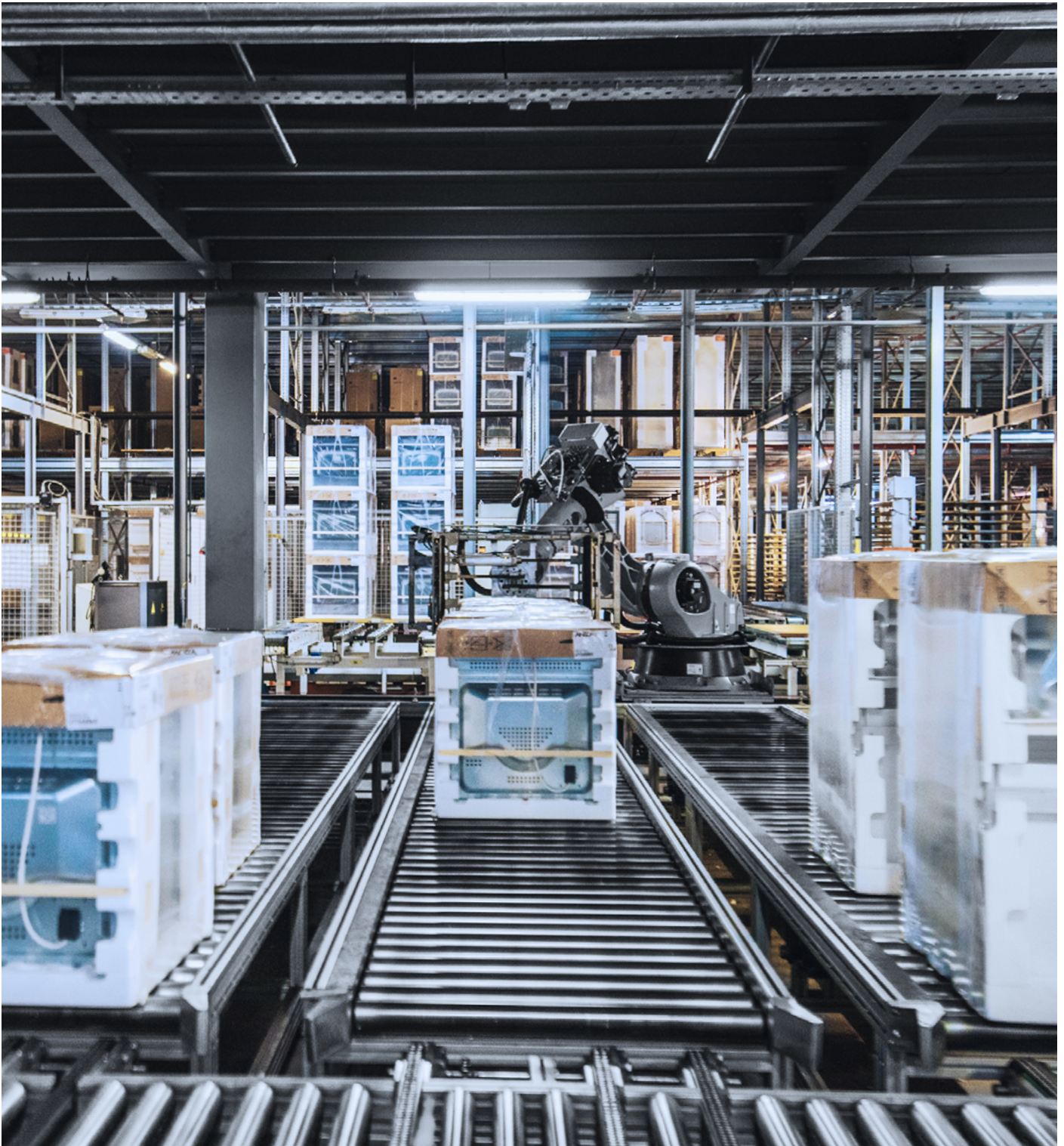


How-to Guide

Three Steps to your Buffer Solution





Which type is the best fit?

Buffer solutions ensure secure and reliable production processes in industry. They can assume various functions:

- Smoothing out the different speeds of consecutive work steps and offering an intermediate storage of goods until they are required for the next production step.
- Cushioning short-term disruptions or fluctuations in the production flow. Using a reserve function, buffer storage prevents costly production downtime.
- Enabling maturation or acclimatization processes for goods that cannot be processed immediately.
- Where required, a fast and reliable reintroduction of the products from intermediate storage into the production process.

Due to these requirements, buffer storage has become indispensable during many manufacturing processes. In practice, a wide range of solutions with differing levels of automation have arisen. To find the right solution for your situation, consider the following three factors:



#1 Which level of automation is appropriate?



#2 Obstacles and goals



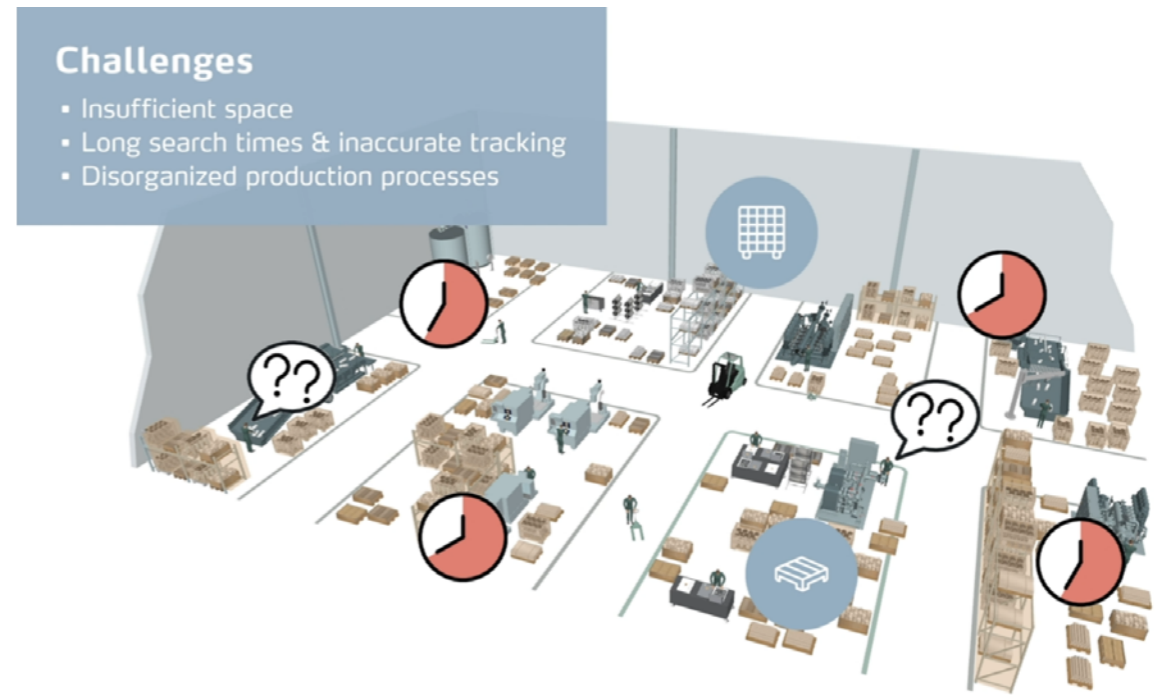
#3 Solution examples for fully automated buffer storage

#1 Which level of automation is appropriate?

The appropriate level of automation depends on various influencing factors. In this case: The greater the requirement for availability, transparency, space utilization and efficiency, the sooner manual solutions reach their limits.

Manual solutions, in the form of staged buffer pallets at machines or simple rack or block storage, are appropriate in the following circumstances:

- Available space: Within the production area, large spaces are available. Completely utilizing the production hall's height is not necessary.
- Time buffer: The upstream and downstream production steps are only loosely coordinated. Delays through long replenishment routes from the remote high-bay warehouse do not represent a risk to production. The same applies to manual searches looking for the correct pallets for specific machines.
- Low personnel costs: The comparatively high personnel costs caused by diverse manual activities are not relevant in costing.
- Adequate transparency and process quality: Manual buffer storage complicates efficient and complete tracking. In addition, the risk of product returns rises as a result of incorrect assignments.
- Safe storage environment: Despite significant manual intervention, there is no risk to employees in terms of carelessness, falling objects, or additional forklift traffic.



Manual buffer solutions often lead to long search times, poorly organized production processes and lack of space.

Fully automated buffer storage comes into consideration if there is an optimization requirement in the following fields:

- **Space gains:** High buffer capacity combined with low space requirements
- **Process quality:** Secure, error-free and reliable goods staging
- **Just-in-sequence delivery:** Procedure-compliant supply of raw materials to production
- **Availability:** 24/7 operations
- **Transparency:** 100% overview for all storage processes
- **Operating safety:** automation significantly reduces the risk of accidents

#2 Obstacles and goals

When preparing to invest in automated processes, it is important to consider the following questions:

- **Questions on initial situation and objectives**

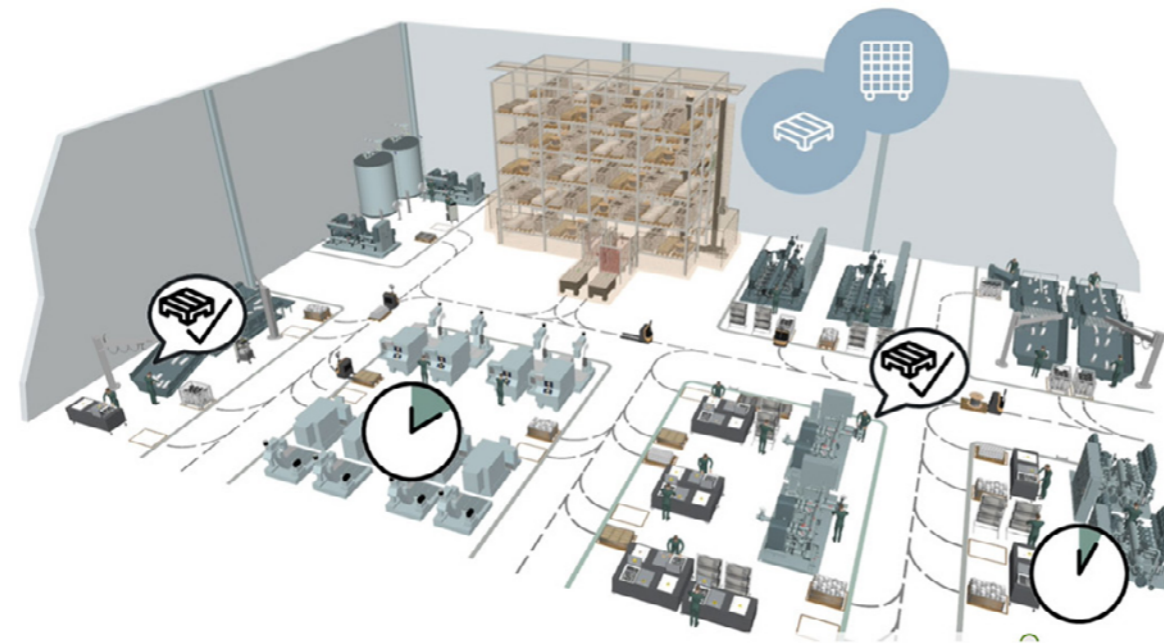
- a Is space required for additional production plants?
- b How fast must the load units be staged in the production area?
- c Is there potential to expand the existing site?
- d How many load units must be buffered?

- **Questions on the building infrastructure**

- a How much space (width and height) is available for buffer storage?
- b What are the costs per square-meter of the facility?

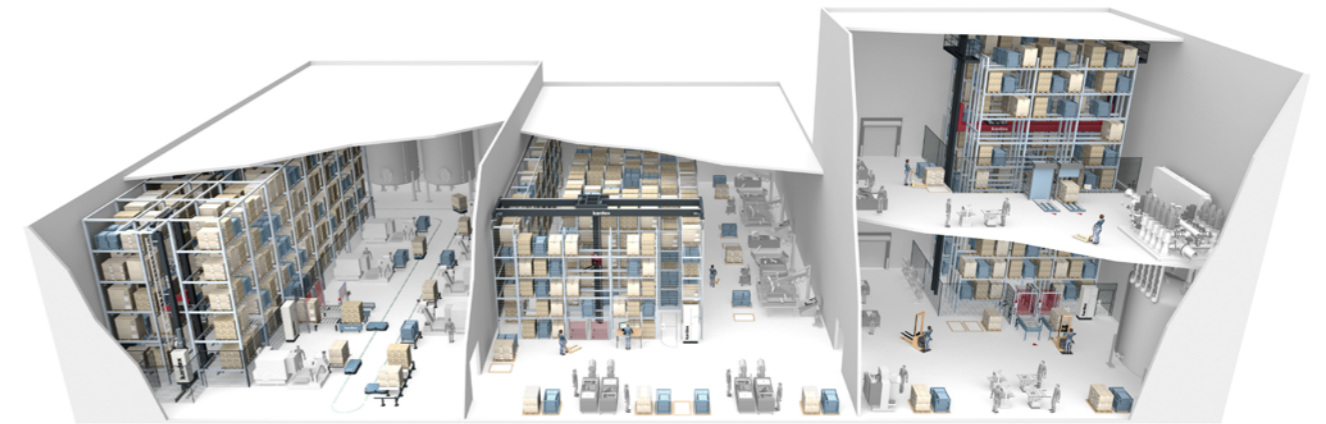
- **Questions on loading goods**

- a What load units are used?
- b Are the goods to be buffered without load carriers?



#3 Solution examples for fully automated buffer storage

There are major differences between fully automated buffer storage solutions on the market. It is important to review these differences before making an initial investment. When selecting a system, the available space is a critical factor, as is the subsequent extension capability and the required capacity. In addition to customer-specific solutions, Kardex Mlog offers three different concepts – this guide illustrates the technical options and differences.



Kardex MSequence

Flexible buffer and sequencing solution

Typical buffering capacity
170 – 800 pallets

Typical height
8 – 12 m

Space requirement (b/d)
80 m / 8 m

Kardex MCompact

Autom. mobile racking storage, universally deployable

Typical buffering capacity
500 – 1300 pallets

Typical height
< 9 m*

Space requirement (b/d)
14 m / 40 m

Kardex MTower

High-bay warehouse with minimum footprint

Typical buffering capacity
300 – 500 pallets

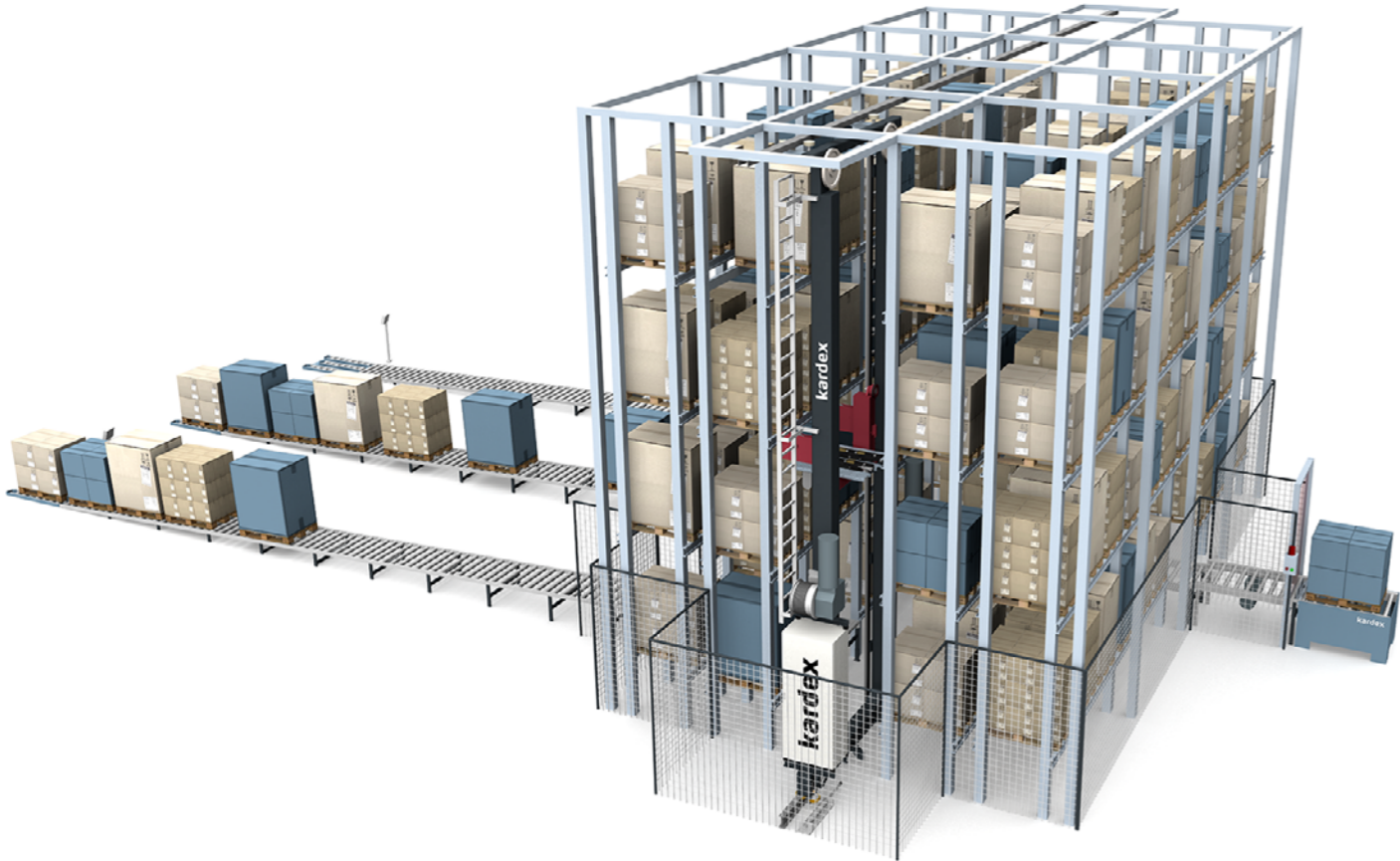
Typical height
15 – 25 m

Space requirement (b/d)
12 m / 8 m

*Top of load unit 7,5 m

Kardex MSequence: dynamic buffer and sequencing solution

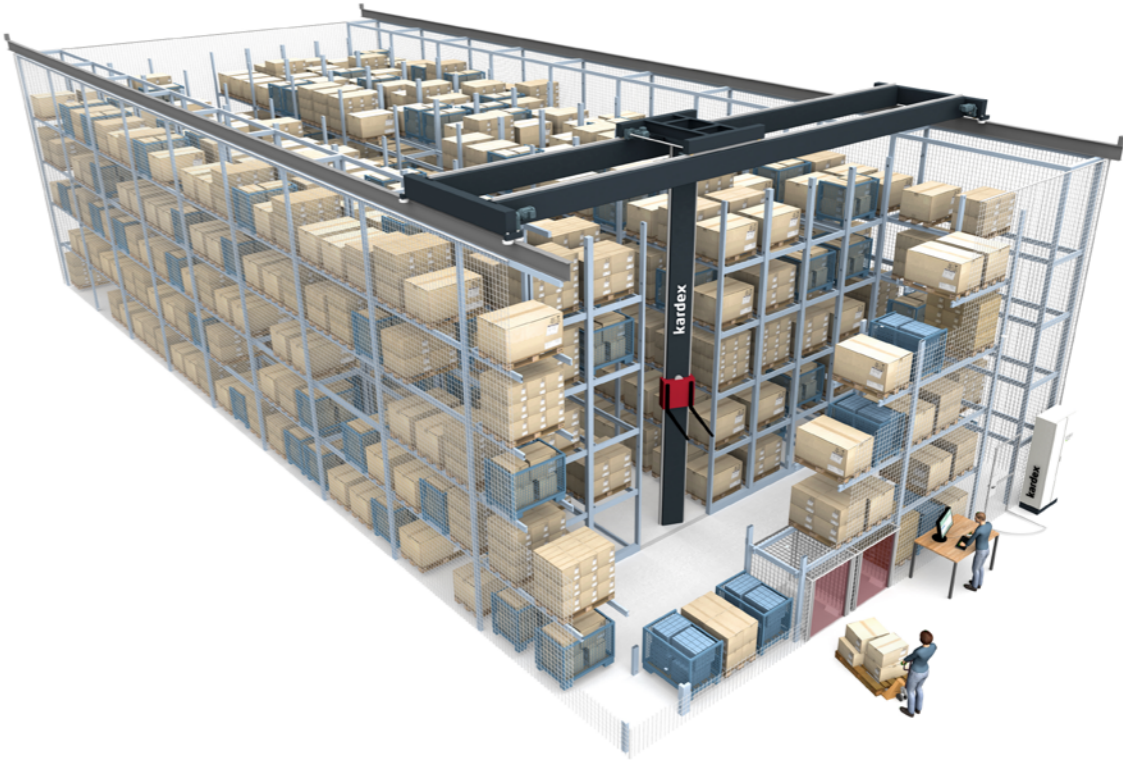
The Kardex MSequence is a dynamic buffer and sequencing solution designed for maximum storage and retrieval performance. The pallets are stored in a longitudinal direction on driven roller conveyors. This automatic pallet buffer enables double-deep storage and when compared to conventional pallet storage, achieves a space savings of 66%. Depending on individual requirements, the Kardex MSequence's flexible design allows it to be configured to fit any dimensions or capacity. It is suitable for a buffer capacity of between 170 and 800 pallets. A complete module consists of an automatic storage and retrieval machine (SRM), one storage and one retrieval line and the associated racking construction. The module's own warehouse management software and control technology complete the plug & play solution.



Kardex MCompact: automated mobile racking storage

The Kardex MCompact is an automated mobile racking system that offers a universal use for diverse load carriers. This unique solution is based on a suspended, rotating lift-column with a pallet lifting device or other load pick-up device. Pallet feed and discharge take place at the floor level without conveying technology. Compared to conventional forklift-based storage, this turnkey solution requires approximately 40 percent less floor space and it can be integrated into existing buildings.

The Kardex MCompact is particularly suited to smaller and medium-level volumes and it can also be deployed in difficult conditions such as the storage of hazardous substances and deep-freeze storage. Autonomous, accident-free operations reduces costs and does not require extensive load securing.

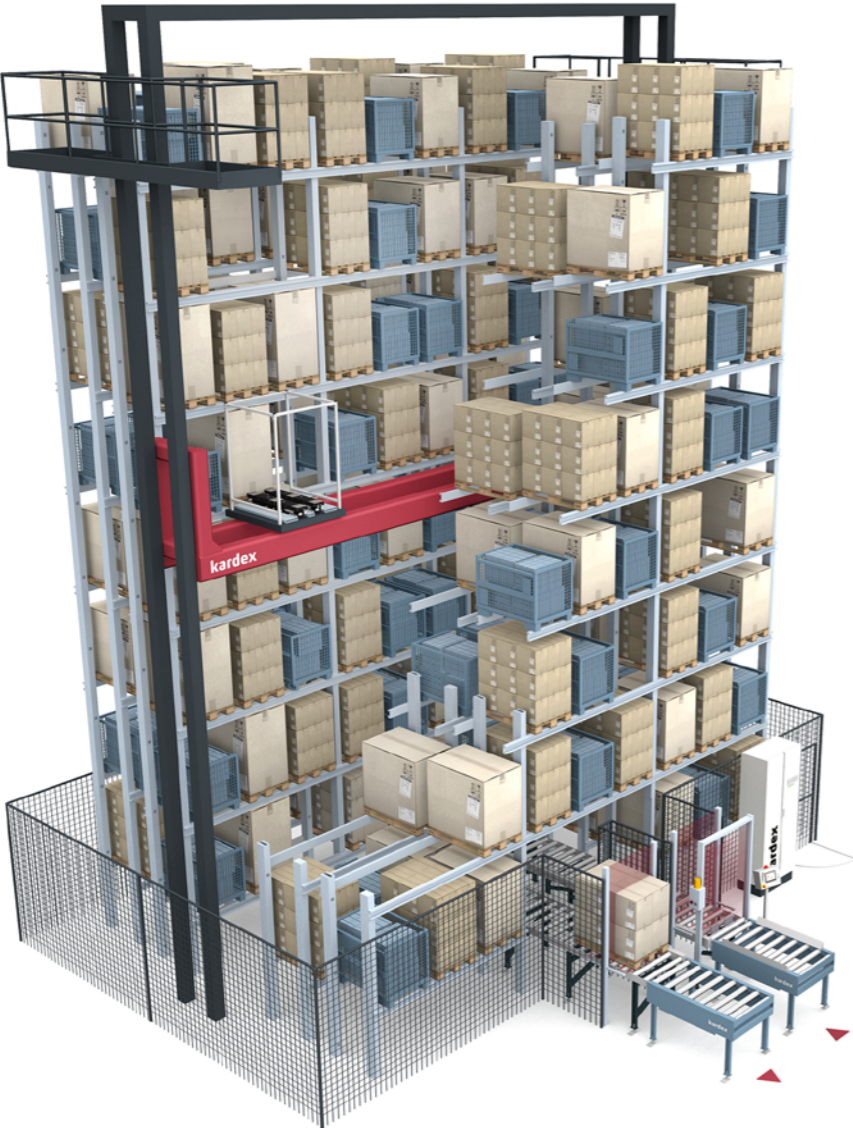


Kardex MTower: compact high-bay pallet storage

With the Kardex MTower, Kardex Mlog offers a high-bay warehouse with a minimum footprint, which is also suitable for buffer storage. The principle is based on a shuttle car mounted on a vertically guided lifting beam, which accesses the pallet storage spaces on different levels. The load pick-up can be designed for either single or double-deep storage by means of a telescopic fork. With single-deep storage, the system requires a depth of only 4.5 meters.

The double-deep version can be operated with a depth of 8 meters. This solution is particularly suitable for small spaces and was developed specifically for areas up to 25 meters high and 12 meters wide. This makes Kardex MTower an option for narrow but high warehouses without compromising stability, performance or speed.

The plug & play solution is suitable for common host systems and software standards and easily integrates into existing IT landscapes.



Conclusion

Buffer storage can drastically reduce the risk of failure for production plants and, as a result, has become an integral part of today's industrial production. Minimum space requirements, low operating costs, high reliability, and 24/7 availability are some of the many intriguing reasons to invest in a fully automated solution. The market offers a wide range of options that can adapt to fit your specific requirements and building size.

The key advantages of fully automated buffer solutions

-  Minimum space requirements
-  Low operating costs
-  High reliability and 24/7 availability

Smart Intralogistics Solutions

Kardex offers an A-Z product portfolio targeting the niche needs of various industries. Discover innovative offers ranging from everyday handling of bins and pallets or storage in controlled environments to fully-integrated automated storage solutions and material handling systems. From day one, the Life Cycle Service team works hand-in-hand to support your project implementation, maintenance and future plans.

