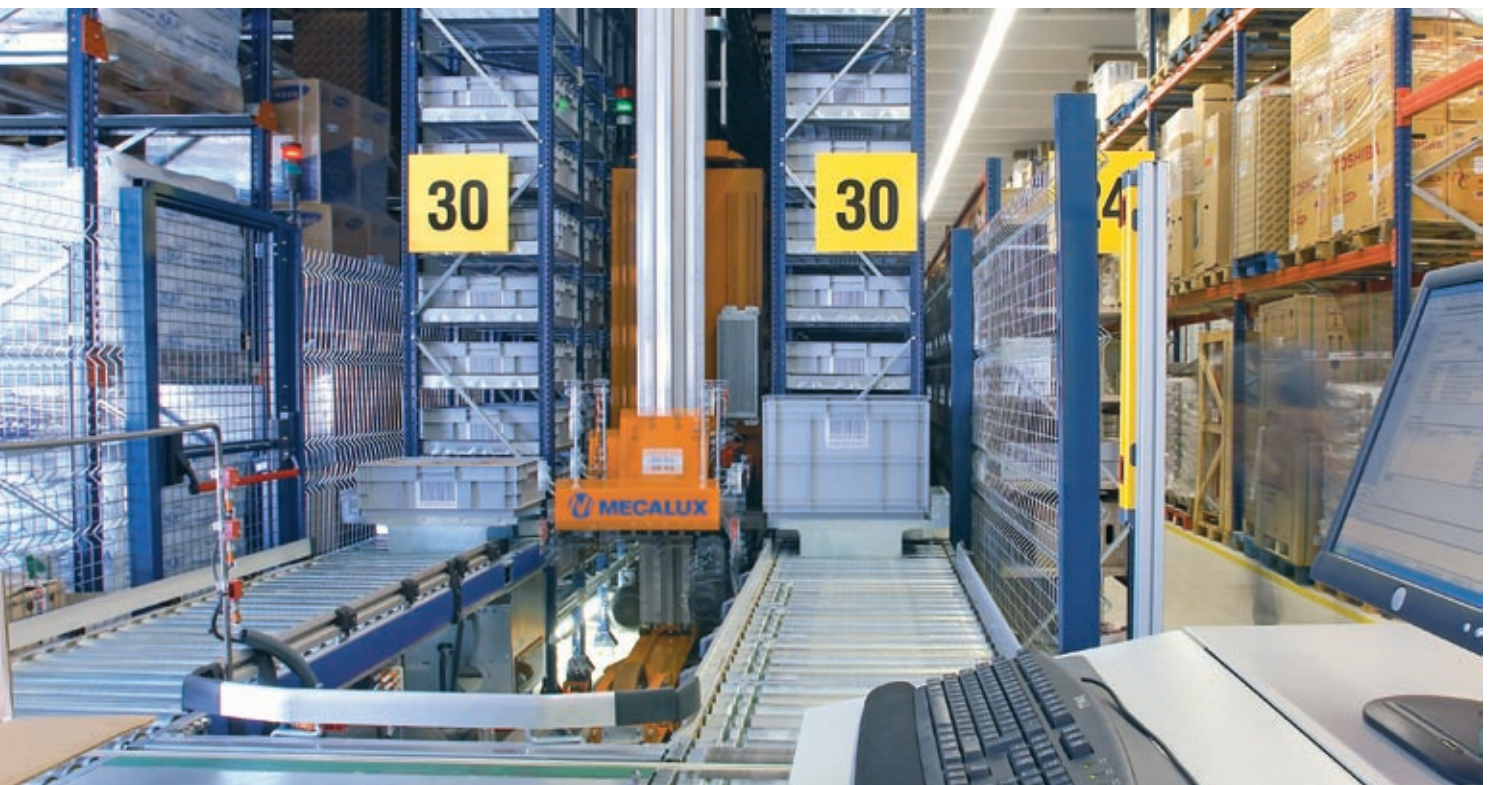


- Consultation and Reporting Tools: Users can make consultations at all times about the status of the warehouse and the components involved in the various operations (stacker cranes, conveyors, work stations, radiofrequency terminals, etc.). Common queries are in reference to entries, exits, logs and failure diagnoses. The most relevant information related to the occupation and workload at all times can be grouped on a single screen that displays this constantly updated data in both numerical and graphical form.

- Integration: Easy WMS allows coordinated management of several warehouses that, due to being part of the same organisation, share information and can have stock transferred between them.

Easy WMS can exchange information with the company's ERP: master files, delivery forecasts, client orders etc. can be imported, while information about completed transactions, stock variations etc. can be sent to the ERP.

For more detailed information, we recommend consulting the specific Easy WMS catalogue or requesting a meeting with a specialised technician.





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