kardexmlog
Just move it!

We get your warehouse moving!

Efficient, future-proof, tailor-made.

Configuring logistics processes to be efficient, quick and reliable.

Whatever your logistical challenge – we have the answer. Besides your customised high-bay warehouse or economical system solution, we also supply intelligent 4.0-capable components produced in-house in Germany which feature modularity, top quality and durability.

Our portfolio ranges from requirements analysis and professional consulting to the development of customised logistics concepts which guarantee high flexibility and transparency while at the same time, minimising process costs.

Warehouse refurbishment and optimisation of logistics processes
With tailor-made refurbishment concepts, we turn your warehouse into a state-of-the-art facility with respect to performance, energy savings and efficiency. The systems installed as part of warehouse refurbishment frequently require new processes and often lead to optimisation of the material flows.

With a large range of different refurbishment measures, we ensure that your plant availability is high and that your competitiveness remains unchanged.

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Professional service concepts
Our comprehensive service is a flexible portfolio of professional services that you can avail of as required. From spare parts management to 24-hour, on-site service and full technical support for your facility: Each module contributes to error-free operation of your plant and relieves the burden on your staff.

Single-source expertise
As part of the Kardex Group, we can offer you all services and technologies from a single source. You benefit not only from our over 50 years of experience in the development of customised logistics concepts for diverse industry sectors, but also from the most modern components made by us in-house.

Contents

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Thank you for your interest in our company.

If you would like further information, please feel free to contact us.

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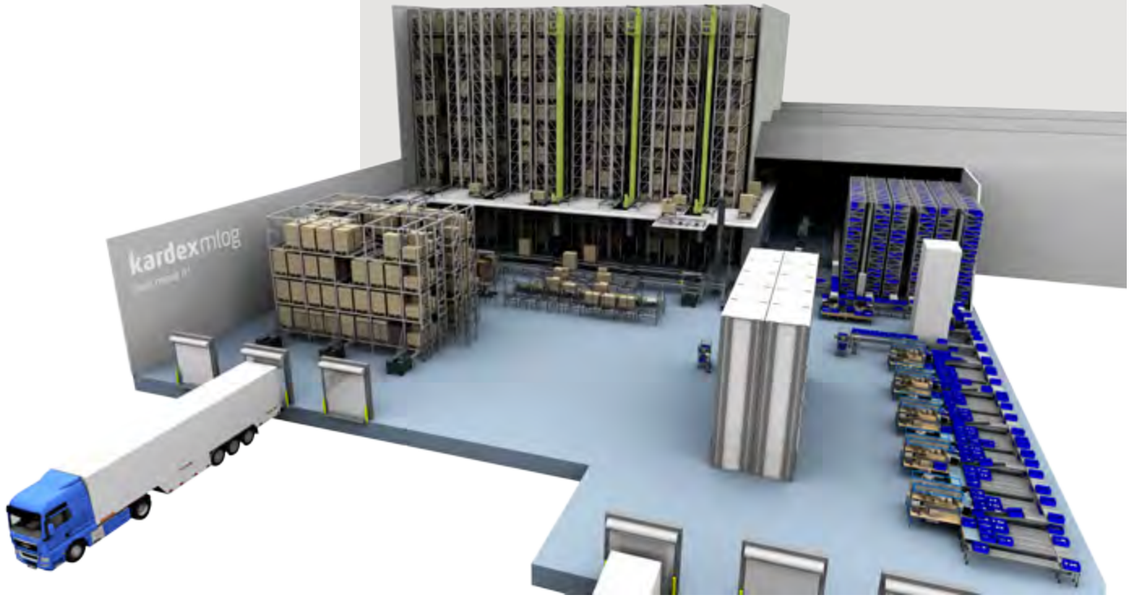
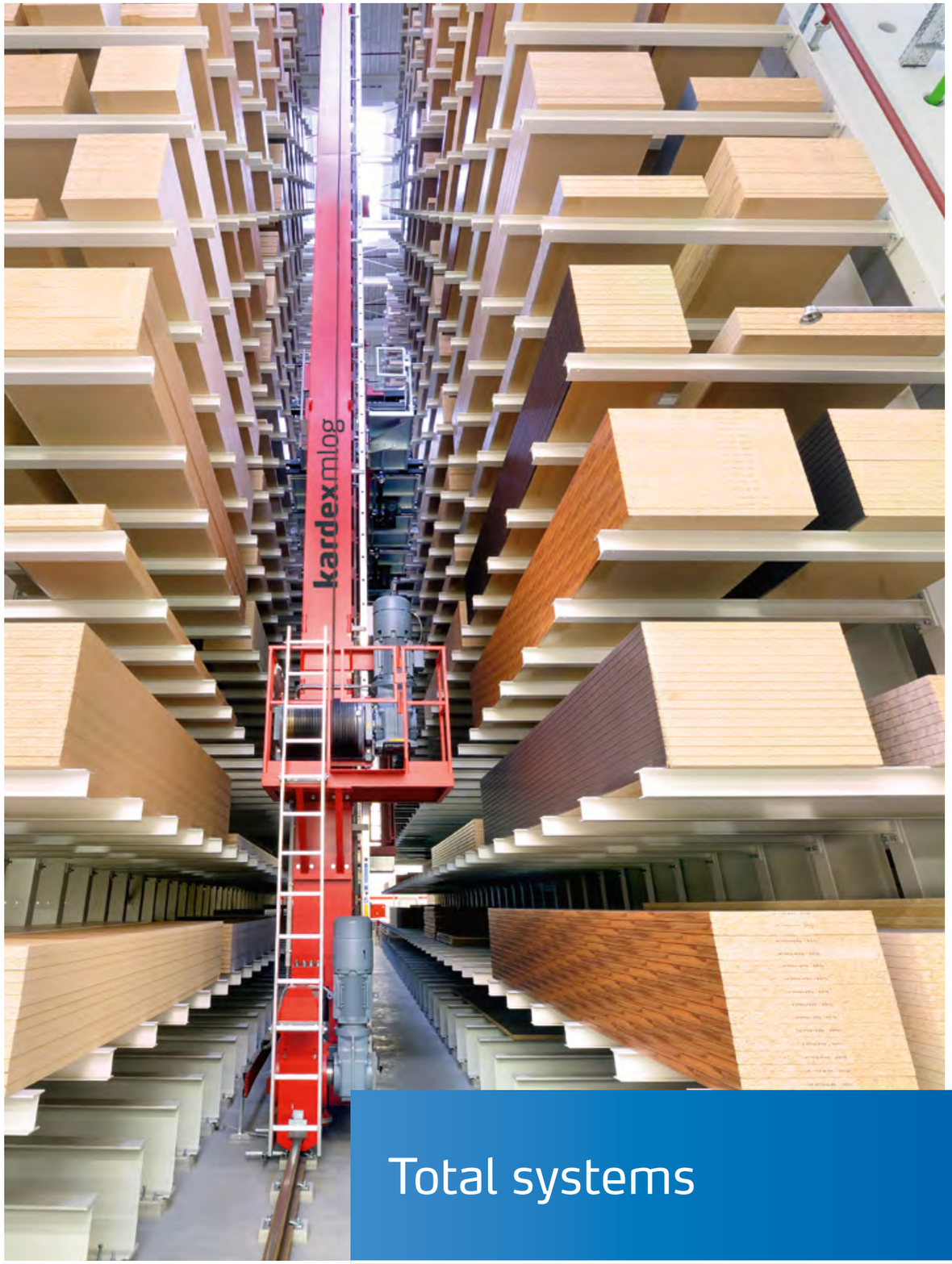
www.kardex-mlog.com

Standardised storage modules to fit your processes.





Total systems

Innovative warehousing logistics from a single source.

No warehouse like another

During construction of your logistics facility, Kardex Mlog supports you with the competence and experience gained over 50 years and more than 1,000 successfully completed projects worldwide. The expertise of our specialists is manifested in every detail and in every phase of the project – from planning to commissioning.

No warehouse is like another. Whether consumer goods or hazardous goods, deep-freeze or pharmaceutical products: each industry has special requirements – as does each company. With individual concepts we ensure that all processes are optimally coordinated and the facility can from the outset be operated with the performance and capacity appropriate to your business.

All services from a single source

- Planning
- Project planning
- Manufacture of components
- Programming and implementation
- Installation and commissioning
- After-sales services

We offer you all services associated with the construction of a logistics facility from a single source, whether we assume responsibility for the entire project as general contractor or contribute our know-how as specialist in individual disciplines.

Our competences range from the planning and project planning through the complete coordination and realisation of projects up to a complete range of services in ongoing operation. In addition to the personnel resources and an efficient infrastructure, we have access to our own manufacturing facilities in which we produce the most important components for your facility ourselves and optimise these for your needs.

Storage/retrieval systems

The storage/retrieval machines form the heart of your storage facility. The system's performance depends to a decisive extent on their speed and reliability. We therefore produce these important components ourselves, which means that we can also guarantee you the highest degree of security against obsolescence. Each S/R machine is only delivered to the customer following extensive quality testing and commissioning by Kardex Mlog at our production plant. As a result, our S/R machines have enjoyed an outstanding reputation for decades. Kardex Mlog have steadily extended this lead through continuous further development and special solutions for specific industries, also integrating this technology in the standardised system storage solutions.

- Modular and individually adaptable
- Maximum performance with minimum energy consumption
- More than 2,500 SRMs in use worldwide

Pallet conveying technology

There's no room for compromise when it comes to conveyor systems either. After all, they keep the material flow moving. All core elements are therefore also manufactured in-house, guaranteeing reliable stock movements which protect the products, even under challenging environmental conditions and temperatures.
In the planning, we rely on optimised layouts and sophisticated material flow strategies in order to maximise the efficiency and reliability of your facility.

- Products for every application
- Extremely robust
- Outstanding energy efficiency

Material flow control

The intelligence of your plant is contained in the control system we have developed in-house. That's why we pay particular attention to this aspect. We focus on networking all information into an integrated system and on linking the facility to the higher-level IT environment.

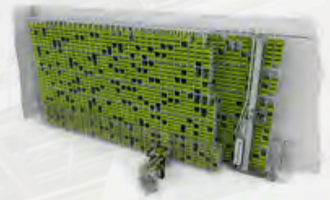
All the modules of our material flow control system are equipped with all relevant interfaces to databases and enterprise resource planning systems and can be integrated, practically without any restriction, into any IT environment.

- Modular material flow systems
- Unrestricted SAP-compatibility
- New generation interfaces

MSequence

MCompact

MTower



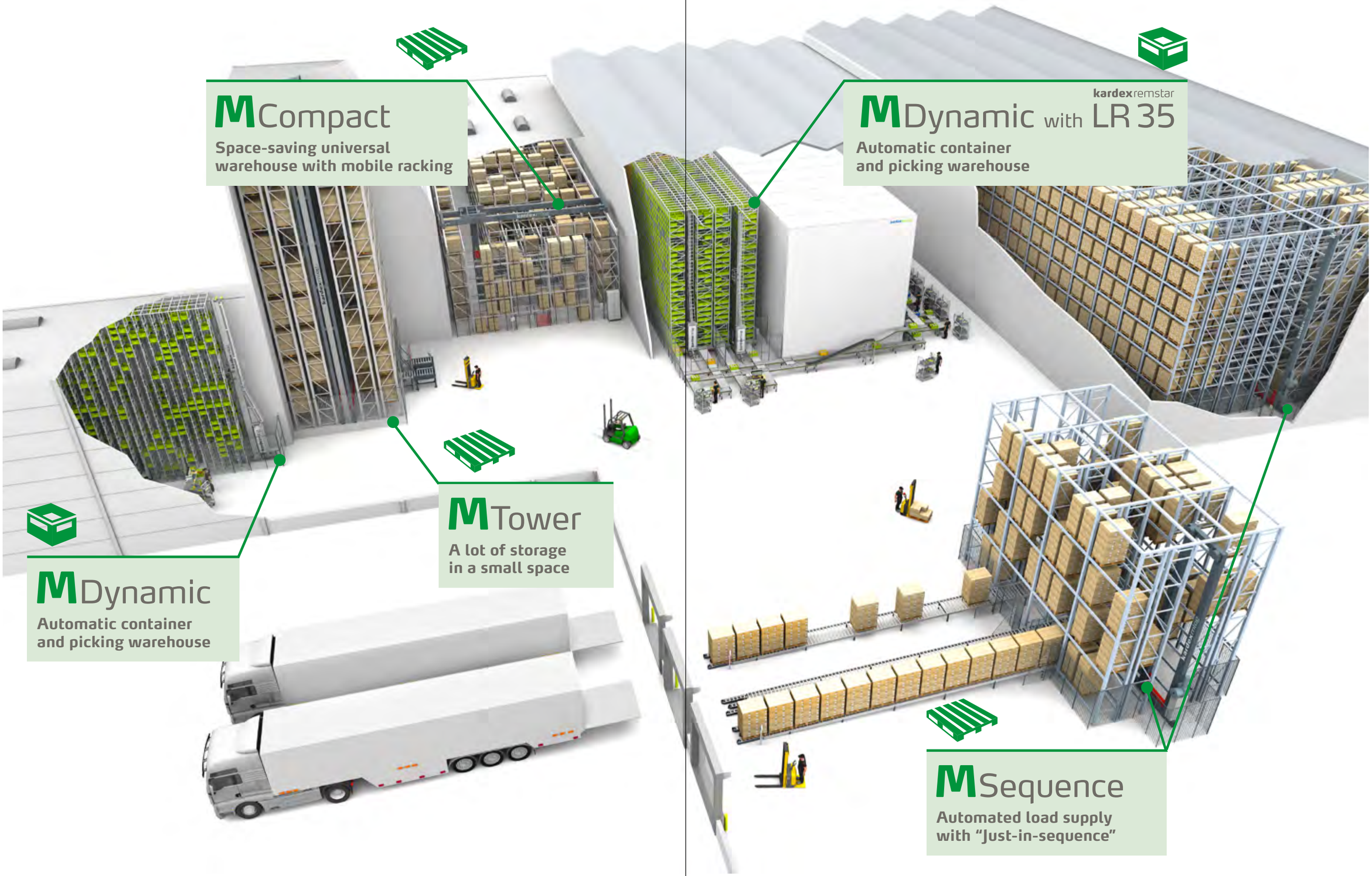
MDynamic

MDynamic with kardexremstar LR 35

System solutions

Preconfigured maximum performance
in compact spaces.

Overview of preconfigured system solutions



MCompact
Space-saving universal warehouse with mobile racking

MDynamic
Automatic container and picking warehouse

MTower
A lot of storage in a small space

MDynamic with kardexremstar LR 35
Automatic container and picking warehouse

MSequence
Automated load supply with “Just-in-sequence”

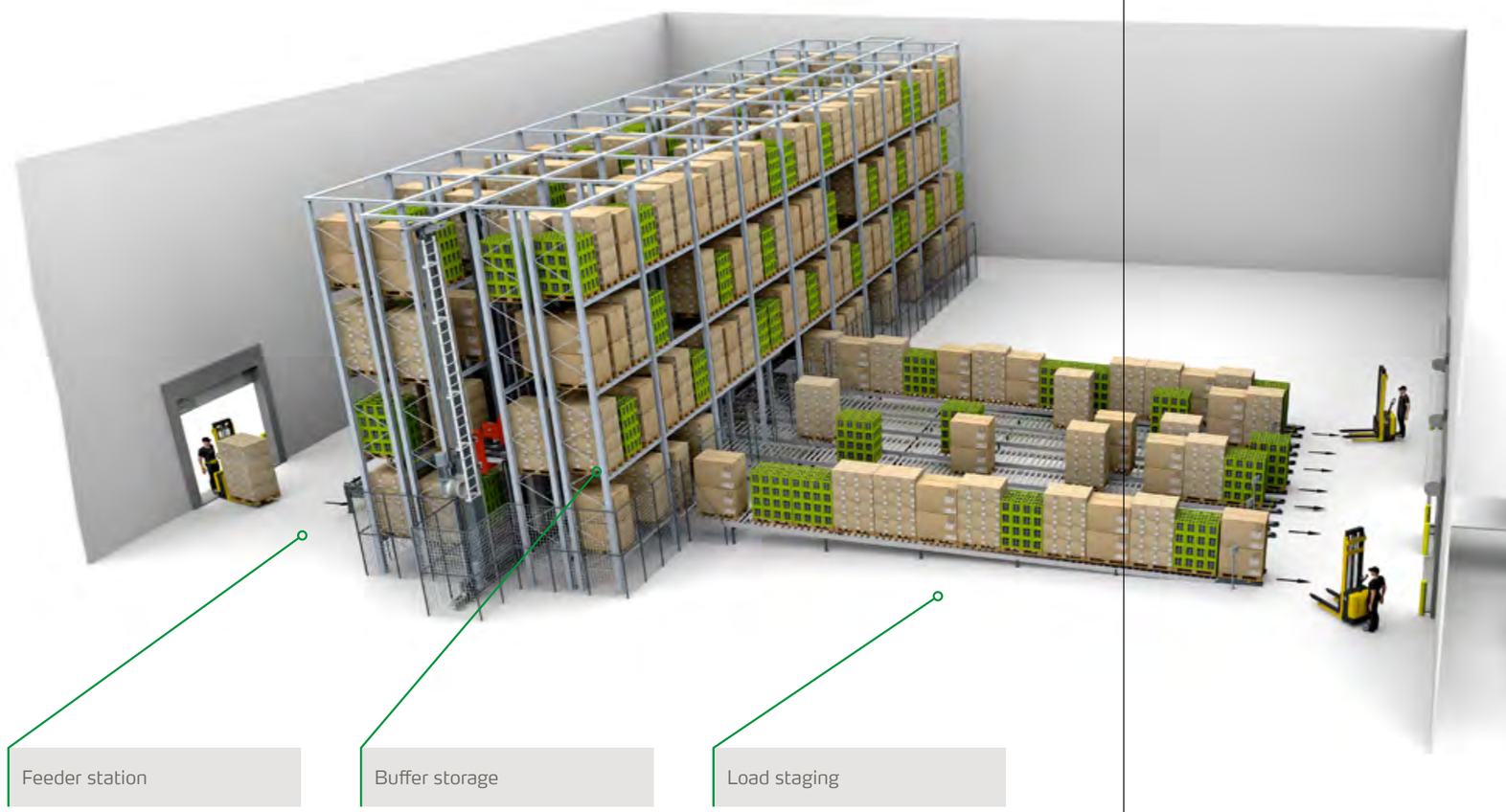
MSequence - automated goods issue

Simple, automatic and intelligent - Load supply with the MSequence

The modular solution for future-oriented, efficient and error-free goods issue.
To sustainably lower the costs in goods issue and to increase delivery flexibility and quality, Kardex Mlog has developed the dynamic sorting buffer MSequence. This ensures automatic, error-free and dynamic just-in-time order staging with optional screen display of the truck loading plan (just-in-sequence).

Cost drivers and efficiency reducers at goods issue:

- High space requirement
- Loading errors
- Sorting errors with respect to unloading points
- Long truck waiting times
- Personnel intensive
- High complaint costs (returns, credit memos)



Feeder station

Buffer storage

Load staging

Automatic staging of loading orders

High buffer capacity with low space requirement

Secure and error-free goods issue

Reduction of waiting times

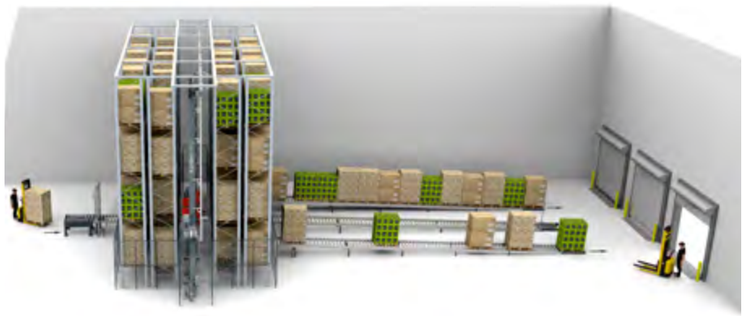
100 % transparency of loading operation

Automatic sorting by unloading point (Just-in-sequence)

Reduction of personnel and material costs

Film: MSequence - Sorting buffer for goods issue

1 MSequence Speed



Properties

- Automatic pallet buffer with double-deep storage
- Designed for maximum storage and retrieval capacity and space for 5 truckloads
- Storage of the pallet in longitudinal direction on driven roller conveyors with contour check
- Gate-based retrieval of the pallet on gravity conveyors with optional screen display of the truck loading plan
- 2/3 space savings
- Complete module (Plug&Play)
- Scalable system

Consists of

- 1 automatic storage and retrieval machine
- Racking
- 1 storage line
- 3 retrieval lines
- Control technology (Siemens S7)
- Warehouse management software

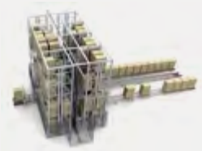
MSequence Speed*

Body:
Height: up to 12 m
Width: up to 36 m
Depth: 8 m

Payload:
max. 1000 kg
Handling capacity:
Up to 64 double cycles/hr
Up to 106 retrieval cycles/hr

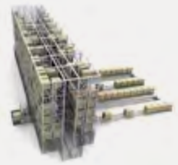
*Specs for standard variant

Configuration examples:



Properties:
- Double-deep storage
- 4 levels
- 4 shelf distances for every 3 load units
- (WxDxH): 17 x 29 x 12 m
- 1 driven storage line
- 3 retrieval lines (gravity)

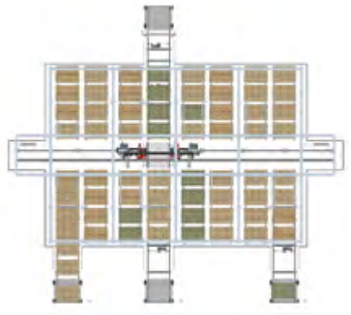
Storage capacity:
176 Euro pallets



Properties:
- Double-deep storage
- 7 levels
- 10 shelf distances for every 3 load units
- (WxDxH): 36 x 29 x 12 m
- 3 driven storage lines
- 8 retrieval lines (gravity)

Storage capacity:
804 Euro pallets

2 MSequence Volume



Properties

- Automatic pallet buffer with multiple-deep storage
- Designed for maximum buffer capacity for more than 8 truckloads
- Storage of the pallets in transverse direction on driven chain conveyors with contour check
- Gate-based retrieval of the pallet on driven chain conveyors with optional screen display of the truck loading plan
- Complete module (Plug&Play)
- Scalable system

Consists of

- 1 automatic storage and retrieval machine
- Racking
- 1 storage line
- 3 retrieval lines
- Control technology (Siemens S7)
- Warehouse management software

MSequence Volume*

Body:
Height: up to 12 m
Width: up to 36 m
Depth: 10 m

Payload:
max. 1000 kg
Handling capacity:
Up to 57 double cycles/hr
Up to 94 retrieval cycles/hr

*Specs for standard variant

Configuration examples:

Properties:
- Quadruple-deep storage
- 4 levels
- 4 shelf distances for every 2 load units
- (WxDxH): 17 x 16 x 12 m
- 1 driven storage line
- 3 driven retrieval lines

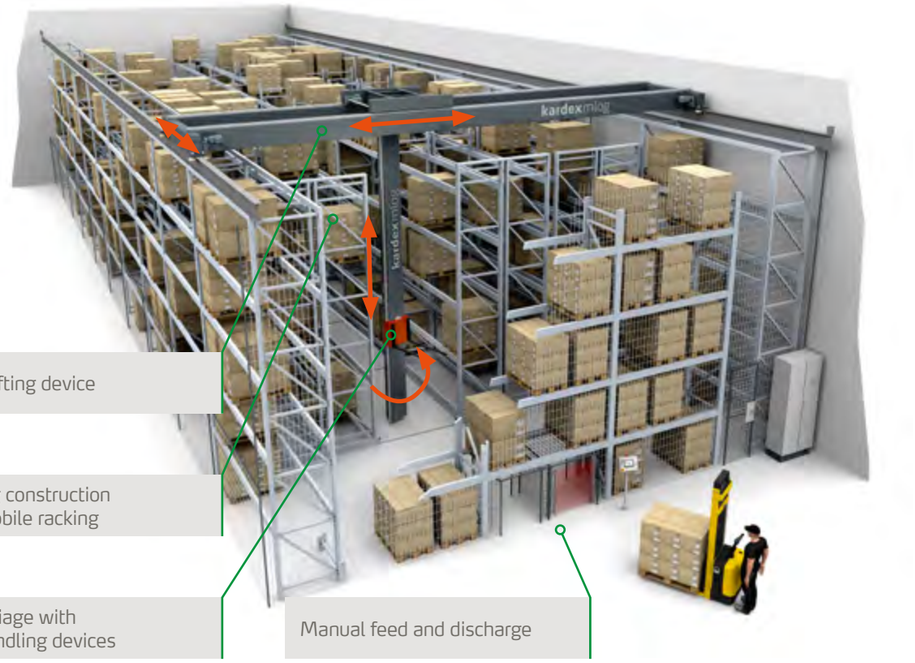
Storage capacity:
240 Euro pallets

Properties:
- Nine-deep storage
- 7 levels
- 10 shelf distances for every 2 load units
- (WxDxH): 36 x 27 x 12 m
- 2 driven storage line
- 6 driven retrieval lines

Storage capacity:
2448 Euro pallets

MCompact

Space-saving mobile racking for pallets of all types



Properties

- Automatic pallet storage
- Compact construction through mobile racking
- Suspended, rotating lifting column with no floor contact
- Floor-level pallet feed and discharge without conveying technology
- Complete module (Plug&Play)
- Scalable system

Benefits

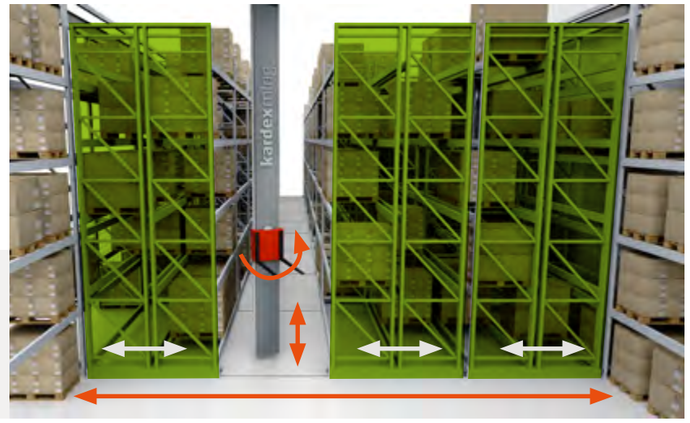
- Optimal utilisation of space through mobile racking
- Individual access to each pallet
- Floor-level pallet feed and discharge (can be operated with manual pallet truck)
- Low height means that sprinkler system is not required
- Easy installation and integration
- Adaptations possible to suit existing structural conditions
- Reduction in personnel and material costs

MCompact

Body:
Height: up to 9 m
(7.5 m top of load unit)
Width: up to 16 m
Depth: up to 40 m
Payload: max. 1000 kg
Handling capacity:
Up to 25 double cycles/hour

Consists of

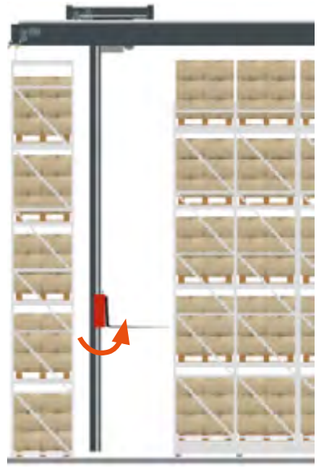
- 1 automatic pallet lifting device with fork arms
- Racking with fixed shelving and mobile racking
- Control technology (Siemens S7)
- Automatic storage location management



The mobile racking forms an aisle along which the pallet lifting device can access the various pallet spaces

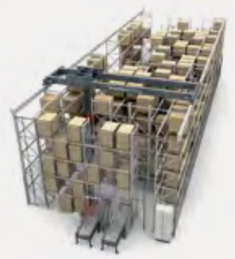
The MCompact turnkey mobile racking system features a small footprint, requiring around 40% less floor space than a conventional forklift-based storage system. It is especially suitable for small and medium goods volumes and can be integrated into existing buildings – even under challenging conditions, e.g. for storage of hazardous materials and for deep-freeze storage. MCompact is a standardised but modular extensible compact warehouse with access to each individual location. Even the basic version features a fully automated storage and retrieval machine, a mobile racking system and a complete control system with storage location management.

The number of racks, the dimensions of racking or the floor area can be designed individually. The maximum height of the top of the load unit is 7.5 m. This means that a sprinkler system is normally not necessary.
The storage and retrieval machine moves up to 50 pallets per hour and can access each storage space directly without needing to move other items. The load units are picked up and set down using manual pallet trucks or by means of additional conveyor systems.
MCompact can be supplemented and customised through our function-oriented conveyor modules. The warehouse management system of the MCompact can be integrated into the existing IT environment without any problem and can be coupled with any popular host system.



Rotating lift carriage

Configuration examples:



Properties:
- Racking construction with 2 mobile racking units
- 5 levels
- (WxDxH): 13 x 32 x 9 m
- Automatic storage and retrieval line

Storage capacity:
768 Euro pallets

Properties:
- Racking construction with 3 mobile racking units
- 5 levels
- (WxDxH): 16 x 40 x 9 m
- Manual feed and discharge

Storage capacity:
1343 Euro pallets

MTower

A lot of storage in a small space

Properties

- Automatic pallet storage for Euro pallets
- Tower construction
- Separate conveying technology elements for storage and retrieval
- Complete module (Plug&Play)
- Scalable system

Benefits

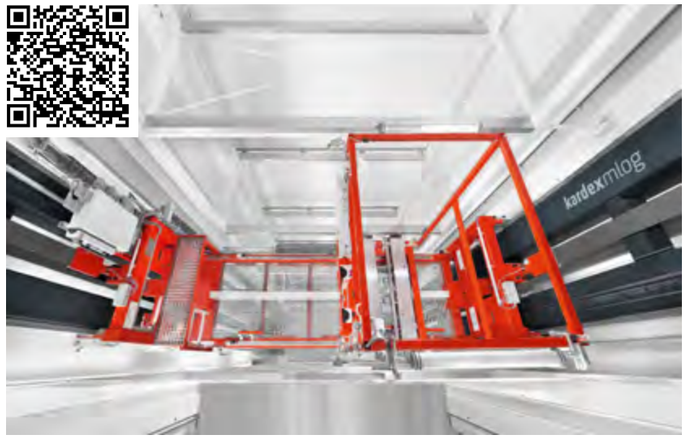
- High storage capacity with minimum floor space
- High storage and retrieval capacity
- Utilisation of hall height
- Easy installation and integration
- Adaptations possible to suit existing structural conditions
- Reduction in personnel and material costs

Consists of

- 1 autom. lifting beam device with telescopic fork
- Racking
- 1 storage line
- 1 retrieval line
- Control technology (Siemens S7)
- Autom. storage location management

MTower

Body:
Height: up to 25 m
Width: up to 12 m
Depth:
Single-deep 4.5 m
Double-deep 7.5 m
Payload: max. 1000 kg
Handling capacity:
Up to 50 double cycles/hour

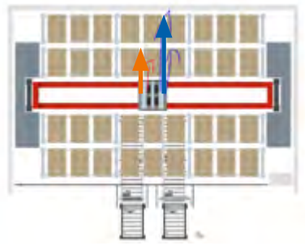


Via the lifting beam, the distribution vehicle services the pallet locations on the different levels.

The narrow but high lifting-beam warehouse MTower is both fast and efficient: With its dynamic design, the complete system increases throughput by up to 20% compared with solutions based on conventional storage and retrieval machine concepts.

The principle is based on a shuttle car mounted on a vertically guided lifting beam. The construction design is extremely flexible and can also be used under challenging conditions, for example, clean room storage facilities.

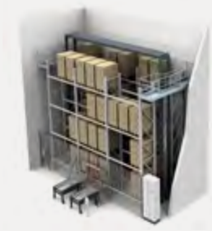
The load pick-up can be designed either for single or double-deep storage by means of a telescopic fork. The load capacity can be defined individually and the storage system can perform up to 50 double cycles per hour.



- Double-deep storage
- Single-deep storage

MTower is equipped as standard with storage and retrieval machine, function-oriented conveyor modules, racking structure, and control and warehouse management system. It is particularly suitable for small spaces and was specially developed for geometries up to 25 metres high and 12 metres wide. This makes MTower an economical option for short but high warehouses without compromising on stability, performance and speed. MTower is suitable for all popular host systems and software standards and is equipped with the latest interfaces. This means that it can be integrated without any problem in virtually any IT environment.

Configuration examples:



Properties:
- Single-deep storage
- 4 levels
- (WxDxH): 12 x 4.5 x 12 m
- 1 driven storage lin
- 1 driven retrieval line

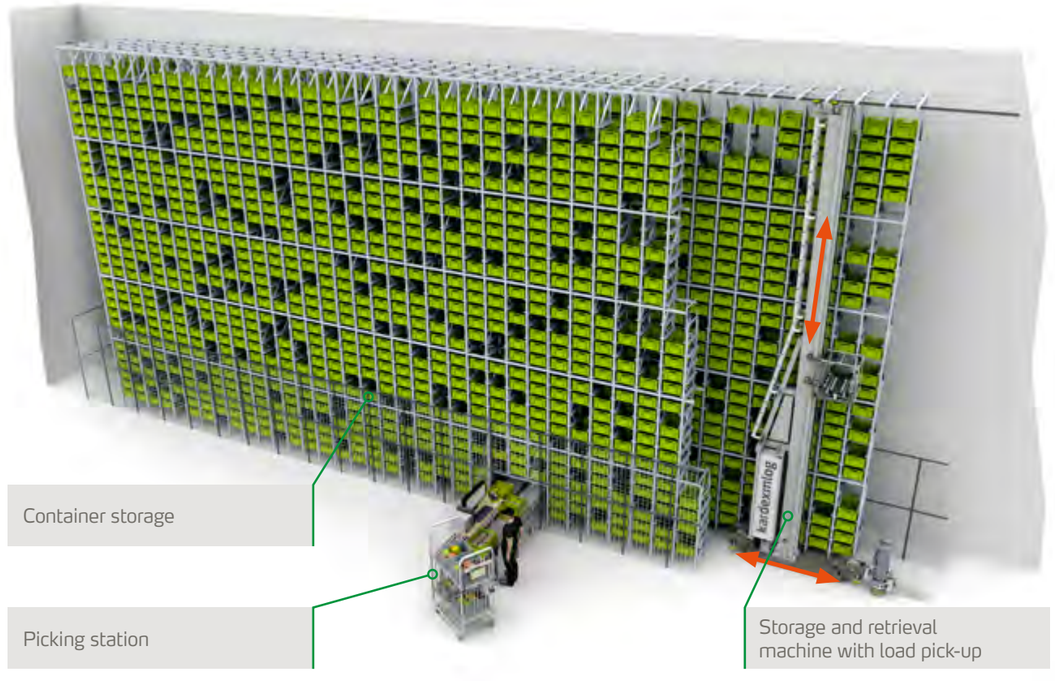
Storage capacity:
69 Euro pallets

Properties:
- Double-deep storage
- 9 levels
- (WxDxH): 12 x 7.5 x 24 m
- 1 driven storage lin
- 1 driven retrieval line

Storage capacity:
321 Euro pallets

MDynamic

Automatic container storage



Properties

- Automatic container storage
- Proven construction for small parts
- Single-deep and double-deep storage
- Energy-efficient design
- Complete module (Plug&Play)
- Scalable system

Benefits

- High storage capacity
- Reliable staging for picking
- Cost-effective
- High availability
- Adaptations possible to suit existing structural conditions
- Reduction in personnel and material costs

Consists of

- 1 automatic storage and retrieval machine with telescopic table
- Racking
- 1 picking station
- Control technology (Siemens S7)
- Autom. storage location management

MDynamic

Body:
Height: Up to 12 m
Length: Up to 90 m
Width:
Single-deep to 3 m
Double-deep to 3.5 m
Payload:
Single-deep max. 100 kg
Double-deep max. 50 kg

Containers:
600 mm x 400 mm (LxW) or
640 mm x 440 mm (LxW),
Height up to 420 mm
Handling capacity:
Up to 135 double cycles/hour

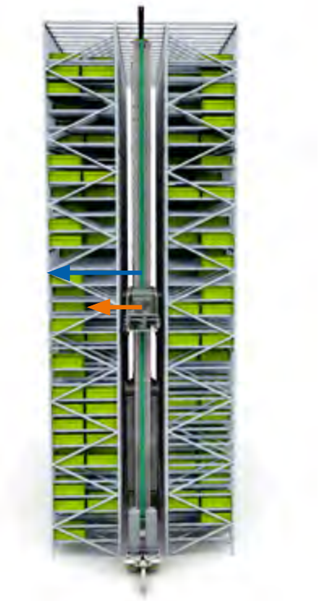
Picking station

The MDynamic system solution is a standardised and modular system designed for the handling of containers. It consists of a storage and retrieval machine, conveyor system, racking and storage location management.
The storage and retrieval machine with freely selectable overall heights between 5 m and 12 m is equipped with telescopic forks and belt conveyor. This means that up to 135 double cycles per hour can be achieved, depending on the dimension of the overall system.

The conveyor system consists of a picking module with a picking station. Up to four modules can be connected to the side of the racking. They can be integrated in the racking in any desired position without any structural modification.

The racking is designed for single-deep storage of containers of up to 100 kg and for double-deep storage of containers of up to 50 kg, and is available in variable sizes – height up to 12 m, length up to 90 m.

The MDynamic storage location management can easily be integrated into the existing IT environment and can be coupled with any conventional host system.

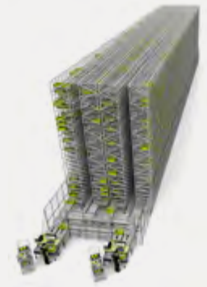


- Double-deep storage
- Single-deep storage

Configuration examples:

Properties:
- 1 MDynamic with racking
- Single-deep storage
- (WxLxH): 3 x 50 x 12 m
- 1 picking station

Storage capacity:
4032 containers



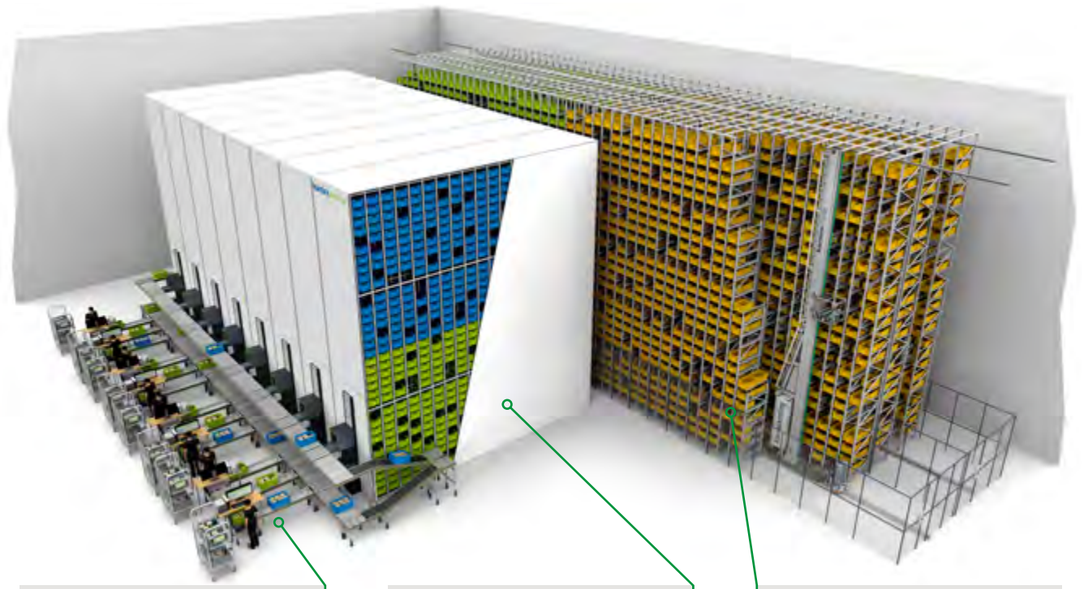
Properties:
- 2 MDynamic with racking
- Double-deep storage
- (WxLxH): 7 x 50 x 12 m
- Conveying technology and connecting elements
- 2 picking stations

Storage capacity:
16128 containers

kardexremstar

MDynamic and LR 35

Container buffer storage (MDynamic) with high-performance picking modules (Kardex Remstar LR 35) in the e-commerce environment



Connection elements and picking modules

High-performance picking module Kardex Remstar LR 35

MDynamic buffer storage

Properties

- Automatic container and picking warehouse
- Clear ABC article structuring
- High throughput
- Energy-efficient design
- Proven basic elements
- Complete module (Plug&Play)
- Scalable system

Benefits

- Fast access to A + B articles, direct access to C parts
- Easily and quickly extensible with modules
- Fast staging for picking
- ERP interface
- Easy installation and integration
- Reduction in personnel and material costs

Consists of

- Automatic container storage MDynamic
- High-performance picking module Kardex Remstar LR 35
- Racking
- Conveyor system with picking station
- Control technology
- WMS/MFC

MDynamic and Kardex Remstar LR 35

Combination of autom. container storage and high-performance picking module

Payload: max. 35 kg
Containers: 600 mm x 400 mm (LxW) or 640 mm x 440 mm (LxW), height up to 420 mm

Scalable complete system, direct access to all containers, ideal for e-commerce environment

Modularity

The combination of container buffer storage MDynamic with the high-performance picking modules of Kardex Remstar LR 35 enables a scalable automated warehousing solution, which consists of intelligent, configurable Kardex standard modules. Step-by-step expansion of throughput performance and warehousing capacity is possible with virtually no limits.

The modular solution offers a very short planning, tendering, and project time span. Also, the modular products are very easy to configure so that a tailored solution can be implemented based on standardised products and this can be connected to diverse types of container storage. Kardex Mlog's predefined storage and picking modules enable easy and low-cost entry into the world of automated warehouse logistics, step by step.

Goods to person – Picking

The system is a compact solution with direct access to each article, so that every square metre of your warehouse is put to effective use. Short staging times for article containers ensure high picking performance. The combination of Kardex Remstar LR 35 and MDynamic is particularly suitable for heterogeneous order structures with a large variety of articles in an e-commerce environment. Fast-moving and slow-moving items (ABC articles) can easily be picked simultaneously. This is especially relevant for the omni-channel sector where the times of peak demand vary widely.

Feeder station

High-performance picking modules

Value Added Services (VAS) as added value for your logistics process.

Inventory management, warehouse management and online process information are all factors that contribute to a fast and transparent internal logistics function. Not only can the solution be expanded quickly and incrementally, it also covers just about all customer requirements.

Strategy

The intelligent and modular warehouse logistics from Kardex Mlog fulfills all prerequisites for the future digitally networked world. With Kardex Mlog's flexible warehouse logistics solutions, you can take the next step into the digital age as the solutions provide you with a data set that can be used for future improvements within the internal logistics processes.

Configuration examples:

Properties:

- 1 MDynamic double-deep
- 4 Kardex Remstar LR 35 single-deep
- (WxLxH): 25 x 55 x 12 m
- Feeder station
- 2 picking stations "W"
- Conveying technology

Storage capacity:
11744 containers

Properties:

- 2 MDynamic double-deep
- 8 Kardex Remstar LR 35 single-deep
- (WxLxH): 29 x 55 x 12 m
- 2 feeder stations
- 4 picking stations "W"
- Conveying technology

Storage capacity:
23488 containers

Reasons

to choose a system solution from Kardex Mlog:

Modularity
System solutions are created from preconfigured modules. After initial implementation, the customer can extend his systems module by module to suit changing requirements.

Standardisation
Short project planning and implementation times for preconfigured system solutions. Thanks to the configurator and the options available, an offer can be created in a very short time. This reduces the planning and implementation time period.

Cost-effectiveness
The customer can achieve significant cost savings through the optimisation of his processes using standardised products.

Easy integration
The independent system solutions have certified interfaces to all standard HOST systems and can therefore be integrated without any problems.

Proven components
High reliability through tried and tested components. Components made in-house by Kardex Mlog.

Turnkey solutions from a single source
From requirements analysis through professional consulting and development of customised logistics concepts with standardised products, right up to implementation and a comprehensive service portfolio, Kardex Mlog is a full-range provider.

Storage and retrieval machines

System components for customised storage facilities.

Storage/retrieval machines

MSingle A

Single-mast S/R machine for **pallets**

Overall height: up to 24 m
Payload: 1,200 kg
Lifting speed: up to 80 m/min
Travel speed: up to 240 m/min
Load handling device:
- Telescopic fork (single-deep, double-deep, triple-deep)
- Channel vehicle MMove (multiple-deep)
- Special fittings

Other information:
- Emergency operating platform

MSingle B

Single-mast S/R machine for **pallets**

Overall height: up to 45 m
Payload: 2,400 kg
Lifting speed: up to 100 m/min
Travel speed: up to 240 m/min
Load handling device:
- Telescopic fork
- Channel vehicle MMove (multiple-deep)
- Two load handling devices/double fork
- Special fittings

Other information:
- Operator platform

MTwin

Double-mast S/R machine for **pallets**

Overall height: up to 45 m
Payload: 4,000 kg
Lifting speed: up to 80 m/min
Travel speed: up to 240 m/min
Load handling device:
- Telescopic fork (single-deep, double-deep, triple-deep)
- Channel vehicle MMove (multiple-deep)
- Special fittings

Other information:
- Operator platform

MOrder

Single-mast S/R machine for **pallets**

Overall height: up to 30 m
Payload: 1,000 kg
Lifting speed: up to 50 m/min
Travel speed: up to 180 m/min
Load handling device:
- Telescopic fork (single-deep, double-deep)
- Roller tables
- Platform
- Special fittings

Other information:
- Operator platform controlled manually
- picking area

MMini

Single-mast **miniload** crane

Overall height: up to 20 m
Payload: max. 300 kg
Lifting speed: up to 120 m/min
Travel speed: up to 360 m/min
Load handling device:
- Telescopic fork
- Telescopic table (with belt conveyor)
- Combination telescopic bracket
- Telescopic grab
- Push-pull device (with chain)

Other information:
- For containers (single-deep, double-deep)
- For trays (single-deep)

MDynamic

Single-mast **miniload** crane

Overall height: up to 12 m
Payload: max. 100 kg
Lifting speed: up to 180 m/min
Travel speed: up to 360 m/min
Load handling device:
- Telescopic fork
- Telescopic table (with belt conveyor)
- Combination telescopic bracket
- Telescopic grab
- Push-pull device (with chain)

Other information:
- For containers (single-deep, double-deep)
- For trays (single-deep)

MTwini

Double-mast **miniload** crane

Overall height: up to 24 m
Payload: max. 300 kg
Lifting speed: up to 100 m/min
Travel speed: up to 300 m/min
Load handling device:
- Telescopic fork
- Telescopic table (with belt conveyor)
- Combination telescopic bracket
- Telescopic grab
- Push-pull device (with chain)

Other information:
- For containers (single-deep, double-deep)
- For trays (single-deep)
- Two load handling devices/ double fork

Conveyor and warehouse technology

System components for customised storage facilities.

Conveyor systems

Chain conveyor

Function:
Transports the load in a transverse direction;
optional: lateral guide rails

Load carriers:
Europallets, industrial pallets, special pallets, cage pallets
Payload:
max. 1,500 kg per pallet position
Conveying speed: 0.2 - 1 m/s
Construction:
- Galvanised, height-adjustable feet
- Painted frame
- Galvanised support beams
- Duplex chain mounted in plastic runners
- Frequency-controlled drive
- Light barriers/sensors

Roller conveyor

Function:
Transports the load in a longitudinal direction;
load guidance with wheel flanges

Load carriers:
Europallets, industrial pallets, special pallets, cage pallets
Payload:
max. 1,500 kg per pallet position
Conveying speed: 0.2 - 1 m/s
Construction:
- Galvanised, height-adjustable feet
- Painted frame
- Galvanised support beams
- Frequency-controlled drive
- Light barriers/sensors

Accumulating roller conveyor

Function:
Transports the load in a longitudinal direction with accumulation function; each pallet position with individual drive and control logic;
load guidance with wheel flanges

Load carriers:
Europallets, industrial pallets, special pallets, cage pallets
Payload:
max. 1,500 kg per pallet position
Conveying speed: 0.2 - 0.6 m/s
Construction:
- Galvanised, height-adjustable feet
- Painted frame
- Galvanised support beams
- Galvanised steel rollers
- Frequency-controlled drive
- Light barriers/sensors
- Control module

Variants / conditions of use: Standard versions for normal conditions. Special versions possible for: explosion protection, low temperatures down to -28°C, increased protection against corrosion, clean room conditions.

Other elements: Swivel tables, pick-up/delivery station, depositing units, scissor lift tables, gravity roller conveyors, rotating/lifting elements, picking stations of all kinds, stacking units, scales, pallet checking and cleaning systems, integration of special machines, for example, stretch-wrapping machines.

Transfer unit - turntable

Function:
90° transfer of load from roller to roller conveyor or from chain to chain conveyor, without change of direction; throughput approx. 200 unit loads/hour

Load carriers:
Europallets, industrial pallets, special pallets, cage pallets
Payload:
max. 1,200 kg
Conveying speed: 0.2 - 1 m/s
Construction:
- Painted,height-adjustable frame fixed to floor
- High-quality bearing-mounted rotating platform
- Frequency controlled rotary drive
- Mounted conveyor module
- Limit switch
- Intrinsically safe design

Transfer unit - lift table

Function:
90° transfer of load from roller chain conveyor or vice versa; lifting principle with eccentric; projecting external rollers; throughput up to 240 unit loads/hour

Load carriers:
Europallets, industrial pallets, special pallets, cage pallets
Payload:
max. 1,500 kg
Conveying speed: 0.2 - 1 m/s
Construction:
- Painted, height-adjustable frame fixed to floor
- Galvanised lifting element actuated by eccentric rollers and sliding guides
- Lifting drive with brake
- Mounted conveyor module
- Limit switch
- Intrinsically safe design

Transfer unit - 4-way turntable

Function:
90° transfer of load from roller to roller conveyor, without change of direction; loading/unloading without intermediate rotation; unrestricted angle of rotation; throughput approx. 240 unit loads/hour

Load carriers:
Europallets, industrial pallets, special pallets
Payload:
max. 1,200 kg
Conveying speed: 0.2 - 0.6 m/s
Construction:
- Painted, height-adjustable frame fixed to floor
- High-quality bearing-mounted rotating platform
- Frequency-controlled rotary drive
- Mounted roller conveyor with crosswise driven rollers
- Limit switch
- Intrinsically safe design

Transfer unit - roller-chain conveyor

Function:
Transfer of load from roller to chain conveyor or chain to roller conveyor, with change of direction; throughput approx. 200 unit loads/hour

Load carriers:
Europallets, industrial pallets

Payload:
max. 1,200 kg
Conveying speed:
0.2 - 0.6 m/s
Construction:
- Painted, height-adjustable frame fixed to floor
- High-quality bearing-mounted rotating platform
- Galvanised lifting element actuated by eccentric rollers and sliding guides with chain conveyor and mounted roller conveyor
- Frequency-controlled rotary drive

Vertical transfer units

Function:
Vertical load transportation; load transfer with chain or roller conveyor; lifting height up to 25 m; throughput up to 180 unit loads/hour (at 5 m lifting height)

Load carriers:
Europallets, industrial pallets, special pallets, cage pallets

Payload:
max. 1,500 kg
Conveying speed:
up to 2 m/s
Construction:
- Painted single-mast design with guide rails
- Frequency-controlled vertical drive mounted at top or bottom of mast
- Painted lift carriage with rope pulley
- Mounted conveyor module
- Limit switch/laser
- Optional arresting device

Transfer carriage

Function:
Horizontal load transportation; carriage with on-board or off-board drive; load transfer with chain or roller conveyor or telescopic fork; throughput up to 180 unit loads/hour (depending on transfer distance/variant)

Load carriers:
Europallets, industrial pallets, special pallets, cage pallets

Payload:
max. 1,200 kg per load transfer
Conveying speed:
up to 4 m/s
Construction:
- Painted carriage with 4 wheels
- Guided by 2 pairs of pressure rollers
- Frequency-controlled drive unit (on-board or off-board)
- Handling of one or more loads
- Aisle equipment (rails, bus bar, positioning, end buffer and optical data couplers)

Transfer carriage with lifting device

Function:
Horizontal load transportation and distribution across several levels; load transfer with chain or roller conveyor or telescopic forks; throughput up to 120 unit loads/hour (depending on transfer distance/variant)

Load carriers:
Europallets, industrial pallets, special pallets, cage pallets

Payload:
max. 1,200 kg per load transfer
Conveying speed: up to 2 m/s
Hubhöhe: up to 3 m
Hubgeschwindigkeit:
up to 1 m/s
Construction:
- Painted carriage with 4 wheels
- Guided by 2 pairs of pressure rollers
- On-board lifting frame
- Frequency-controlled drive unit (on-board or off-board)
- Load transfer for one or more loads

Control devices

Function:
Checking the load for:
- profile, using light sensors
- overload, using load cells
- pallet clearance, using light barriers or mechanical flaps

Load carriers:
Europallets, industrial pallets, special pallets, cage pallets

Construction:
- Aluminium frame with light barriers and sensors

Electric monorail

Function:
Overhead conveyor system with individually driven chassis; flexible adaptation of the guideway to complicated conditions. Performance dependent on length of track and number of vehicles.

Load carriers:
Europallets, industrial pallets, special pallets, cage pallets, special formats
Payload:
Modular construction:
max. 2,000 kg
Conveying speed: up to 2 m/s
Construction:
- Rails
- Lifting and lowering station
- Lifting belt
- Transfer unit
- Lift carriages and frame
- Buffer and weights
- Frequency-controlled drives and points
- Position sensors
- Absolute positioning
- Communication via WLAN

Note: All data relate to our standard models. In addition, special models can be realised for load units with different dimensions, weights etc. We would be happy to advise you – just call us.

Warehouse technology - MMove

With MMove, fast and safe around your warehouse

Height: 150 mm
Load per shuttle: 1,200 kg
Speed:
without load: up to 3 m/s
with load: up to 2 m/s
Acceleration/braking:
without load: up to 3 m/s²
with load: up to 2 m/s²
Lift time: < 1 second
Range when fully loaded:
up to 350 metres

The innovative MMove is the new universal transport platform for pallets and cages, etc. up to a weight of 1,200 kg. With reduced acceleration and speed, this increases to 1,500 kg. Thanks to its unique concept, the MMove can be used in a variety of applications:

- With storage and retrieval machines for storage at multiple depths
- With distribution vehicles for distribution and intermediate storage
- As a single transport system from A to B
- Multiple MMove in a single aisle
- The MMove can independently switch from one aisle to another

The energy supply is provided by powerful energy storage devices (Powercaps)[1] which enable up to 350-metre trips when fully loaded. The braking process is used intelligently for energy feedback. Via innovative and secure communication modules, the MMove communicates with its environment and provides information on current orders and statuses.
The MMove transports your products quickly and safely. It grows to match your tasks - within the automatic warehouse or beyond.

[1] Powercaps with 8 times the normal battery life.

Area of application

- Automatic movement of pallets, cage boxes, etc. inside and outside a warehouse

Compatible

- The MMove is compatible with all Kardex Mlog storage and retrieval machines

Efficient modules

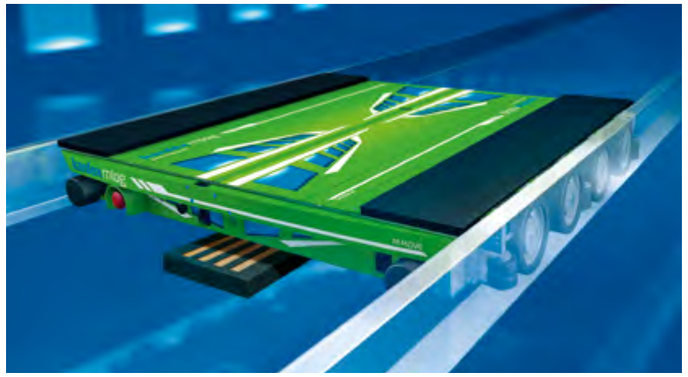
- Automatic energy-saving mode
- low-energy data communication
  - outside the WLAN network
  - no disruption to IT
- Binary interface
- Ethernet interface

Energy-efficient high-performance energy storage with more than 8 times the normal battery life

Innovative low-energy communicator
Innovative and secure communication module

≤ 10-second charging time with the 400 volt energy charging module

Maintenance-free
DC drives



Film: MMove - fast and safe around your warehouse.

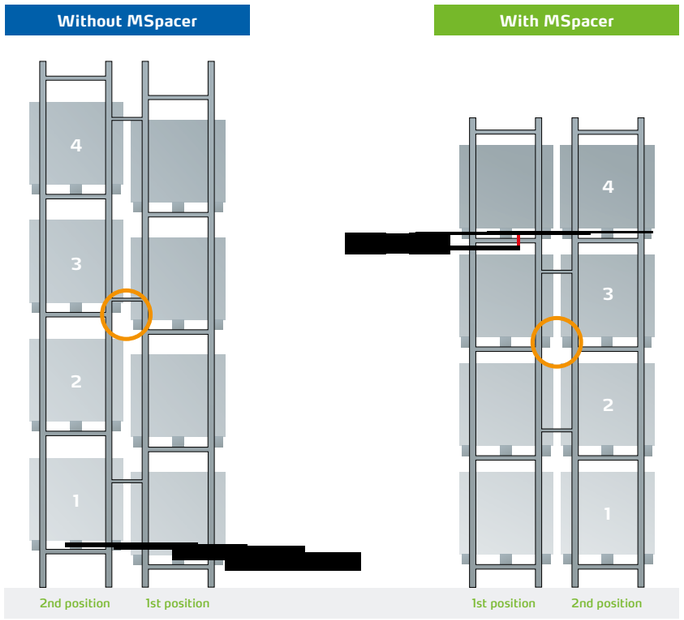
MSpacer

Approx. 10% space savings in your high-bay warehouse

The new MSpacer technology reduces the space requirement by approx. 10% compared to a conventional high-bay warehouse with double-deep storage. This is now possible with a new innovative telescopic fork which has been developed jointly with leading German research institutes. With MSpacer, you can store the pallets in the back row on the same level as those in the front row. This means that the additional blocks normally required at the back are no longer necessary. This reduces your costs and ensures more efficient use of your storage space.

- Cost savings through storage volume reduction
  (roof, wall, floor panel ▪ steel racking ▪ energy costs)
- Performance increase through shorter distances
- More storage spaces with the same warehouse volume

Load per fork:
1st position: 1,000 kg
2nd position: 800 kg
Telescope speed single-deep
without load: 80 m/min
with load: 50 m/min
Acceleration/braking:
without load: 1,6 m/s²
with load: 0.8 m/s²
Telescope speed double-deep
without load: 80 m/min
with load: 50 m/min
Acceleration/braking:
without load: 1.6 m/s²
with load: 0.8 m/s²



≤ 100 mm height gain with the MSpacer
on each level

Your advantage

- Low costs
- Greater performance
- Better use of space

Compatible

- The MSpacer is compatible with all Kardex Mlog storage and retrieval machines

Film: MSpacer - Reducing unused storage space.

Modular conveying technology

The function-based conveying technology modules are the perfect complement to our system solutions for pallet handling. The following modules are available for the storage, retrieval, and picking functions:

Storage:

- Feed point with pallet check and NOK handling
- Operation with forklift truck / electric pallet truck
- Lateral connection to the racking

- Feed point with depositing unit, pallet check and NOK handling
- Operation via manual pallet truck
- Lateral connection to the racking

- Feed/pick-up point with pallet check and NOK handling
- Operation with forklift truck / electric pallet truck
- Frontal connection to the racking

Picking:

- Picking station with pallet check and NOK handling
- Lateral connection to the racking

- Gravity roller track with picking station for permanent staging
- Lateral connection to the racking

- Picking station with pallet check and NOK handling
- Frontal connection to the racking

Retrieval:

- Pick-up point
- Operation with forklift truck / electric pallet truck
- Lateral connection to the racking

- Pick-up point with depositing unit
- Operation via manual pallet truck
- Lateral connection to the racking

- Gravity roller track with permanent staging in shipping area
- Lateral connection to the racking

- Feed/pick-up point with pallet check and NOK handling
- Operation with forklift truck / electric pallet truck
- Frontal connection to the racking

MCC Software

Modular
software solutions.

Modular solutions

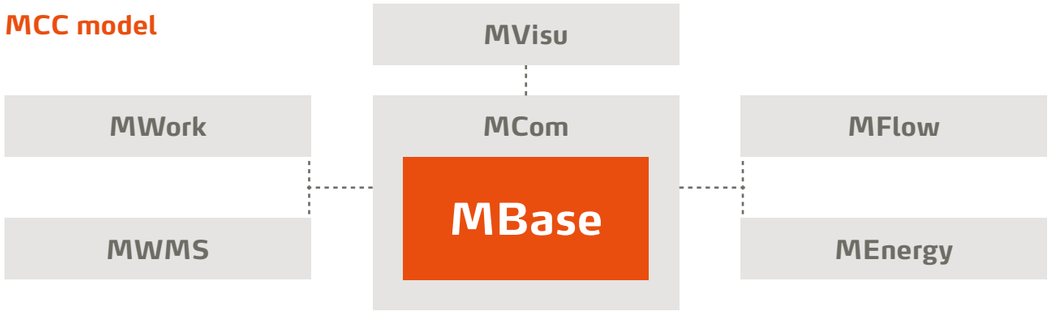
Efficient and reliable software solutions for warehouse management are just as important for the productivity of modern warehouses as the hardware components.

For this reason, Kardex Mlog develops modular IT concepts which can be parameterised individually for the processes and requirements of your warehouse and sustainably coordinate and monitor your flow of goods. Our services include customer-specific development, implementation and integration of advanced software solutions, which can either be integrated in existing process environments or serve as higher-level control software – as stand-alone solutions from goods receipt to goods issue.

The products from the family of the Kardex Mlog Control Center (MCC) allow material flow processes to be controlled more quickly and efficiently. From user administration through linking of interfaces and visualisation of the complete facility up to intelligent energy management, the modules of the MCC offer flexible concepts for your material flow.

The MCC makes it possible to integrate software solutions into existing and newly-conceived value and supply chains. The high level of flexibility means that different packages or individual modules can be integrated in the warehouse management system. In addition, the system can be adapted to your specific needs.

MCC model



MBase base module

All system settings such as user and operating mode administration, database management or system data configuration are already contained in MBase, and are freely configurable. For example, logging on and off times, access authorisations and operating modes can be administered and controlled. Even with this basic version, both operating times and different parts of the system can be parameterised individually.

The basic module serves as a basis and platform for all additional modules. All configurations and the initialisation of the other software take place here. MBase is therefore already equipped with interfaces with both the individual modules of the MCC as well as existing software environments. The browser-capable interface allows full access to the functions, both via the integrated user interface and via pre-defined clients.

Database system:
- Microsoft SQL Server
- Oracle

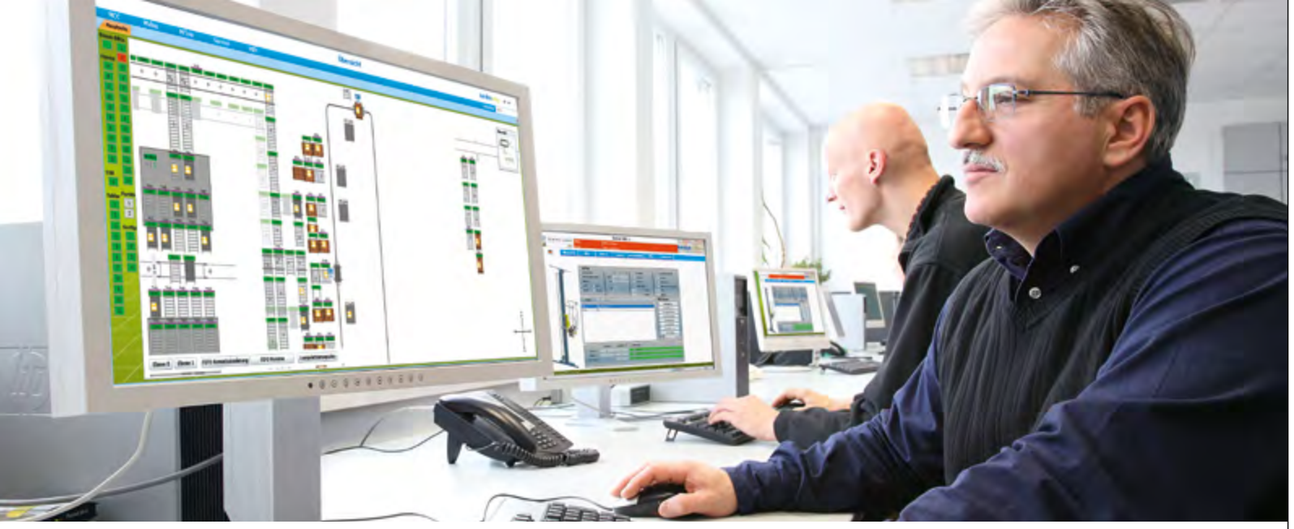
Programming:
- C#
- C/C++

Functions:
- Extensive reporting functions
- Access possible via the server and via predefined clients, user administration including logging on and off
- Administration of general operating modes
- Output of dialog and error texts
- Language selection, integrated help system, management of statistics
- Administration of the dialog boxes, database management, document printout
- Central administration of configuration
- Audit trail

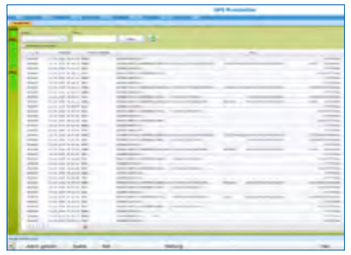
MVisu visualisation system

The system visualisation module allows all automated conveyor systems and storage/retrieval machines as well as their operating status to be represented graphically. MVisu makes it possible to control the material flow system interactively – from context-related location data processing up to notification in the event of a problem with the system. The visualisation system is connected with the automation devices of the control systems via TC P/IP, data is continuously exchanged between the systems. In addition, HTML5 technology also enables display of plant information on mobile devices and tablets.

Functions:
- Visualisation of conveyor systems, storage/retrieval machines, electric overhead conveyors, movement directions in moveable conveyor modules, operating statuses, configuration of signalling devices
- Context-related location data processing
- Reporting of system faults
- Statistics functions relating to transports, plant performance, availability



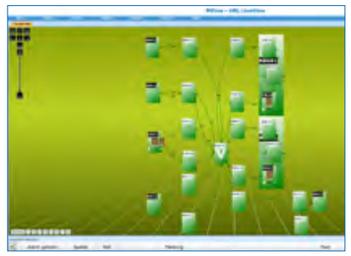
MCom communication module



The module forms the interface with other higher-level systems as well as the subordinate controls. Using Mcom, different interfaces can be integrated into the system depending on the application, e.g. for communication with modern controls via Ethernet, with various database systems or for integration with enterprise resource planning via SAP.

Interfaces:

- TCP
- Serial
- WebService
- Database interface for ODBC, Oracle, MS SQL, Pervasive, Ingres
- SAP
- Special extensions are possible



MFlow material flow control

The material flow control system is used to control conveyor systems and storage/retrieval machines. The MFlow module tracks all material flows. With an order administration function, route planning and the possibility of manual intervention in the process, MFlow fulfils all the requirements of a material flow control system. The entire project, together with all the processes involved, can be tested in advance, also without installations and local controllers (PLCs), with the aid of the simulation module MSim:

Control of conveyor systems:

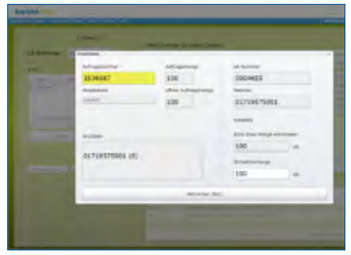
- Buffer management, picking, priority control, dynamic routing

Control of storage/retrieval machines:

- Monitoring of controls / storage and retrieval
- Picking runs
- Lane depth monitoring

Functions:

- Control of conveyor systems, storage/retrieval machines, industrial trucks, electric overhead conveyors
- Emulation of the material flow
- Analysis of automatic scanners
- Recording and checking of weights
- Display and monitoring of status of equipment
- Output of error reports
- Statistics



MWork workplace module

This Web-based interface allows orders for the warehouse management system to be viewed and processed. The user can access the transport orders and, in combination with MWMS, the dialog boxes of the warehouse management software, e.g. the picking dialog or inventory information. MWork features predefined dialog boxes which, because of the browser capability of the clients, can be edited irrespective of location.

Dialog boxes:

- Storage and retrieval
- Picking
- Packing
- Inventory count
- Quality assurance
- Individual expansions possible

Functions:

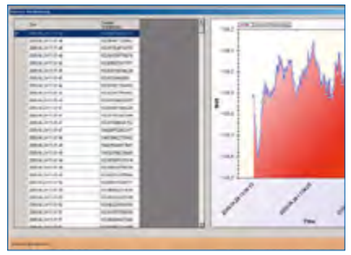
- User interface with predefined dialog boxes
- Individual adaptation of the dialog boxes to customer-specific requirements
- Processing of orders from warehouse management (MWMS module)
- Recording of entries
- Mobile data processing

MWMS warehouse management

Intelligent strategies are the foundation stone for the rapid and efficient control of the intralogistics processes. With the MWMS warehouse management system, the allocation of storage locations as well as the storage and retrieval processes can be planned and centrally coordinated – irrespective of the type of storage facility.

Functions:

- Optimised storage location allocation
- Management of storage notifications
- Sequencing
- Deep-lane storage
- Management of 2/3 space storage
- Order management for picking stations, floor conveyor vehicles, goods issue zones
- Compaction
- Stock level monitoring
- Stock removal orders with automatic release and missing part control
- Blocking and QA handling
- Route planning

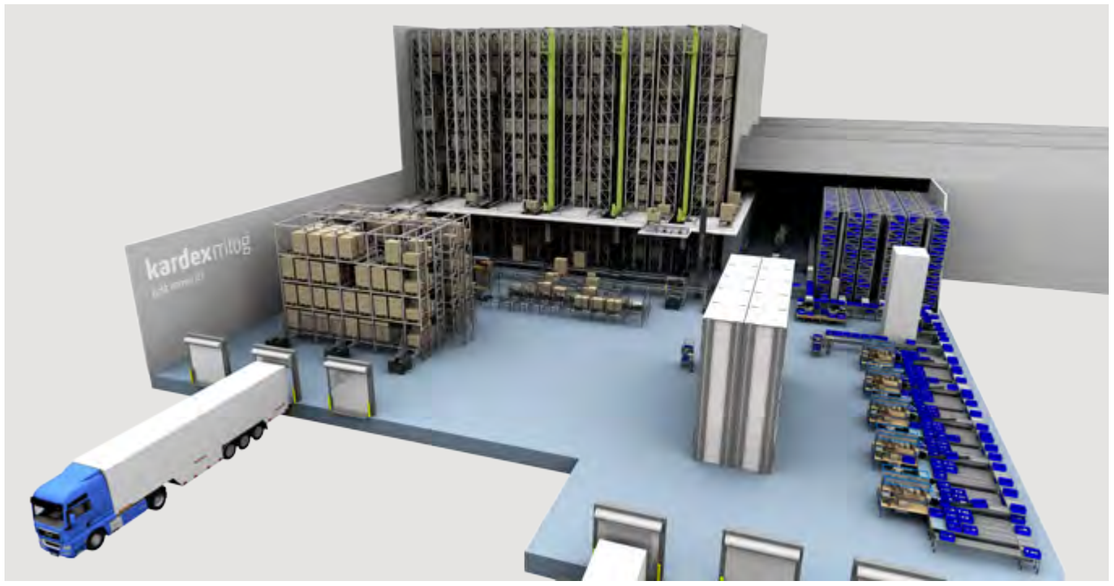


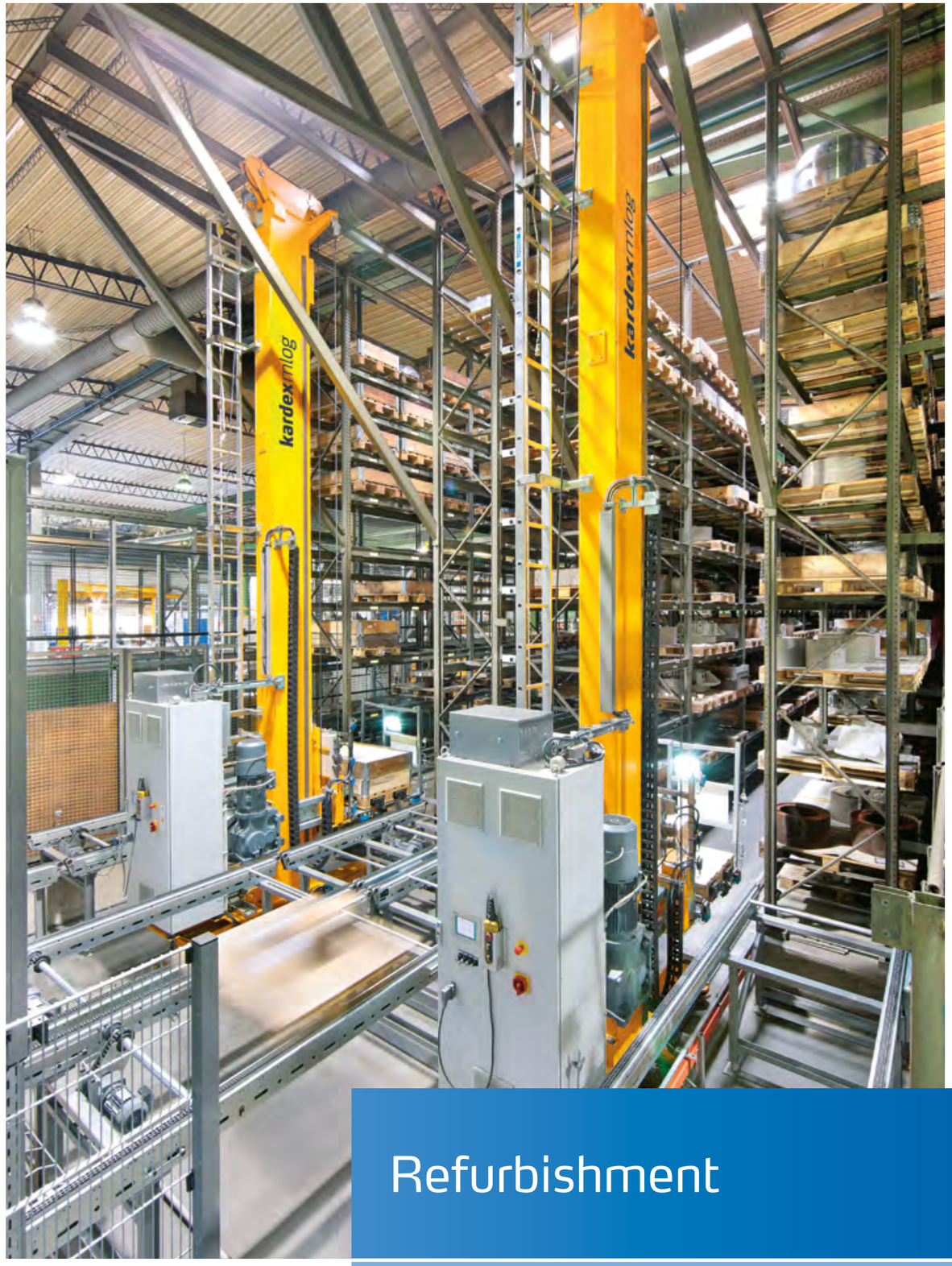
MEnergy energy management

Kardex Mlog develops intelligent systems for controlling machines and material flows in order to adapt the dynamics of conveyor systems and storage/retrieval machines to current demands and thus save energy. MEnergy adjusts the dynamics of the storage/retrieval machines and conveyor systems to the current situation. This allows start-up behaviour and speeds to be regulated and surplus energy can be used to drive the axes or fed back into the internal supply network.

Functions:

- Weight optimisation of the conveyor systems and storage and retrieval machines
- Route optimisation
- Reduces friction and losses in the conveyor systems and storage and retrieval machines
- Energy recovery
- Energy optimisation of the component controls
- Adaptation of dynamics to demand





Refurbishment

State-of-the-art technology
- with no interruptions.

Keep your warehouse up to speed

A modern, state-of-the-art warehouse is efficient, energy-saving and enables fast handling of goods. Incorrectly sized or obsolete facilities are prone to malfunction, are costly to operate, and restrict the growth of your company. Professional refurbishment will pay for itself very quickly.

The prerequisite for successful and sustainable refurbishment: The measures taken are based on your actual needs and are tailored to the current state of the plant. For this reason, every refurbishment carried out by Kardex Mlog begins with an analysis. The first step is a detailed check and examination: "the plant check". Based on this, we work with you to develop a tailored refurbishment schedule and we then implement this during ongoing operations – from the replacement of individual components right up to fundamental refurbishment of the entire plant and the optimisation of processes and workflows.

- Objective analysis of plants, processes and workflows
- Innovative diagnosis tools
- Individual assessment
- Benchmarking

Objective plant check

At Kardex Mlog, we don't just check the technology, but the entire logistics concept. We want to concentrate on the causes, not the symptoms. In a detailed analysis, we use objective criteria to form an accurate picture of the condition of the plant and we compare this with the requirements profile and the competition.

All information is evaluated and weighed up. The result is a refurbishment concept with which you can quickly and cost-effectively bring your plant up to date.

Refurbishment solutions that fit

The right preparation saves money during implementation and enables the work to be done during ongoing operations without affecting your business. Therefore, before each step, we jointly define the objective and the strategy, schedule and milestones.

The fact that we spend more time on the preparatory phase provides subsequent planning certainty, transparency, and a precise sequence of exactly coordinated activities. And a plant that runs perfectly and is an excellent fit for your company. Quite simple actually.

- Individual and personal consulting
- Transparent and plannable costs
- Minimal downtimes
- Highest efficiency
- Tailored solutions

Cost-effective integration into your existing facility

In order for the refurbishment to begin right where it's needed and to ensure that well functioning areas are left alone, good planning on its own is not sufficient. What's needed is experience, know-how and the kind of instinct that is developed through hundreds of successfully implemented projects. The experts at Kardex Mlog have this instinct.

Whether it's a replacement, an extension or a total refurbishment: We guarantee short implementation times, seamless integration into your existing plant, and a perfectly crafted result. Our own production plays a role too as we can custom-manufacture all the key components.

- Maximum precision
- Know-how from hundreds of projects
- Seamless integration into your existing facility
- Short implementation times
- Implementation during ongoing operation

Services provided by professionals for professionals

Each plant is only as good as the people who run it. For this reason, intensive training of your employees to use the new components is an integral part of our service. In addition, we can provide individual training courses or group seminars.

Over the long term, we guarantee smooth operation of your plant through continuous updates and spare and wear part services which also include third-party components. The optimal plant is the one which you don't need to worry about.

- Intensive training courses provided by qualified trainers
- Seminars on site
- Telephone Hotline and Helpdesk
- Spare parts service from a single source for our Kardex Mlog and third-party components

Refurbishment investment that pays off

A well planned, tailored refurbishment, therefore, pays for itself very quickly. Kardex Mlog develops customised refurbishment concepts which can be implemented rapidly during ongoing operations. From day one, you reap the benefits of a modern, state-of-the-art plant – no matter when it was built.

There are several excellent reasons to refurbish

- Lower operating and energy costs
- Significant performance gains
- Increased capacity as a result of more effective use of space
- High availability, minimal downtimes
- Optimised processes
- Transparent processes which make for easier troubleshooting
- Improved usability
- Guaranteed supply of spare parts
- Extended useful life of your warehouse

Replacement of telescopic fork drive.

The range of possible refurbishment measures is huge. In some cases, you need only replace a few individual components in order to sustainably improve the capability of the entire system. In obsolete plants, however, with restricted availability, a complete refurbishment is frequently the best option, or the existing warehouse must be reorganised to meet new requirements.

From component replacement to complete refurbishment

Replacement of parts and components

Modern components are more capable, require less maintenance and, in the event of breakdown, they can be sourced faster than older obsolete parts.

Chassis of storage and retrieval machine old/new.

Refurbishment of control systems

The intelligence of your plant depends on its control system. For control refurbishment, we offer the following modules which can be combined to suit your requirements:

- Conversion to S7 standard
- Connection to higher-level ERP systems/SAP
- Use of current Profinet systems
- Integration of energy efficiency technologies
- Installation of precise positioning systems
- Installation of camera systems
- Changeover to state-of-the-art communication technology
- Installation of web-based visualisation systems

Conversion from S5 to S7.

Replacement of entire units

Storage and retrieval machines and conveying system units from Kardex Mlog are often still in use decades after installation – proof of the quality made in Neuenstadt.

However, new warehouse logistics requirements, modified processes in the warehouse, higher throughput rates, or different types of pallets can in some cases mean that entire units need to be replaced. Kardex Mlog can replace storage and retrieval machines or conveying system units such as vertical transfer devices or distribution vehicles - independent of manufacturers.

Lift unit of storage and retrieval machine old/new.

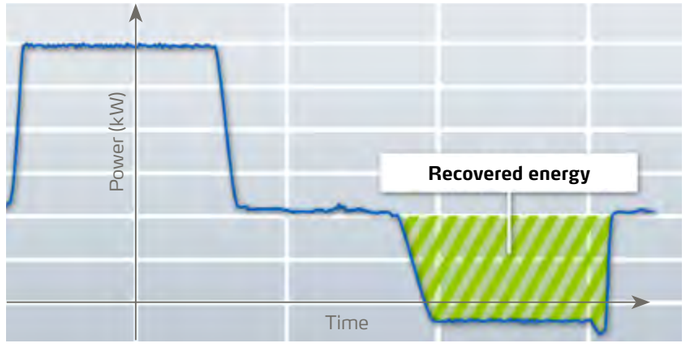
With the Kardex Mlog energy check, we identify electricity guzzlers and areas with savings potential. Finally, together with you, we develop a concept for holistic refurbishment to lower energy consumption and reduce CO_2 emissions.

Concepts for greater energy efficiency

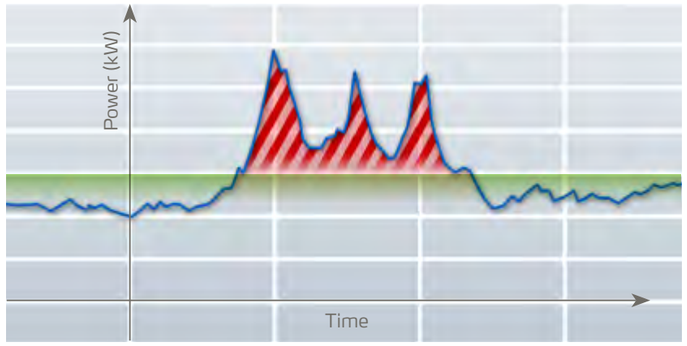
Drive systems
Modern frequency-controlled motors are highly efficient with low consumption and minimal wear.

Energy recovery
The energy released during braking and lowering is not converted into heat but is fed back into the system and used for propulsion and lifting.

Frequency-controlled chassis motor of storage and retrieval machine.



Avoidance of peak loads
Short-term peak loads drive energy costs up and can be avoided with intelligent plant management.



Energy management
Modern plant control matches speed and acceleration to current demand and can thereby reduce consumption and wear in periods of lower capacity utilisation.

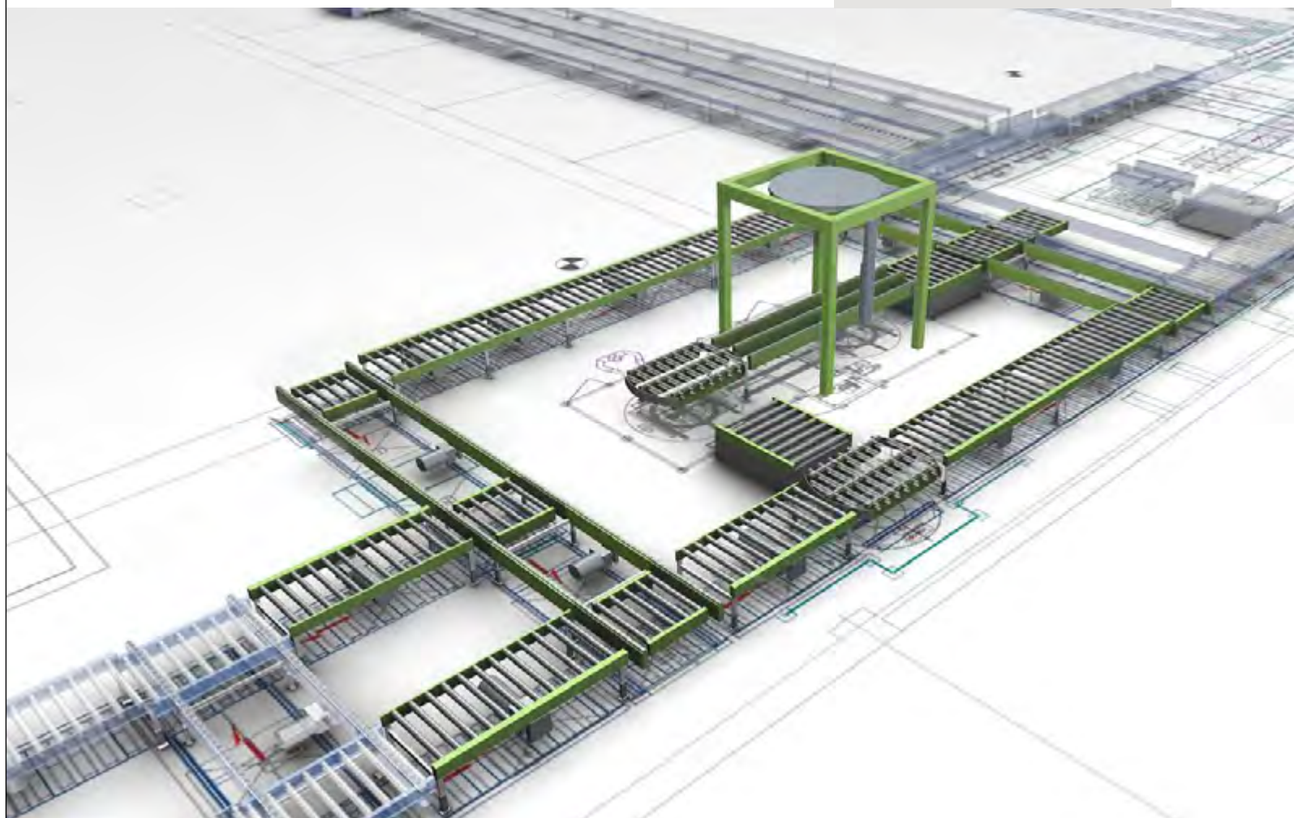
Replacement of IT systems
For the economic viability and availability of your warehouse, reliable software solutions are just as important as the hardware components. Obsolete warehouse management systems or material flow control systems are replaced, if necessary, by the Kardex Mlog Control Center, MCC. For efficient control of your material flow processes, this solution offers various modules - from user management, interface networking, plant visualisation, right through to energy management.

Reorganisation and optimisation of the processes
Measures to improve the processes and, as a result, performance are not restricted to technology. Very often, significant optimisation potential can be identified in the daily operations of the warehouse. Systems installed in the course of refurbishment often require new processes and render some manual tasks superfluous. We view the organisation of the warehouse as an integrated component of every refurbishment project and we assist you in realising this potential.

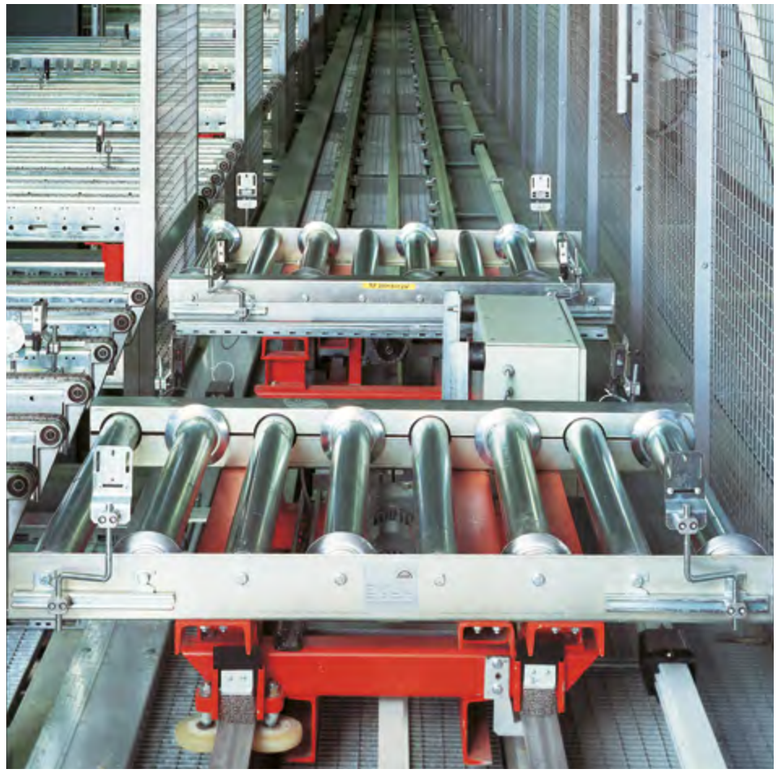
State-of-the-art technology - with no interruptions

If ongoing production is to continue uninterrupted, good planning is sometimes not enough. Extensive experience is required, as is know-how and the feel and sensitivity that can only be gained through hundreds of successfully completed projects. Kardex Mlog has this experience – we guarantee short implementation times and seamless integration with your existing facility.

Refurbishment concept:
Reorganisation and optimisation of the processes.



Transfer cars old / new.



Customer service

Professional services
made to measure.

Customer service

Service offerings ensure the availability and the long-term viability of your plant. Kardex Mlog offers you a flexible portfolio of professional service offerings.

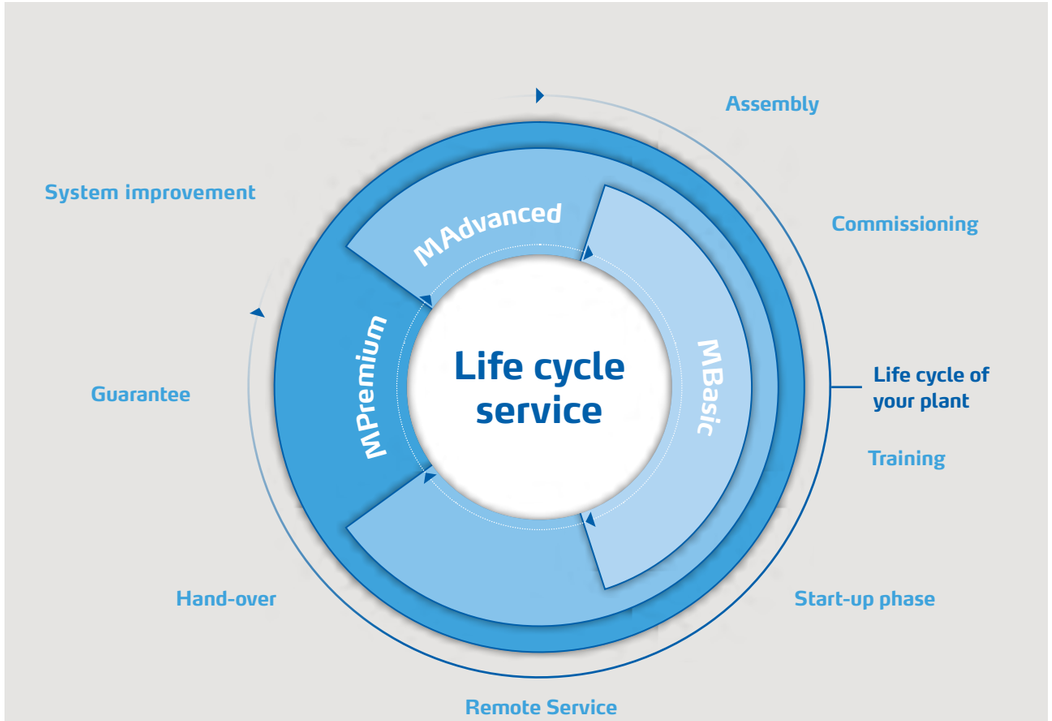
Smart Services 4.0

We are already working with Smart Services such as tablets and smartphones and we offer various **remote services** and **predictive maintenance**.

Since our plants are equipped with highly intelligent sensors, we can collect, analyse (data mining), and evaluate basic data. This is used to improve the processes.

We continue to grow and develop to serve you better. For this reason, we are already implementing condition monitoring, augmented reality, and service apps and are integrating smart approaches in our service offerings.

Life cycle service - We support your system



Our life cycle service ensures that we can provide you with optimal support services during the entire lifetime of your plant and that your plant is always state of the art. With life cycle service, you can rely on the safety, sustainability and economic viability of your facility.

Service Packages - To ensure the highest possible plant availability

We have designed our service packages MBasic, MAdvanced and MPremium with the objective of guaranteeing the highest possible plant availability.

MBasic

With MBasic, you set the framework for high availability, maintenance of the warehouse key figures of your logistics solution and, as a result, compliance with the minimum legal requirements. All services are carried out by highly-skilled and QM-qualified service employees.

- Inspection / maintenance
- Spare-parts package
- Remote Service
- Hotline: Mon.- Fri. 7:00 a.m. - 5:00 p.m.
- Repairs by agreement
- Training
- Safety inspection (UVV)
- Racking inspection (EN 15635)

MAdvanced

Faster, better, more efficient!
Compared to the MBasic services, this offers even faster reaction and on-call service times and extended hotline times. You also benefit from our service consulting to optimise your plant performance and from our fast replacement support for spare and wear parts. Within the framework of the temporary operational support, you can optionally avail of the assistance of our service personnel during the start-up phase of your plant.

- Spare and wear part support
- Remote Service
- Hotline: 24 h / 5 d a week
- On-site call service
- Service consulting (at least once per year)
- Monitoring of your plant
- IT maintenance
- Temporary operational support

MPremium = Full service

The best of all - with our premium services, the full service option.
Take advantage of an all-inclusive, worry-free package:
We handle the complete maintenance on-site at your premises. From personnel recruitment to maintenance planning, right up to spare-parts management including physical inventory. You also benefit from an extended warranty. Our service team is permanently on site and manages the technical operation of your plant.

- Full service: complete on-site maintenance including provision of personnel
- Remote Service
- Hotline: 24 h / 7 d a week
- Extended warranty

Full service

Companies need to be able to rely on uninterrupted operation of the plant – why not outsource maintenance, troubleshooting and spare parts management to a reliable and competent partner?

Outsourcing that pays off

With the full service concept, Kardex Mlog is your partner for the entire life cycle of the plant. Personnel trained specifically for your plant are on site and provide a full support service.

The operator need no longer train and maintain specialist company employees to service the warehouse technology. The available staff can be more effectively deployed in the core business.

Kardex Mlog assumes responsibility for the entire technical operation of the warehouse. A service team from the company handles and logs repairs, inspections, regular maintenance and safety checks, optimisation of the key performance indicators (KPIs), and spare parts management. Our specialists are permanently on site.

Benefits to you

- Budget security during the lifetime of the contract = transparent costs
- Outsourcing of responsibility for the high-bay warehouse = concentration on your core competences
- Qualified, trained personnel through recruitment and training
- Guaranteed plant availability
- All services from a single source – a single contract partner for both plant and service
- Faster troubleshooting and fault correction
- Continuous improvement process – through close liaison with the plant manufacturer

Kardex Mlog service team on the job e.g. at VHZ (formerly Topdeq) in Pfungstadt.

Service offerings

Maintenance

Our maintenance concept ensures high plant availability. Our highly-qualified service technicians carry out maintenance in accordance with the manufacturer checklist. Preventative, regular and predictive maintenance ensures that any weak points are recognised and removed at an early stage. This keeps downtimes to a minimum.

Spare-parts package

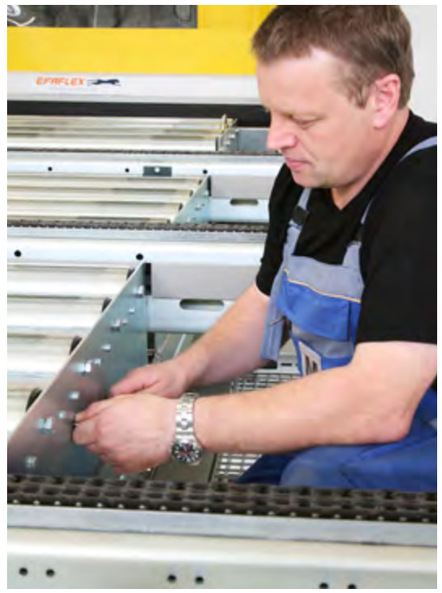
We define a spare-parts package according to the customer's requirements. By stocking spare parts at the customer site, any downtimes are kept to a minimum. In the event of a disturbance, our service technicians have access to spare parts on site and can repair the plant without delay. This saves time and money!

On-site call service

If you are relying on a Kardex Mlog service technician in the event of a problem, the reaction time depends on the type of service agreement you have. The service technician can be on site by the next day or within two hours. A round-the-clock service is also available.

Temporary operational support

In an operational support measure, Kardex Mlog will provide you with your own service team on-site, for example, during the start-up phase, during peak times or as replacement for employees on holidays. The team is trained specifically to handle your plant. The size of the team depends on your particular requirements. Our service personnel can be deployed in single or three-shift operation. This way, your own employees can acquire technical know-how right from the start.



Service offerings

Service consulting

Service consulting takes place once each year. Through regular liaison with our service experts, any weak points in your system can be eliminated promptly and any potential for improvements identified. At the same time, you keep up-to-date on new technologies and possible process optimisations.

Profibus analysis

Using Profibus/ASI bus analysers, we can recognise undesirable interruptions caused by ageing components and other gradual changes before damage occurs and thus minimise any downtimes. The analysis is carried out on site by our service experts. After the analysis, you will receive a detailed status report on your plant.

General overhaul of the telescopic fork

With a general overhaul of the forks, you can prevent positioning errors due to wear, complete failure of the fork or, in a worst case scenario, downtime of the storage and retrieval machine. Using a replacement fork and roundabout exchange, all forks are sequentially removed, overhauled and reinstalled. Through the use of the replacement fork, the operation of the plant is not disrupted. During the manufacturer-independent general overhaul, the forks are fully disassembled and then reassembled. Defective or worn parts are replaced with new ones. This enables error-free storage and retrieval for many years to come.

Spare and wear parts support

We guarantee fast and straightforward delivery of original spare parts no matter where you are in the world. Whether it's a new plant, an older facility, or a refurbishment of your existing plant, you will always have a personal contact person available who can provide support with technical questions, repairs, or warranty issues. And whether per e-mail, fax, post or by phone, we make sure that your order is delivered as quickly as possible.

Hotline, Remote Services

Our telephone support and remote service are tailored exactly to your requirements. You can opt for regular working hours support from 7:00 a.m. to 5:00 p.m., 24 hours per day, or even the entire week (24/7). Support is provided by project-experienced and highly-qualified hotline personnel. Through targeted and specific diagnostics, approx. 96% of all malfunctions can be resolved by telephone or remotely. If, in exceptional cases, this does not provide a solution, then you can avail of our on-site call service with varying response times.

Training

We offer a broad range of tailored training courses for plant operators, maintenance personnel, and plant managers. In all cases, your employees will be trained so that they understand how your logistics plant works, and they will be well qualified to operate and maintain it. We prefer to hold the training courses on-site at your plant but, if you wish, we can arrange them at our premises in Neuenstadt.

Full service

With our full service team, we assume round-the-clock, full responsibility for the availability and performance of your plant. We handle all tasks including maintenance, hotline, troubleshooting and repairs – be it for mechanics, control, or IT. In addition, we develop emergency plans and we look after spare parts management. We provide the technical support for your plant and you can devote 100% of your energy to your core competences.

Extended warranty

We offer an extended warranty which goes beyond the normal warranty period of two years. This is valid for 3 or 5 years, depending on the customer requirement. Your advantage: Your budgeting security with regard to repairs and spare parts is extended for the agreed period.

Safety inspection

The safety of your employees and the reliability of your plant are our priority and both are subject to regular, legally prescribed inspections. These are carried out once every year and you receive certification of the results. This not only increases the level of safety for your employees but also increases the economic viability of your company.

Racking inspection

In accordance with DIN EN 15635, warehouse equipment and racking must be inspected by a qualified person at least once every twelve months. Automatic high-bay warehouses are inspected at a rate of 20% per year over a period of 60 months. Kardex Mlog is a certified racking inspector and carries out manufacturer-independent racking inspection.

Greater safety in your warehouse

Occupational safety through safety training and equipment training

Your obligations
As the employer or manager, you are not only responsible for the economic success of your company, but also for the health and safety of your employees on the job.
The plant operator is obliged by labour law to provide employees with the necessary safety equipment and to provide appropriate training.
In accordance with Section 12 of the ArbSchG (i) (German Labour Protection Act) and BGV A1 Section 4, this instruction must take place at appropriate intervals, at least once annually.

Our services
Kardex Mlog can provide safety training which is specially tailored to your plant and requirements. Our trainers will discuss the course content with you. The training courses consist of the following modules:

- Proper use of the safety facilities in the aisle
- Proper use of the storage and retrieval machines and conveying technology
- Proper use of the safety gear
- Maintenance/operation of mechanical components
- Maintenance/operation of electrical components
- Training in the basic functions of the plant / material flows

Our trainers come to your premises and carry out the training directly at your plant.

You can find the statutory regulations concerning the obligations of the employer with regard to safety and health protection here:

Benefits to you
With our safety training courses, you satisfy the relevant regulations concerning training of your employees to properly use storage and retrieval machines and conveying technology.

- You take action to prevent serious accidents at your plant
- You increase the safety and raise the awareness of your employees
- You discover ways to increase your production safety and quality
- You can provide evidence of the qualification of your personnel to safely operate storage and retrieval machines and conveying technology in accordance with BGV A1 Section 4 para. 1 and EN 528: 1996 10.3.2
- You receive support with the fulfilment of your legal obligation as an employer (Obligation to provide safety training in accordance with Section 9 (2) BetrSichV (German Industrial Safety Regulation), Section 12 ArbSchG (German Labour Protection Act))
- Moreover, you keep the availability of your plant at a high level.

Racking inspection in accordance with DIN EN 15635

The safety of warehouse installations and racking must also be checked at regular intervals. According to Section 3 BetrSichV, these are classified as work equipment and are subject to the Industrial Safety Regulation. In accordance with DIN EN 15635, racking (e.g. for shelving racks, pallet racks, automatically operated high bays) must be inspected by a competent person at intervals of not more than twelve months. Automatic high-bay warehouses should be inspected at an annual rate of 20% over a 60-month period. Kardex Mlog can carry out your racking inspection based on DIN EN 15635 using a certified racking inspector. We contribute to your operating safety by identifying damaged or defective warehouse equipment in good time and we thus help to avoid possible injury to persons and costly repair charges.

Our services
- Racking inspection in accordance with DIN EN 15635
- Inspection carried out by a certified racking inspector from Kardex Mlog
- Inspection for compliance with specifications of Employers' Liability Insurance Association in accordance with BGR 234
- Labelling of damaged components and appraisal of the damage
- Reconciliation of load signs with the racking system and the structure
- Closing inspection record with appraisal of damages and inspection label
- Damage analysis - Assessment of safety of use
- Information on prevention of damage to racking
- On request, preparation of a quotation and execution of the relevant repairs

Safety inspection for storage and retrieval machines and conveying technology

The German accident prevention regulations (UVV) - or, since 2000 the regulations for Safety and Health Protection (VSG) - define binding obligations for every company with regard to safety in the workplace. These include inspection of the lift tables in accordance with DIN EN 619 or DIN EN 1570 and the inspection of storage and retrieval machines in accordance with DIN EN 528. Our service employees receive regular training in this area and are qualified to carry out the relevant inspections. These are carried out once every year and you receive certification of the results. This not only increases the level of safety for your employees and your plant, but also increases the profitability of your company.

Service locations

Always at hand

Headquarter

MLOG Logistics GmbH
Wilhelm-Maybach-Straße 2
74196 Neuenstadt am Kocher
Germany

Tel. +49 7139 4893 363
Fax +49 7139 4893 277
service.mlog@kardex.com

Other locations

- Service Base Herford
- Service Center Rhein-Ruhr, Oberhausen

International

- Austria
- Benelux
- Czech Republic
- France
- Hungary
- Italy
- Serbia
- Switzerland
- USA
- Turkey

Telephone numbers and service teams

Spare parts service:	Tel. +49 7139 4893 136	Fax +49 7139 9314 870
Warranty:	Tel. +49 7139 4893 347	Fax +49 7139 9314 870
Hotline/Troubleshooting:	Tel. +49 7139 9375 5899 330	
Commercial processing:	Tel. +49 7139 4893 363	Fax +49 7139 4893 277
Customer support North-East:	**Subsidiary in Herford**	
	Tel. +49 5221 12095 51	Fax +49 5221 12095 10
Resource planning:	Tel. +49 7139 4893 311	Fax +49 7139 9314 870
Customer support North-West:	**Service Center Rhein-Ruhr, Oberhausen**	
	Tel. +49 208 4683978 21	Fax +49 208 468 3978 99
Resource planning:	Tel. +49 7139 4893 311	Fax +49 7139 9314 870
Customer support South-East:	**Headquarters Kardex Mlog, Neuenstadt**	
	Tel. +49 7139 4893 314	Fax +49 7139 9314 870
Resource planning:	Tel. +49 7139 4893 251	Fax +49 7139 9314 870
Customer support South-West:	**Headquarters Kardex Mlog, Neuenstadt**	
	Tel. +49 7139 4893 317	Fax +49 7139 9314 870
Resource planning:	Tel. +49 7139 4893 251	Fax +49 7139 9314 870
Customer support International:	**Headquarters Kardex Mlog, Neuenstadt**	
	Tel. +49 7139 4893 314	Fax +49 7139 9314 870
Resource planning:	Tel. +49 7139 4893 311	Fax +49 7139 9314 870

References

Well-known companies rely on us.

Deep freeze

Eisbär

Sales of ice cream are up again during these hot days. To be able to offer this frozen delicacy, whether in a cone, as a wafer or on a stick, in fresh and delicious condition at any time requires meticulously planned logistics. After all, what is being consumed in such quantities during the hot summer months is already being produced during the winter. The producer Eisbär Eis has therefore doubled the size of its deep freeze storage area to 14,000 pallet storage spaces.

On average, Germans consume around seven litres of industrially manufactured ice cream per year – taking the country as a whole, that's almost 500 million litres in total. This is a classic seasonal business: most ice cream is sold during the summer, with only around one portion in five being sold during the winter. As a rule, the manufacturers therefore produce in advance during the cold months and need to have corresponding storage capacities available. In Apensen in Lower Saxony, just outside Hamburg, Eisbär Eis GmbH are also well prepared for the coming season. The central warehouse can handle up to 3,000 pallets of ice cream a week; even more in particularly hot weather: at peak times, working three shifts, over one million portions of ice cream a day are produced and shipped: the majority of this is destined for the big German retail chains. This makes the family-owned company Germany's sixth biggest producer of ice cream.
At the beginning of 2011, Eisbär doubled their capacities with the construction of a second high-bay deep-freeze warehouse – five years earlier than planned, because of continuing growth. The expansion by 7,000 additional pallet slots created a total capacity of 14,000 pallets.
This is equivalent to over 100 million portions of ice cream.

Reliability of operation at arctic temperatures

The twin of the existing 32 metre high refrigerated warehouse which was opened in January was built, refrigerated and commissioned within only eight months. As in the first construction phase, conveyor systems and storage/retrieval equipment were supplied by Kardex Mlog. The volume of investment for the expansion came to around 4.5 million euros. By way of comparison: the new build of the first warehouse cost around 9 million euros. On average, for the entire facility, this means moderate initial costs of around 1,000 euros for each of the total of 14,000 pallet storage spaces. Within the plant, temperatures of -28° C prevail – a lot colder than in the domestic freezer. "Only through these extremely low temperatures can we guarantee a minimum shelf life of 18 months", says Andreas Starck, project manager at Eisbär, explaining the arctic conditions. In contrast, it's comparatively warm in the shipping area and in the area of the conveyor bridge, with temperatures of between 2° C and 5° C. The environmental conditions are a severe test for both humans and materials. However, the two MSingle storage/retrieval machines which were installed in

The storage and retrieval level after expansion with a vertical conveyor.

the two new aisles are unaffected by the cold. Machines of this type have been in use for many years in the deep-freeze sector. Over the course of numerous projects, Kardex Mlog have built up an expertise in this area which has also gone into the construction of the facility in Apensen. For example, the thirty-metre-high machines came equipped with specially heated and insulated switchgear cabinets to provide the controls and electronics with double protection against the cold. The controls are operated by means of touch panels designed for deep-freeze conditions (and for operation while wearing gloves). In addition, special lubricants and bearings with cold-resistant properties guarantee that all moving parts literally run smoothly. The MSingles are equipped with telescopic forks for double-deep storage and retrieval of the pallets, with a payload capacity of 7.5 kN. Finally, the machines' performance data prove that robust construction and performance need not be mutually exclusive. The maximum travel speed is 180 m/min, the lifting speed 50 m/min. Without any stock relocation, the system can perform 27 double cycles or 49 storage operations per hour. The frequency-controlled drives contribute to a high level of efficiency. DC link coupling and intelligent movement management further reduce power consumption.

Focus on conveyor systems

Key objectives for Kardex Mlog were the integration of the new warehouse with the existing facility and the expansion and modification of the existing conveyor system. In this way, the efficiency and economy of the facility were significantly improved. Four additional spaces (four storage locations, one free space) were set up in goods issue.

The storage and retrieval machines were installed via the roof.

The dispatch area was given an additional loading port, and the dispatch preparation area was given two additional transfer trolleys, halving the distances which have to be covered. This measure not only increases handling speed, it also makes it possible to set up an "express route" on which the pallets can be passed directly to a loading port – without using a transfer trolley. This was not possible with the earlier configuration. All work on the rails, the conversion of the existing transfer trolleys and the integration of the new components was carried out outside of operating hours at the weekends so as not to interfere with warehouse operations. The scale of the project can also be seen from the number of newly installed drives: the specialists installed a total of 68 additional motors. Like the other partners who contributed to the realisation of the facility, Kardex Mlog were able to draw on the experience gained during the previous new build. With one exception, the same companies were involved as in the preceding project.

So it's no wonder that the project was not only completed on time, but actually several weeks ahead of schedule. And the filling of the warehouse also proceeded rapidly – less than three weeks after commissioning, each rack location was occupied.

Foodstuffs

Kellogg

The world's most famous cornflakes began their career as healthy nutrition for prominent guests at Dr. Kellogg's sanatorium. Over 130 years ago, the doctor placed more faith in gentle wellness therapies than in physically draining radical cures. A reasonable concept which can certainly be applied to plant engineering.

In order to restore a warehouse to its full efficiency, a policy of small steps often proves to be the most efficient strategy, given that it allows individual storage/retrieval machines to be upgraded during the course of ongoing operation. Kellogg have operated their production and distribution centre with high-bay warehouse in Bremen since the end of the 1980s. The finished goods produced at the location itself are transferred via a bridge into the warehouse; some of the products come from European plants and are delivered by truck. The quantities involved are considerable: in Bremen alone, around 1 million packs of cereal are produced each day. Lined up, the boxes produced each year would stretch twice round the earth.

Kellogg's production and distribution centre in Bremen underwent refurbishment work which was carried out during ongoing operation.

From a mechanical viewpoint, the S/R machines created a solid foundation for the refurbishment project.

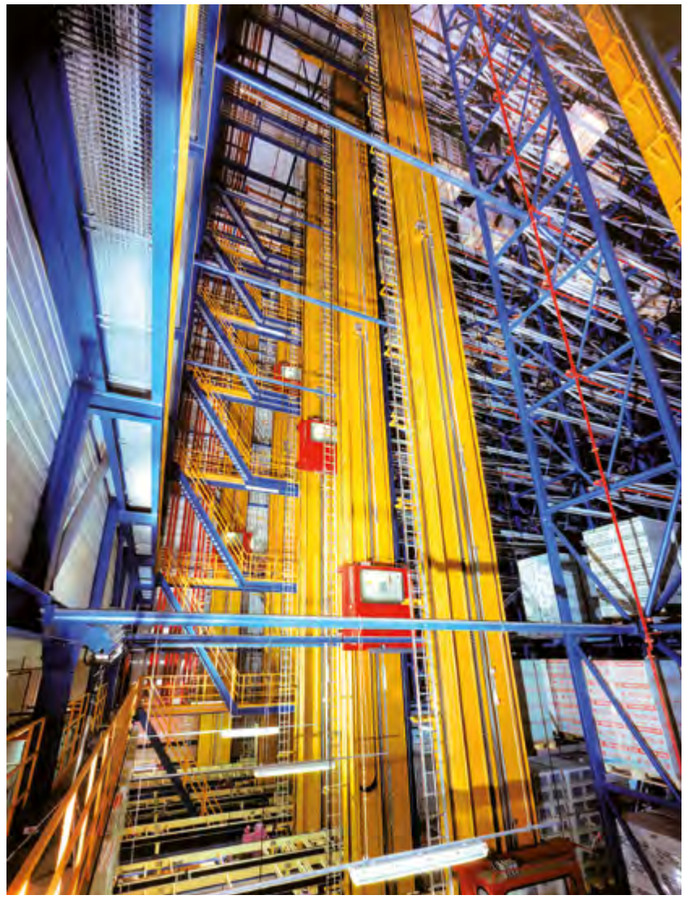
Focus on availability and throughput

On its completion in 1989, the warehouse was classed as the most modern of its kind in Europe. It includes over 33,000 pallet storage locations and as well as eight truck loading bays, it actually has two goods-train sidings of its own. It is connected via conveyor systems to the packaging plant, the last stage in production – a distance of 170 metres, before the cartons are sorted and stored and retrieved, fully automatically, on pallets. The popular cereals can then set out from Bremen on their journey to one of 50 countries. In order to optimise the performance and reliability of the facility, all eight S/R machines, manufactured by MANsystem, were modernised. The 32 metre high machines date from the year in which the warehouse was built, but from a technical and mechanical viewpoint formed a good basis for a general upgrade. In a first step, the contractor Kardex Mlog completely rebuilt one S/R machine, followed shortly afterwards by three more. The refurbishment of the remaining four machines was carried out in 2010.

Step-by-step refurbishment

During the course of the measure, work was carried out on all the key components. Among other things, the pallet truck transfer points and the drive technology for the horizontal travel and hoist mechanisms were upgraded and laser positioning systems installed. The most extensive work was in the area of communications and control technology. The type S7-300 on-board controllers and the Profibus system are both new.

The S/R machines are now linked with the – also new – data concentrator via Ethernet TCP/IP interfaces and new WLAN routers. This forms the interface with the existing warehouse management system (WMS) and was linked with the new visualisation system during the course of the refurbishment project. The entire system was conceived in such a way that the other S/R machines can be integrated at a later date without any problem. "We developed this step by step, jointly with the customer. In terms of economic efficiency and realisation times, it represents the optimum solution for this facility", explains Harald Bauer, head of department at Kardex Mlog.



Upgrade during ongoing operation

Kellogg's production plant operates in three shifts, five days a week. In order to allow the measures to be realised during ongoing operation, work which would have led to disruptions in the plant's productivity was carried out at weekends. Nonetheless, it was possible to complete the work after only three months.

The refurbishment took place in two phases: after surveying and analysing the existing condition of the plant and the technical assessment of the mechanical systems, the actual realisation phase followed, with the manufacture, installation and commissioning of the components. At the same time, Kardex Mlog carried out an analysis of the optimisation potential of the conveyor systems and drew up a specification on this basis. "The main priority was to bring the first machines up to the state of the art", says project manager Claus Becker, DHL, "and thus guarantee higher availability in the production process."

Lindt & Sprüngli

After the Easter Bunnies have left the plant and before the Santas go into production, it's time for the technicians to go to work in the chocolate factory. There is a very short time gap between the seasons which can be used for maintenance, inspection and refurbishment. Production does not stop completely during this time as the sweet tooths still need to be satisfied but the pace is a little slower. This is the pattern at the Swiss chocolate maker, Lindt & Sprüngli. The company commissioned Kardex Mlog to completely overhaul their conveying technology for the production unit at their Aachen plant. The technology was entirely refurbished and reorganised in double quick time. As of May 2015, the plant is flourishing with performance more than doubled.

Company building, Lindt & Sprüngli, Aachen

Twilight hour in the chocolate factory

The supply to production and the disposal of waste from the plant are the beating heart of any operation, the conveying lines are the main arteries of any plant. All the more important is careful planning of all work and project steps in these areas to ensure that smooth operation is not jeopardised. This is also the situation at Lindt & Sprüngli in Aachen. This is one of eight production sites that the Zurich-based premium chocolatier operates in Europe and the USA, and in which the well-known pralines and chocolate bars are produced, as well as the famous Lindt Gold Bunny. This golden bunny with the red ribbon first appeared in the 1950s and is now part of the Easter tradition in over 40 countries. The company's products are distributed across the globe by way of numerous subsidiaries and branches. The Lindt & Sprüngli Group is thus one of the world's most successful premium chocolate companies.

Step by step refurbishment

In 2012, Kardex Mlog was the general contractor for logistics components at the site in Aachen and carried out the construction of a new, fully automatic high-bay warehouse. The next step was the refurbishment of the conveying technology within the four-storey production plant and the connection to the high-bay warehouse. "This was a bottle-neck that was not solely due to technical reasons", points out Sebastian Haist, the Kardex Mlog project manager, "the physical structures were no longer adequate for today's requirements for material flow." In order to bring the existing plant, which has been running a four-shift operation for many years now, up to current standards, Kardex Mlog refurbished the entire conveying technology and replaced approx. 185 drives with controls. This was accompanied by numerous structural changes. Following preparatory work in November 2014, Kardex Mlog was tasked with completing the substantial radical changes during the period from January to June.

The individual floors of the building were refurbished one by one. Kardex Mlog needed eleven working days for each conversion section; three full days were required for building works such as wall openings which became necessary as a result of the reorganisation and relocation of the conveying lines. The schedule was tight as were the working conditions on site. Due to the dust-intensive structural changes, several of the work stages had to be carried out with special protective measures in place so as not to endanger ongoing production. Behind the mobile dust protection walls and the low-pressure dust extractors, up to five different work elements were being carried out simultaneously.

High standards for hygiene and efficiency

Kardex Mlog is among the most experienced suppliers of material flow systems in the food industry. From frozen pizzas to cakes, from muesli to chocolate: There is hardly a product category that is not stored in a Kardex Mlog high-bay warehouse. It is well known that the food industry has extremely high standards, for example, regarding hygiene and food safety. These standards have to be adhered to, also from a technical perspective, right down to the smallest detail: Self-locking nuts, and special oils and fats which prevent contamination of the products. In Aachen, these are primarily semi-finished products such as the famous Lindor truffles which are already individually wrapped but not yet packed in the containers. These are transported to the various levels of the plant via vertical conveyors. The existing conveyor was modified and equipped with a new, frequency-controlled lift unit, a new lift carriage, and completely new sensors. The maximum lifting speed is now 120 m/min, and the maximum acceleration is 1 m/s2. With a lift height of 18 metres, and with five floors, the capacity is now 70 double cycles per hour. Two additional double-vertical conveyors with similar capacity were installed. All three conveyors now have load handling devices for two load units. The entire plant is designed for high energy efficiency. The drives, which are also frequency-controlled, do not start until the material to be conveyed has registered, and they switch off as soon as the material leaves the section.

Source: Lindt & Sprüngli

Significant performance gains

Substantial performance gains were achieved as a result of the measures implemented and these were recorded in the documented performance test during the projecting phase. The major performance gains have played a role in the company's decision to plan follow-on projects. When the Gold Bunny makes its reappearance in the spring, Kardex Mlog intends to take the opportunity to add further capacity to the plant.

Beverage

Hassia Mineralquellen

Logistics and beverages - an ongoing and highly-topical issue. The beverage industry has always placed great demands on material flow. High throughput rates and seasonal peaks, heavy and, at the same time, fragile loads - for example, with glass containers - and in some cases, strict regulations with regard to hygiene and temperature: a high level of complexity that is increased further by trends and developments in the trade. In a competitive situation, a company's logistics competence is critical. Those who opt for automation can gain a competitive edge as can be seen with the example of Hassia Mineralquellen in Bad Vilbel near Frankfurt in Germany.

Warehouse automation in the beverage industry

Warehouse capacity has been increased by 30 per cent, goods issue has been doubled, personnel costs in the warehouse are down by 50 per cent: the results so far after two years working with the new automatic high-bay warehouse at Hassia Mineralquellen GmbH & Co. KG are extremely positive. The ultra-modern facility was commissioned at the company's Bad Vilbel site in 2012 and a large portion of the costs has already been recovered.

The company invested approximately ten million euros in the fully automatic facility and carried out intensive preparatory work. The plant was erected on a 4,500 m² site and, with 22,000 pallet spaces, it increased the total warehouse capacity to over 60,000 pallets - sufficient for almost ten million litres of mineral water, Hassia's core product.

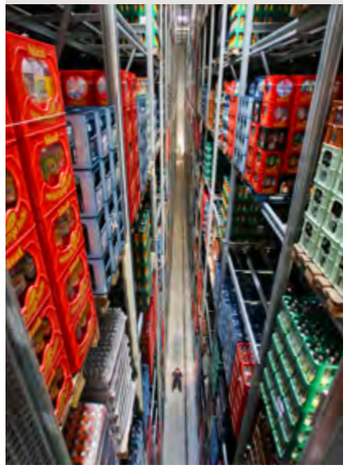
At the heart of the plant are the seven fully automatic storage and retrieval machines which operate in the narrow aisles. Each machine is equipped with electronic components and sensors which enable precise positioning in front of the shelves and throughput of up to 200 pallets per hour and per machine - all this with shelf sizes of approx. 80 metres in length and 20 metres in height.

Megatrends in the warehouse

In addition to the increased space requirement, the main impetus for the project was the need for an automatic facility which could handle the complex logistics processes of the premium drinks supplier. Hassia's beverage range comprises approximately one hundred different beverage products - mineral water, soft drinks, spritzers, near-water, energy drinks, iced teas, fruit juice drinks - packed in 26 container types, and 178 articles. The company is increasingly focussed on diversification, a multi-brand portfolio and regional distribution strategies for its core products, but also on numerous product innovations. The goal originally was to significantly increase the throughput speed of 300 pallets per hour in goods issue - this has been achieved with a current speed of 450 pallets per hour. Hassia's solution was a fully-automatic high-bay warehouse in which all processes from goods receipt to goods issue are automated. And the company's partner of choice for the project was Kardex Mlog. The South-German specialists have constructed numerous plants for companies in the food and beverage sector, these include smaller system solutions which are appropriate for drinks distributors and also turnkey customised logistics and distribution concept centres such as the one designed for Hassia.

Sales have been growing for several years - with good reason according to Hans-Jürgen Heitzer, Head of Division Kardex Mlog. In his opinion, the conventional manual warehouse has almost had its day. The industry expert identifies three megatrends in the sector for which the warehouse must be set up in order to secure the future of a beverage company over the longer term:

Warehouse capacity for more than 60,000 pallets - sufficient for almost ten million litres of mineral water.



Changed consumption patterns and consumer behaviour

"The trend towards smaller containers which are purchased more frequently means that all goods must have permanent availability at all locations and this trend is repeated throughout the entire supply chain". The throughput performance in the warehouse must increase and with it, the flexibility.

Growing variety of products

Most beverage companies these days have a second and even a third brand, and also diverse product variants. To maintain high throughput figures, mixed pallets holding various products on a single carrier are the result, and these contribute significantly to the complexity in the warehouse. This is a challenge for Hassia too: depending on the season, the portion of mixed pallets can exceed 30 per cent.

Shorter-cycle supply chains

Logistics competence is becoming more and more the responsibility of the producer. The increasing demands placed by the trade on delivery capability and reliability mean that a high-performance warehouse is a prerequisite. Simply increasing inventories in order to buffer stocks is not a viable alternative. This ties up capital and does not contribute to efficient issuing and distribution of the goods.

The Hassia case demonstrates:

companies who commit to automation can certainly prosper when dealing with the new challenges. However, it is important to note: half measures will not suffice. The decision to automate will mean significant investment and effort. Project runtimes of a year or longer are quite common. One of the reasons for this is that entire processes are affected.

"Automation will change your business - you will have more time to concentrate on your core business since you will not be permanently concerned with logistics", Hans-Jürgen Heitzer points out. Conversely, the logistics function will also change as IT-supported processes provide opportunities that would inevitably cause problems in manually operated warehouses. This is evidenced by new warehousing concepts.

Method to the chaos

Chaotic storage has proven itself as highly efficient - especially with a high portion of mixed pallets. With this method, the individual goods or material groups are not assigned any fixed shelf space. They are simply stored wherever space is available.

What appears to the uninitiated to be complete confusion is actually a highly systematic solution: the material flow and warehouse management computers know at all times precisely where any batch has been stored and when it was stored, and they use this information to meet any retrieval requirements. The goods required are then retrieved fully automatically at the push of a button and transported to the picking area or directly to the truck. Having goods transported directly to the truck shortens the waiting and loading times significantly meaning that the goods reach the customer even faster.

"A competitive advantage that should not be underestimated", says Heitzer. This chaotic system is currently in use at Hassia and is producing excellent results. Plans are already underway for an expansion.

Dairy

SalzburgMilch

Refrigerated warehouses used in the food industry are frequently characterised by a high degree of complexity arising from the wide product range, and their planning and realisation require a lot of experience and knowledge of the industry.

In constructing and integrating the new high-bay warehouse of SalzburgMilch, the general contractor Kardex Mlog had to take into consideration different temperature zones, as well as the different periods the milk products spent in the warehouse. The result is impressive: following the expansion, cheese, milk and dairy products are now stored in the same warehouse, in around 7,000 pallet storage locations and in each case under optimal conditions. SalzburgMilch produces dairy products for the European market in Salzburg. Less than 24 hours after the milk is collected from the Austrian farms and processing is begun, the first containers are already on sale. This can take a lot longer with the other products, depending on the degree of maturity required. And even then there are significant differences: cheese for example is either transferred to special maturing plants or is stored by the producer until the optimum date.

The Europallets and Düsseldorf pallets are put into storage by the four S/R machines in 75 metre long aisles.

The product is supplied either in blocks or in sliced form. The slicing in turn is also outsourced to external contractors. The product is thus first completely removed from storage, to be fed back into production later as sliced cheese. Moreover, each product has different temperature preferences during the various processing stages which need to be taken into account in their storage. In the warm storage facility, the average temperature is 15° C, with a temperature of 4° C in the actual refrigerated warehouse. For reasons of space, the temperature of the pallets must be lowered rapidly after they leave production. Rapid cooling locations were therefore installed in the racking which quickly cool the warm pallets individually. Depending on the product and the size of the container, the relevant cooling time is stored in the stock article database. This means that the pallets can already leave the rapid cooling location after the minimum time has elapsed. The warehouse management system then takes over responsibility for storage location management and relocates the cooled product into the racking. For the specialists at Kardex Mlog, who have already planned and realised numerous refrigerated warehouses, an exciting but by no means insoluble challenge.

Proven technology, complex software

The total of four storage/retrieval machines (S/R machines) of the type MSingle A shrug off the low temperatures, with high performance rates of 36 – 38 double cycles per hour each. Each of the between 14 and 21 metres high machines serves an aisle of around 75 metres in length, into which it was previously introduced through the roof of the high-bay warehouse. Europallets and the Düsseldorf pallets which are half the width can be picked up by means of the single or double-deep load-handling attachments. The latter are thereafter handled as pairs in order to ensure compatibility with the conveyor systems.

The high performance of the S/R machines is also made possible by the frequency-controlled drives which Kardex Mlog installed, not least because of their outstanding energy efficiency – these are also used in the conveyor systems, 177 in all. The warehouse management system (WMS) which Kardex Mlog installed with the partner N-GIN models the complex flows of goods one-to-one and is distinguished by a series of innovative solutions. For example, the labeller automatically receives all the information on the type of product, maturity etc. via LAN from the WMS, encodes this and, using a separate printer, prints it out as a label which is applied to the pallets. The intelligent system guarantees 100% identification at all times – irrespective of location. For example, this means that different "maturing zones" can remain purely virtual – a significant reduction in the workload and a key contribution to the optimal utilisation of the warehouse, which is at the same time already prepared for further growth: a fifth aisle can be added at any time quite simply.

Lifting platforms overcome the differences in level between the individual storage areas, in this case in the passage between the new building and the old one (on the right).

Rapid conveyor systems

The picking takes place on the first floor of the new high-bay warehouse, above goods receipt. The pallets are transported to and from production in the adjacent existing building on the lower ground floor. Vertical conveyor units are used to overcome the differences in height. The entire conveyor system, which was also completely planned and installed by Kardex Mlog, is distinguished by its high performance, with speeds of 0.3 metres per second.

In total, the system as a whole moves between 60 pallets per hour in the picking area, 90 pallets per hour for the removal from storage of the finished products and around 110 pallets per hour on the lower ground floor level. This high performance is not an end in itself, but is of the essence when it comes to the processing of fresh products – after all, once the milk arrives in the shops it should still have the longest possible shelf life.

Difficult spatial circumstances

While the temperature in the warehouse can now be exactly regulated, the construction of the warehouse took place during an extreme heatwave, which made the work more difficult, but in no way slowed it down. It was more difficult coping with the constrained spatial circumstances on the building site. However, the project management succeeded, through meticulous planning and coordination, to compensate for the shortage of space for storage and assembly by means of just-in-time deliveries, which in view of the location of the building site right in the city centre proved a complex undertaking. Nonetheless: ongoing operations at SalzburgMilch didn't have to be interrupted once. An indication of the high level of satisfaction and the positive assessment of all participants: just as the project was completed, Kardex Mlog opened a branch establishment in nearby Anthering which is intended to serve the Austrian market. The opening took place in an event held jointly with the customer SalzburgMilch.

Retail

Würth

Kardex Mlog in Neuenstadt were commissioned by Würth International AG with the expansion of their Swiss logistics centre in Landquart. With two additional aisles the high-bay warehouse (HBW) now accommodates more than 23,000 pallet storage locations, making it the biggest of its kind in the whole of Graubünden.

Things are looking up in the Swiss Alps, where Würth International AG operate their central warehouse, Lagerhaus Landquart AG, in Landquart. With typical Swiss understatement, the modest sounding description gives a misleading idea as to the true dimensions of the facility, as the statistics following the expansion show. In addition to the high-bay warehouse, the site also includes an automated small parts warehouse (SPW) now with almost 7,500 storage locations – 1,200 more than before the rebuild. The floor area for goods receipt and goods issue was doubled and now measures 4,400 m². There are also spacious secondary areas and a modern administration block. Deliveries are sent out from Landquart to Würth subsidiaries throughout the world. The logistics centre currently employs 37 staff; those working in order picking must have one of the most beautiful and spectacular workplaces in Switzerland: the entire area is glazed, offering an unobstructed view of the surrounding mountains.

Both aisles of the high-bay pallet storage facility are equipped with the MSingle.

Growth stretches capacity to the limit

Within the Würth group, Würth International AG is responsible for the two areas central purchasing and investments. The core business of the Würth group is the global trade in fastening and installation materials of all kinds. However, Würth has long since developed beyond simply being a company trading in screws, screw accessories, rawl plugs, tools or chemical and technical products. In addition to this classic product range, companies of the Würth group have for years been distributing protective workwear, building and DIY products, electrical installation materials, electronic components (circuit boards etc.), financial services and even solar modules. In Landquart, part of the stock is stored in the form of so-called consignment goods. Under such an agreement, suppliers store their products in the warehouse of the customer. Until they are removed, the parts remain the property of the supplier, who can monitor all movements of materials online at any time. This guarantees maximum security of supply of the corresponding parts combined with minimal handling – this is important in order to guarantee high flexibility and short delivery times despite the enormous range of stock. Due to the increasing demand for this practical service and because of the continuing growth of the Würth group itself, the warehouse, which was only built a few years ago, soon reached the limits of its capacity. At the beginning of 2007 the decision was therefore made to expand.

The goods receipt and picking area, with its large windows, is bright and transparent.

In March 2007 the order was awarded to Kardex Mlog in Neuenstadt, who had already successfully realised a series of projects for the Würth group in the past. Among other things, the order included the construction of two complete new aisles and connection to the HBW serving as a reserve and order picking warehouse. The pallet picking area was expanded to include two additional workplaces. Kardex Mlog built a separate retrieval line at the head of the HBW for the removal of whole pallets. From there, they are passed on to the wrapper in goods issue via vertical lifter. Finally, the load on the conveyor system was relieved by means of a bypass. The entire project was completed over a period of less than a year.

High-bay warehouse and SPW

Kardex Mlog equipped the two aisles of the HBW with fully-automated storage/retrieval machines (S/R machines) of the type MSingle RE-1200. The refurbishment or upgrading of the existing S/R machines in the other aisles is planned to take place at a later date. The S/R machines pick up the pallets from the conveyor systems at the end of the racks and store them in a position in the steel racking structure stipulated by the warehouse management system (WMS). Large parts of the SPW were retained, including the existing tray conveyor system. Only the steel racking structure was extended on the side facing the S/R machines.

High performance of conveyor system

The overall throughput rate of the storage line is 140 pallets per hour. In total, up to 1,800 pallet movements per day are possible in the HBW. The picking capacity is similarly high: up to 205 pallets per day can be handled, equivalent to around 25 orders or 2,800 items. The individual elements of the newly installed conveyor systems were dimensioned with a view to the high throughput. Up to 180 pallets an hour are delivered for picking, the bypass between picking and the HBW transports 70 pallets per hour. In order to control the entire material flow, the material flow control system and the warehouse visualisation system based on the S7 standard were expanded and the existing warehouse management software adapted. All the work was carried out during ongoing operation. The activities and the various disciplines involved in the expansion were co-ordinated by the general contractor Kardex Mlog and Würth ITensis AG, the internationally active logistics consulting company within the Würth group. A successful cooperation which will also endure in the future: following the rebuild, Kardex Mlog were also awarded the contract for the maintenance and servicing of the entire facility.

All the components of the expanded conveyor system are also manufactured by Kardex Mlog.

MTH Retail Group

In the Austrian state of Burgenland, Kardex Mlog was commissioned by the MTH Retail Group to plan and implement a highly flexible, automatic high-bay warehouse with diverse order-picking options and minimal error rates.

MTH Retail Group

A Balancing Act

Automated or flexible: When planning order-picking warehouses, you typically have to opt for one or other of these properties. The distribution centre of the Austrian MTH Retail Group represents an exception to this rule. The automatic high-bay warehouse with 18,000 pallet storage spaces enables diverse automatic and manual order-picking types and can thus be rapidly adjusted to cope with varying product ranges.

Dynamic product range

The solution was conceived and implemented by Kardex Mlog, general contractor for the overall construction of the warehouse from the ground up. With this investment in Müllendorf, MTH has replaced and centralised four manual distribution and warehousing locations of the Group's LIBRO and PAGRO retailing companies. Deliveries are made daily to approximately 170 LIBRO and PAGRO stores; the product ranges extend to 16,000 articles with varying dimensions and weights – from rubber erasers through flower vases to photocopying paper.

"Order picking used to require a high level of expertise among our employees", remembers Karl Gigerl who, as an authorised signatory, is responsible for the entire Group logistics. This, together with the manual aspect of the job "resulted in frequent picking errors". The consequence: The stores had to check each individual incoming delivery and this costs time and money.

520 pallets per hour

"With the new solution, the most important thing was to ensure a minimal error rate", emphasized Gigerl. We could only achieve this goal with a high level of automation. And considering the constantly changing product range, we had to maintain flexibility. This has been achieved: "For each individual article, we can now define the appropriate route between goods receipt and goods issue and also the optimal picking strategy", explains Ulrich Skasik, plant and logistics manager at the new location in Müllendorf.

In the 13-aisle, high-bay warehouse, each pallet is registered by hand-held scanner, checked, and placed on one of the four inbound tables by a floor conveyor vehicle. From here, the pallets move fully automatically via roller conveyors and an Mlog double-distribution trolley to the warehouse aisles. There, they are stored by an Mlog storage and retrieval machine of type MTwin. These storage and retrieval machines can handle a total of up to 520 pallets per hour. They are equipped with two telescopic forks and scissors lift tables for order picking. Using the scissors lift table, the warehousing pallets and the picking pallets can be raised to an ergonomically optimal height for the operator.

Two-step picking

"This is an example of the high level of flexibility of the plant", says Skasik. Depending on the product type and the quantities, either manually picked sub-quantities or entire pallets are moved out of the high-bay warehouse. "In each case, however, there is two-step picking", says Gigerl. Firstly, the total purchase order quantity for all stores is retrieved and delivered to the picking stations. Depending on the article and the picking strategy defined in the data record, the goods then take different paths.

One option is manual order picking, especially for relatively heavy and high-volume products. These are placed in the trolleys by hand. An alternative is put-to-light order picking. Here, employees distribute the individual articles to plastic containers which are subsequently combined with the other parts of the purchase order. "In the put-to-light area, we process articles which, due to their size or weight, are not suited for processing by the sorter", explains Skasik. This includes goods that are lighter than 100 grammes or heavier than 30 kilogrammes. The majority of products, however, are handled by one of the two cross-belt sorters with 440 divert points. The sorters supplied by Interroll can process 20,000 packages per hour with an error rate of only 0.2 per cent.

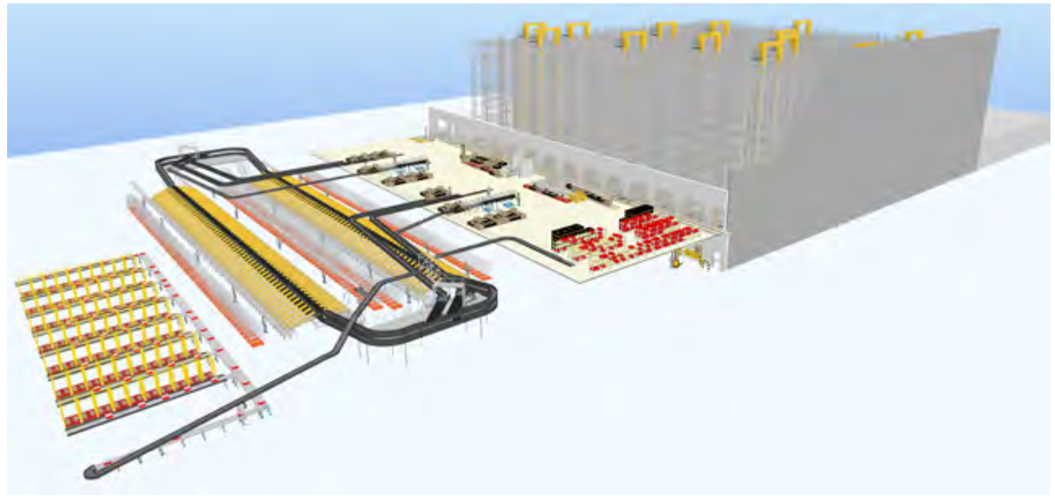
Key to quality improvement

Directly behind the divert points are the roller containers for the stores in which the other components of the purchase orders are also collected. Each trolley is uniquely assigned to a divert point so that the employees cannot make any errors on the route from the sorter to the trolley. "The sorters are the key to our quality improvement and this has enabled us to save on the checks in the stores", Gigerl points out.

The fast sorting machines can be supplied with goods either manually or automatically. Fully automatic feeders together with belt conveyors and labelling machines from SRD enable fast separation and assignment of DVDs and books. At other inflow points, the goods are placed manually on the belts. The sorters are controlled by a Simatic S7 controller from Siemens, the management system is the warehouse management system Metalag Retail from Metasyst – a further partner contracted by Kardex Mlog to work on the project. Other key partners included Econsult for the planning, Kocher for the steel construction and Strapex for the strapping machines.

The high-bay warehouse with its order-picking options and powerful sorting technology manages the balancing act between automation and flexibility. MTH has achieved gains in both quality and service. The new processes enable store-specific order picking and the goods can be distributed to the shelves following optimised route selection. The productivity of the plant also increased significantly. The 150,000 picking operations carried out daily are now handled by 125 employees rather than 170 with the previous system. "This amounts to an efficiency increase of approx. 30 per cent", says Gigerl.

The sorter is the key function point in picking. It is here that the foundation is laid for error avoidance in store assignment.



Consumer goods

Procter & Gamble

The products of the consumer goods manufacturer Procter & Gamble can be found everywhere in Germany. High availability and safety in the home are therefore an absolute priority for the company and are guaranteed through a worldwide quality assurance system and strict safety regulations, which were also taken into consideration in the expansion of the central distribution warehouse at the Braun plant in Marktheidenfeld.

General contractor Kardex Mlog completed the expansion by around 38,700 storage locations within a year. The 8-aisle high-bay warehouse (HBW) has already stood on the site in Marktheidenfeld-Altfeld for 15 years, but with around 25,600 pallet locations had long reached the limits of its capacity. The expansion to include an additional eight aisles with around 38,700 storage locations has now quadrupled the storage area. The contract was awarded to Kardex Mlog in Neuenstadt as general contractor. The customer's strict requirements were no problem for the specialists in material flow systems; it was the topography of the site which presented the greater challenge: the extension had to be constructed in a difficult-to-access hollow without any connection to the road network. This made it a lot more difficult to deliver materials and bring in the 38 metre high storage/retrieval machines. Special foundations were laid for the heavy mobile cranes, access was made possible by means of a temporary road constructed of armoured steel.

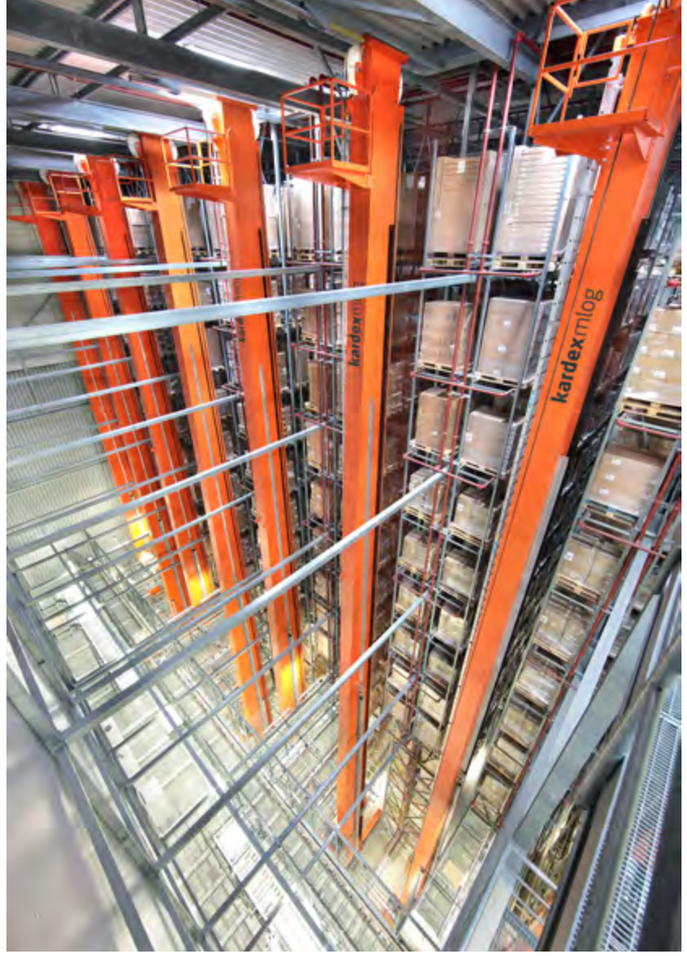
Goods issue/pallet removal with integrated fully-automated labelling machines. Vertical transfer unit for 2 pallets, which are picked up together and delivered to the left and right.

Short completion time

In order to allow the warehouse to be put into operation in July 2008, the schedule required that steel construction work also take place during the winter months. The installation work by the company Kocher contracted by Kardex Mlog was carried out continuously from September onwards, also at weekends, and was thus completed on schedule despite the adverse weather conditions. The roof and walls were erected by the company Hammersen, the company Calanbau supplied the sprinkler systems. All the sections of work from the floor slab upwards were exactly planned and coordinated by the general contractor Kardex Mlog. This meant that the ongoing operation of the existing warehouse could be continued without any restriction while the work was being carried out, while taking into consideration the customer's strict safety requirements and high quality standards.

Storage/retrieval equipment and conveyor systems

A storage/retrieval machine (S/R machine) of the type MSingle B-1000 with a load capacity of 1,000 kilograms was installed in each of the eight aisles. Using telescopic forks, these can pick up load units of up to 1,320 mm (length) and 920 mm (width) on four-way pallets or Europallets. Each S/R machine can perform 24 double cycles or 42 single cycles per hour. The new conveyor system was also installed by Kardex Mlog and extends over three levels. Essentially, the pallets are put into storage on the lower level and removed from storage on the middle level. The top level is used for the removal of pallets for picking and resupply. The pallets are transported by chain and roller conveyors, with turntables used for changes in direction. Differences in height are bridged by means of lifting platforms and vertical transfer units. Most of the work in connection with the existing conveyor systems as well as the modification of the existing system was carried out at weekends, so that ongoing operation was not interfered with.



Intelligent monitoring systems

Each S/R machine is equipped with numerous sensors for the control and monitoring of the storage and retrieval operations, including an on-board camera system which transmits images to the network via WLAN. This means that in the event of a problem pictures can be called up on the PC for evaluation. In order to monitor the load pick-up, the S/R machines are equipped with variably adjustable throughbeam photoelectric sensors for clearance and centring control, height and width are checked by means of retro-reflective photoelectric sensors. Finally, laser sensors on the load-handling attachments are used for fine positioning. The sensor technology used on the conveyor system is equally sophisticated: for contour control purposes, the usual frames with light strips are used to check the front sides of the load units, the height and side dimensions are checked by means of photoelectric sensors. One special feature is the automatic pallet bottom check which allows continuous checking of the quality of the pallets. Finally, the units are weighed on a modified conveyor and are automatically classified into weight classes. Barcode scanners are used for identification.

Wireless data transfer

Kardex Mlog realised the communication between the data concentrator of the conveyor control system and the control components of the S/R machines as a Wireless Local Area Network (WLAN). The WMS communicates directly with the control system for the conveyor system which in turn assigns storage and retrieval orders to the individual S/R machines. The connection to the WLAN takes place via TCP/IP Ethernet interfaces. This is just as reliable as a cable solution, security is guaranteed by sophisticated data encryption. For the transmission of telematic data, for example relating to the operating status of the individual components for the purpose of remote maintenance and diagnosis, Kardex Mlog opted for connection via a virtual private network (VPN). The connection to the VPN tunnel also takes place via Ethernet interfaces.

Fully-automated picking stations with integrated lifting platform for ergonomic working.

Consumer goods

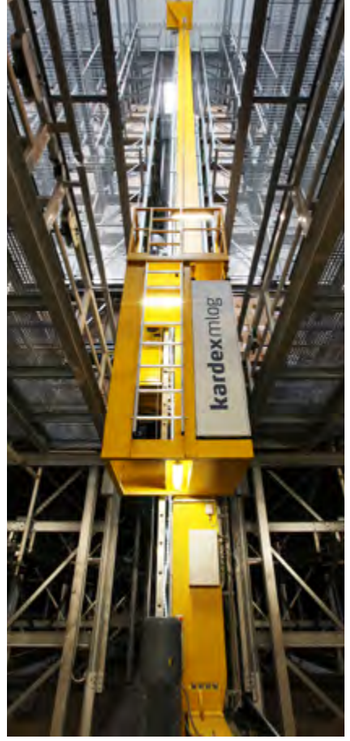
PLAYMOBIL

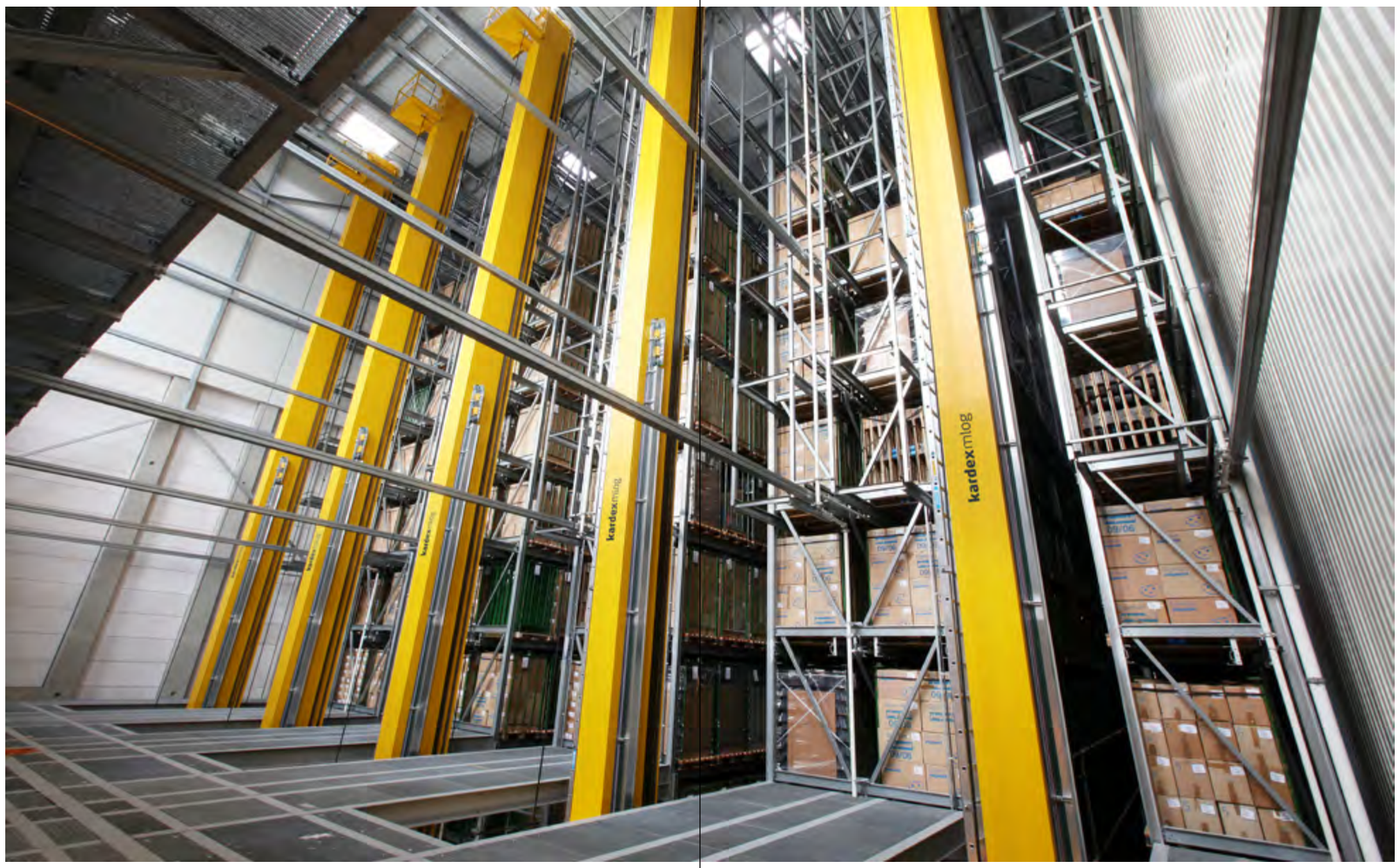
Business with the popular PLAYMOBIL range of toys has been booming for many years. Accordingly, the production facility of the manufacturer geobra Brandstätter in Dietenhofen has been repeatedly expanded and modernised in order to keep pace with the growth in demand. The most recently-built high-bay warehouse 5 offers space for an additional 12,000 pallets. The five storage/retrieval machines installed in the warehouse were supplied by geobra's partner of many years, Kardex Mlog. The next item on the common agenda: the refurbishment of the existing high-bay warehouse 4.

The production plant of geobra Brandstätter GmbH & Co. KG in Dietenhofen operates at full capacity the whole year round. The wide variety of accessories for the PLAYMOBIL figures are produced here, including the popular pirate ship. "Every day is Christmas here," says Joachim Haubach from the high-bay warehouse IT department. This is also reflected in the figures. In 2011 PLAYMOBIL's worldwide turnover came to 505 million euros. Each day, 65,000 playsets are shipped from over 30 loading bays at the Dietenhofen works. In 2011 a record quantity of 55 million packs were shipped worldwide. In order to be able to maintain this high tempo, geobra Brandstätter have relied for years on technology supplied by Kardex Mlog. Since 2008, the company has supplied a total of five storage/retrieval machines (S/R machines) in different projects and modernised nine more. A further five S/R machines have now been installed during the course of the current new build in high-bay warehouse 5.

Thanks to DC link coupling and frequency-controlled drives, the new 25 metre high MSingles are characterised by low energy consumption. In the warehouse in Dietenhofen they operate with a travel speed of up to 3 m/s and lifting speeds of around 0.8 m/s. This allows them to perform 29 double cycles or 48 single cycles per hour and machine. All the new S/R machines feature an S7 controller as well as on-board camera systems and contact-free laser measuring systems.

The capacity and throughput of the warehouse were significantly increased through the expansion. Due to the high volumes sold to retailers and above all because of the enormous seasonal peaks in demand in the toy industry, the increase in capacity and efficiency is necessary since geobra are already manufacturing earlier than ever and have to store the finished articles until the delivery date. The same applies to semi-finished products.





The S/R machines are equipped with frequency-controlled drives for greater energy efficiency

Further refurbishment plans

In order to be able to guarantee this in the future too, the refurbishment of the adjacent high-bay warehouse 4 was commenced immediately following completion of the work in high-bay warehouse 5. This warehouse, which also has five aisles, has so far been operated with only one S/R machine with transfer unit. Kardex Mlog are now installing four additional S/R machines and during the course of the refurbishment will also be bringing the existing machine, manufactured by a different company, up to the state of the art. Completion of this additional project is scheduled for spring 2012.

Furniture

nobilia

nobilia, Germany's biggest manufacturer of fitted kitchens, operates two plants in Verl in eastern Westphalia which until recently had to share a single panel warehouse. In order to optimise processes in the two operations, which are located ten kilometres apart, Kardex Mlog built a second high-bay warehouse which, in two aisles, offers space for almost 15,000 worktops and 12,000 half-format panels.

Plant II in Verl-Kaunitz was opened by nobilia-Werke J. Stickling GmbH & Co. KG in 2006. Since then, production on the site has been increasing continuously. In order to secure the supply with individual components and to relieve the strain on the panel warehouse in Plant I, it was decided that a new high-bay warehouse should be built by Kardex Mlog, who had already realised various projects at both plants previously. Over the past years, the Neuenstadt-based company had opened a series of branch establishments at home and abroad in order to be even closer to their customers in the geographical sense too. The order for the project in Kaunitz went to the Northern Region branch in Bad Salzuflen, less than 40 kilometres away from the company's premises. "The short distances involved not only facilitate work on the actual project", says branch manager Frank Labes, " they also allow rapid reaction times if anything does go wrong".

The 24 metre high MTwins each have two masts and are therefore designed to cope with large and heavy loads. The picking of the almost 6 m long individual panels takes place directly on the S/R machine.

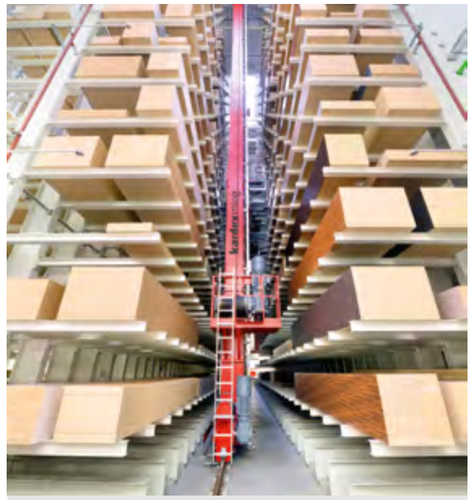
Mass customisation

Each of the around 450,000 nobilia kitchens which are manufactured each year in Germany is custom-built. "The trend towards individualisation has been continuing for years", reports Andreas Wagner, plant manager of Plant II for Germany's biggest manufacturer of fitted kitchens. "Of the over 2,000 kitchens which leave our production plant each day, none is exactly the same as another." There are practically no limits placed on personal taste: the possibilities for domestic creative expression range from the Mediterranean-style farmhouse kitchen to a stylish, contemporary loft ambience. Not to speak of the range of different colours and surfaces available. The overall impression is determined by the front of the cabinets and by the work surface, which usually dominates the optical appearance. An extremely wide variety of panels is therefore distributed between more than 1,200 storage locations at the Verl-Kaunitz plant, in stacks weighing up to 3.5 tonnes – as much as a small truck. Before the expansion, these panels, as well as the so-called half-format panels and alcove panels, had to be pre-picked at the main plant and transported to the Kaunitz production plant where they underwent further processing. Having its own panel warehouse ensures that the production plant is now supplied reliably and smoothly with the components. In addition, this has led to a noticeable relief of the strain on the panel warehouse in Plant I. "This means we have been able to further increase the productivity of both plants", says Wagner.

Fast-moving panels

The area used for production and storage in Verl-Kaunitz covers around 100,000 square metres. Part of this space is occupied by the new high-bay warehouse. The high-quality individual components which are joined together to create the popular kitchen fittings are stored in two aisles, in six zones and on 19 levels – more than a quarter of all kitchens sold in Germany originate from Verl. Because of the scale of the facility, the two 24 metre high MTwin storage/retrieval machines are equipped with load-handling attachments for triple deep storage of the stacks of panels. The picking of individual panels takes place directly on the storage/retrieval machine. Panels from the rearmost rows can also be picked without needing to remove the stacks in front of them. The MTwin model possesses two masts and is therefore ideal for picking up large and heavy loads. This makes the performance of the two machines all the more impressive: each MTwin can pick over 70 of the almost six metre long individual panels each hour. Each panel is picked up by means of two cross-beam vacuum lifters which are extended telescopically in synchronisation and permit the load to be separated cleanly from the stack beneath. The single-deep storage of the comparatively light half-format panels and claddings is a more straightforward matter: due to their shorter length they can be picked up by a single cross-beam vacuum lifter. Using vacuum lifters to pick up the loads not only allows high performance, it has already proved ideal in earlier projects carried out by Kardex Mlog for the furniture industry. "This technique is very effective in protecting the surfaces of cabinet fronts and work surfaces", says Labes.

Both S/R machines are equipped with load-handling attachments for triple deep storage. The loads are picked up by two cross-beam vacuum lifters which allow the panels to be separated cleanly from the stacks below.



The high-quality individual components of the nobilia kitchens are stored in six zones and on 19 levels. The MTwins serves more than 1,200 storage locations in which a wide variety of different panels are stored in stacks weighing up to 3.5 tonnes.

Link to enterprise resource planning

Finally, the picked stacks of panels are transported to production via heavy-duty roller and chain conveyors which, thanks to frequency-controlled drives, achieve transport speeds of 0.2 m/s combined with high energy efficiency. The conveyor system for the warehouse system was realised by Kardex Mlog and – like the storage/retrieval machines – equipped with the latest S7 controllers and TCP/IP interfaces. Data is continually exchanged between the warehouse management system and the production control system. The picking and sawing information is also communicated by these means. The plant is also linked to the SAP enterprise resource planning system.

The entire project only took nine months to complete. After the contract was awarded in January 2008, work on site started in February and the facility was commissioned in September of the same year. If the warehouse reaches the limit of its capacity, the existing aisles can initially be extended by four racking units each.

The possibility of connecting an additional aisle has also already been taken into consideration in the planning.

Pharmaceuticals

Fresenius Kabi

Fresenius Kabi, Europe's leading supplier of infusion therapies and clinical nutrition, have developed their location in Friedberg into the international logistics hub for their entire product portfolio. With the expansion, Fresenius Kabi are further increasing the efficiency of the logistics processes, thus guaranteeing smoothly functioning logistics and optimised flows of goods for the international supply of the products, also with increasing demand.

All the necessary alterations and new builds were realised by the company Kardex Mlog in Neuenstadt. Kardex Mlog, experts in both disciplines, was awarded the contract to realise the concept which essentially comprised four steps: The existing 10-aisle high-bay warehouse 1 was expanded to include an additional storage and retrieval line on its west side. Completely new North and West high-bay warehouses with three and six aisles respectively were built. Finally, all the warehouses were connected via conveyor systems and integrated in the overall material flow control system. In total, the storage capacity was more than doubled, by around 40,000, to provide 75,000 pallet storage locations.

FRESENIUS KABI

Large parts of the logistics centre have been newly built, including the HBW West (on the left) and the new logistics building including office block in the foreground.
The existing warehouse is located to the rear on the right-hand side.

The existing warehouse (at rear) and the new one (in the foreground) were connected by means of the newly installed conveyor systems and integrated in the overall material flow control system.

Proven cooperation

The expansion of the existing facility took place during ongoing operations. The experts on site were quite familiar with local conditions, given that Kardex Mlog had been the general contractor for the construction of Warehouse 1, which was commissioned in 1996. The company was also responsible for the subsequent expansion of the conveyor systems in the pre-storage area. "The technology and components have been tried and tested," says Bernd Heller, project manager for the expansion of the logistics centre and Head of Logistics Technology at Fresenius Kabi, "which was why Kardex Mlog were chosen again to carry out the expansion."

Technology in detail

In the current project too, Kardex Mlog used equipment and components manufactured in-house in Neuenstadt.

In the new silo-style building, Kardex Mlog installed six storage/retrieval machines (S/R machines) of the type MSingle B with a construction height of just under 30 metres. Of these, three machines of the same design are being used in the North Warehouse. All of the machines are equipped with load-handling attachments for double-deep storage. The machines can perform 28 (HBW North) and 33 (HBW West) double cycles per hour respectively. The S/R machines are equipped with frequency-controlled drives and S7 standard controllers as well as SEW MoviPLC Motion Control. The data transmission takes place via WLAN. The control technology used is a simple energy management system which records and documents the actual energy consumption and intelligent DC link coupling allow a high level of efficiency to be achieved.

The energy consumption is low, given the high performance and travel speeds of up to 180 m/min.

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