Optimal Solutions for Small Parts

Automated storage solutions for bins

White Paper

kardex

Efficient storage and staging for bins

This guide looks at and assesses the different approaches to automation of small parts storage. Good judgment in the planning phase will determine the cost-effectiveness and the length of the payback period. Based on 12 parameters and concrete examples with a range of different requirements, we show you how to find the right solution.

Automation: The solution to your storage dilemma

Operators of logistics centers and production locations are facing major challenges: On the one hand, customer expectations regarding speed of delivery, quality, and transparency are rising. Storage and shipping systems must be seamlessly integrated and enable precise inventory tracking in real time. This scenario applies not only to end customers but also to the production supply area.

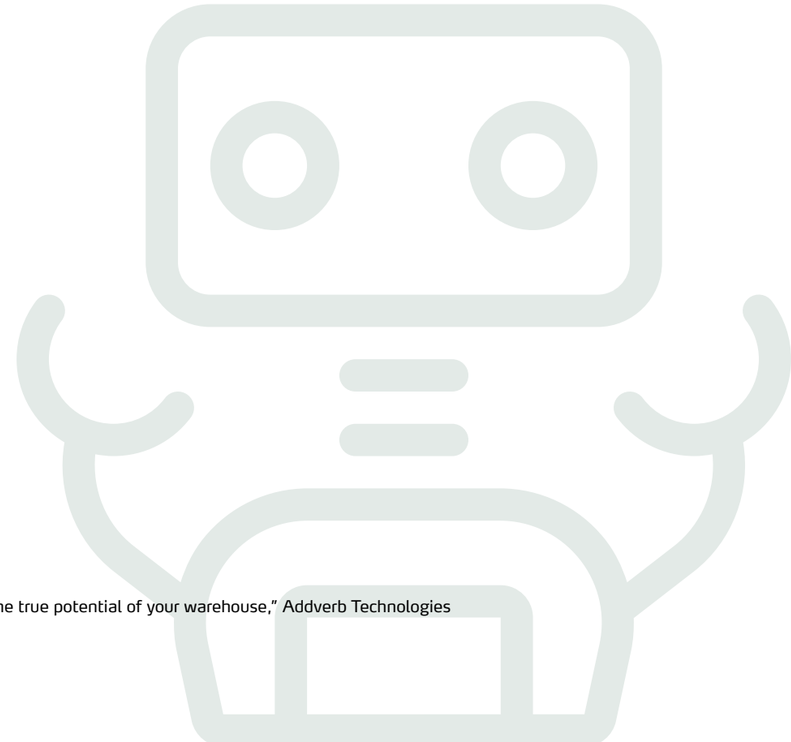
On the other hand, there is a shortage of manpower, and cost pressure is increasing. At the same time, companies must adapt increasingly rapidly to changing markets and demand. To remain competitive, it is critical that the inventory management systems deployed are scalable. An additional factor in industrial companies is that economic growth typically requires an increase in production floor space, whereby storage space is sacrificed to allow for the installation of additional machines and the remaining space utilized more efficiently.

This delicate balance can be managed effectively with investment in the automation of storage processes. For this reason, existing manual storage solutions are increasingly being complemented by automated storage systems – such as automated small parts warehouses – or entirely new logistics centers built on greenfield sites.

Refurbishing and extending existing plants is sustainable and cost-effective, especially since no new green spaces need to be acquired, connected, and sealed. Undoubtedly, in-house material flows can also be automated and flexibly scaled as part of brownfield projects. If the existing warehouse does not allow for design flexibility, companies can opt to use existing halls or construct new facilities.

Whether it's brownfield or greenfield, there is enormous potential in either case: According to a recent study, 42 percent of German logistics warehouses feature very low levels of automation.*

In particular, the automation of small-parts warehouses offers significant opportunities to achieve positive effects. In these facilities, the potential for savings, quality improvements, and acceleration of processes is exceptionally high. The use of reliable automated inventory management systems reduces error levels. At the same time, throughput times and logistic costs per order decrease, leading to higher delivery quality and higher customer satisfaction.



* Study "Unlock the true potential of your warehouse," Addverb Technologies

12 parameters for selecting the right solution

In selecting the right automation solution for your individual use case, we recommend focusing on the most important criteria. In addition to the 12 decision parameters mentioned above, ergonomics, energy efficiency, and sustainability also play a part – properties considered standard in any new system.

The space-efficient and cost-effective storage and staging of small parts in bins with short access times is a critical competitive factor. With the right solution, replenishment requirements from production or customer orders can be addressed quickly while keeping control of costs.

There is a range of solutions that offer exactly this. However, the storage systems available on the market are very different. Using 12 criteria, it is possible to roughly structure the case-specific requirements, which then significantly simplifies the choice.

What are the requirements for the performance, storage capacity, and scalability of the system?

Bin storage systems must be scalable to keep pace with the company's growth and enable seamless expansion. An efficient storage system, therefore, not only takes account of the storage capacity required today but is adaptable to future requirements; a system extension has to be possible if there is predicted inventory stock growth. At the same time, scalability is a necessary condition for flexibility.

After all, bin warehouses must be adapted to changing customer behavior. The throughput performance must be based on the current demand and should be neither too small nor too large to help optimize operating costs and maximize productivity.

What about article diversity and access frequency?

The number of different articles in the warehouse influences the complexity of warehouse management. As the number of articles grows, so does the requirement for efficient management to make optimal use of the available space. Articles with frequent access, for example, must be easily accessible to enable fast picking and seamless order processing. Bottlenecks and delays in operations can also be avoided if withdrawals can be handled efficiently.

Scalability

Storage capacity

Throughput requirement

Picking quantity

Accesses per SKU

SKU count

How heavy and how big are the stored articles?

Other important factors for selecting the right storage system are the weight and size of the stored articles. These determine the carrying capacity, space usage, handling, and efficiency during the picking process.

Item weight

Item size

How soon is the automated solution required?

The planning effort depends on the complexity of the requirements and processes, as well as the modularity and scalability of the system in productive operation. The total duration until the commissioning of the finished storage system also depends on the availability and implementation of the technology. With a competent partner at one's side, it is possible to save time and resources here.

Effort for system design

Time for delivery/ implementation

What are the construction requirements on site?

In many cases, new storage systems have to be integrated into existing buildings. Here, the solution must be adaptable to the existing floor plans or make the greatest possible use of the available height in the warehouse.

Available free height

Available footprint

There is no one solution for all situations

The criteria above are valuable decision supports, which we look at more closely in the following four examples. It will become clear that each warehouse situation requires a tailored solution. Each solution offers different advantages, thus making it more suitable for some applications than others. There is no one-size-fits-all storage system. Looking at each company's situation analysis and their defined goals enables a case-specific configuration where the individual criteria play different roles.

The 12 parameters in practice

Combination warehouse for pallets and small parts for an engineering company

A fast-growing engineering company replaced its manual, forklift-truck-operated area storage and its small-parts storage plant with a state-of-the-art logistics center. Each stored pallet weighs up to 800 kg, and the small-parts bins weigh up to 50 kg.

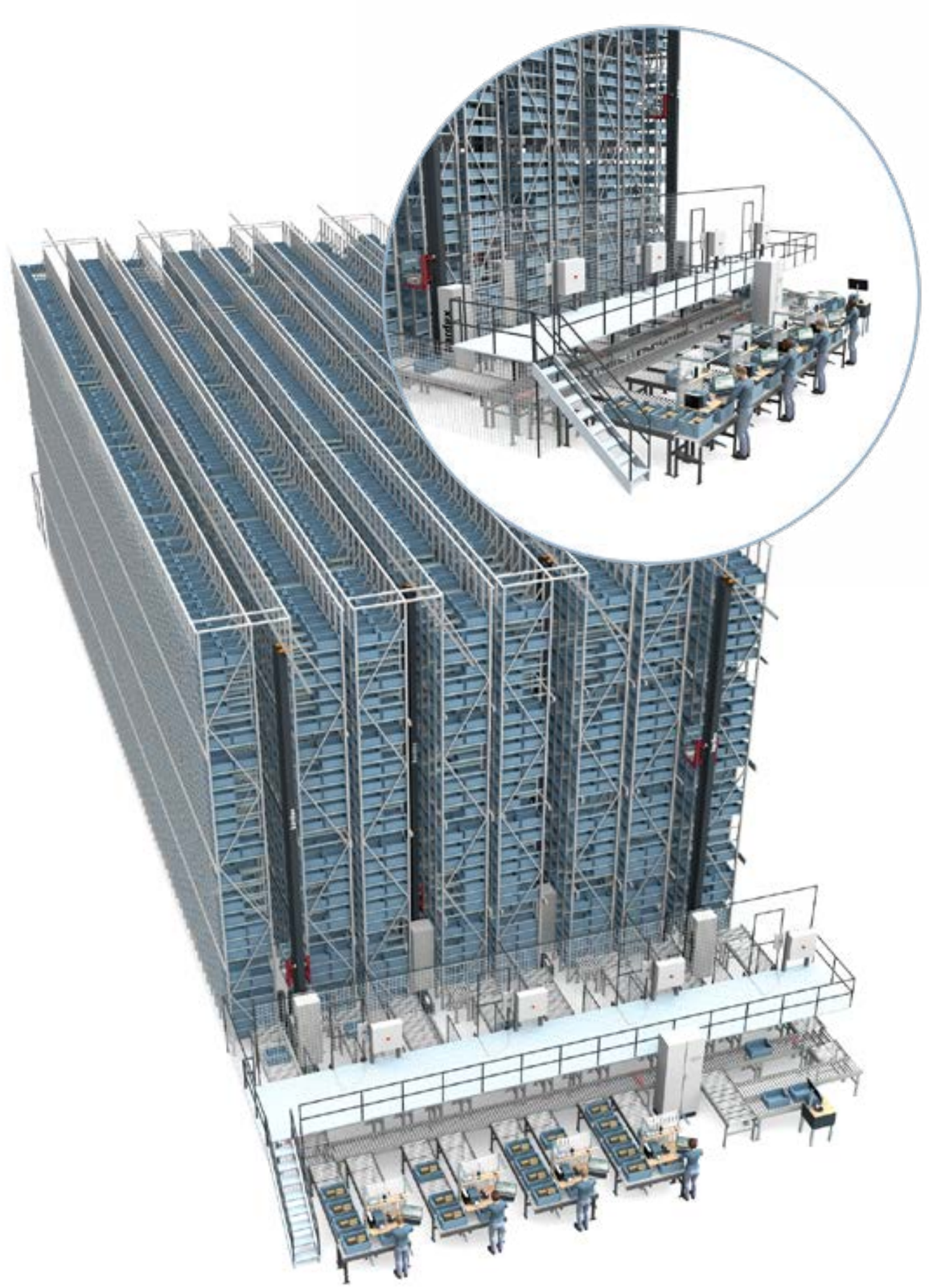
Supply and demand had reached levels that called for a rethink of production and spare-parts logistics. The solution: A fully automated, three-aisle, high-bay warehouse with more than 3,400 pallet storage spaces in conjunction with an automated small-parts warehouse with 4,000 bin storage spaces, a stacker crane, and connected bin conveying technology. The plant also features four picking stations where the small parts are withdrawn.

With the automation and centralization of the manual storage areas, previously located in the production area, it was possible to make significant space savings in both places. The sustainably planned solution allows for considerable extension in the future.

The overall solution provides spare-parts storage and replenishment of components, and assemblies for installation and manufacturing of special-purpose machines. Articles ranging from small screws, valves, and switches to large-scale stainless-steel components and machine benches are stored here.

In practice:

The engineering company wanted to automate the storage area not only for small parts but also for pallets. In this case, it was possible to build on a neighboring site on the factory premises, which meant that the automated storage systems did not have to be fitted into existing buildings. There were certain limits to the construction height and the floorspace, but these were not a major challenge. The planning effort was also not a major concern as the existing solution could be used up until the go-live stage of the new logistics center. A key criterion, however, was extensibility so that the new plant would also be able to meet future require-ments. In fact, the high-bay warehouse can be extended to include two additional aisles, and the picking area in the small-parts storage area can be extended to include additional workstations.



Warehouse refurbishment at C-parts company

A company specializing in C-parts and tools reorganized its logistics center with a state-of-the-art bin shuttle system powered by ROCKETSOLUTION, including robots and automated transport management systems. One of the aisles of an existing 12-aisle manual, narrow-aisle warehouse was redeployed for this purpose.

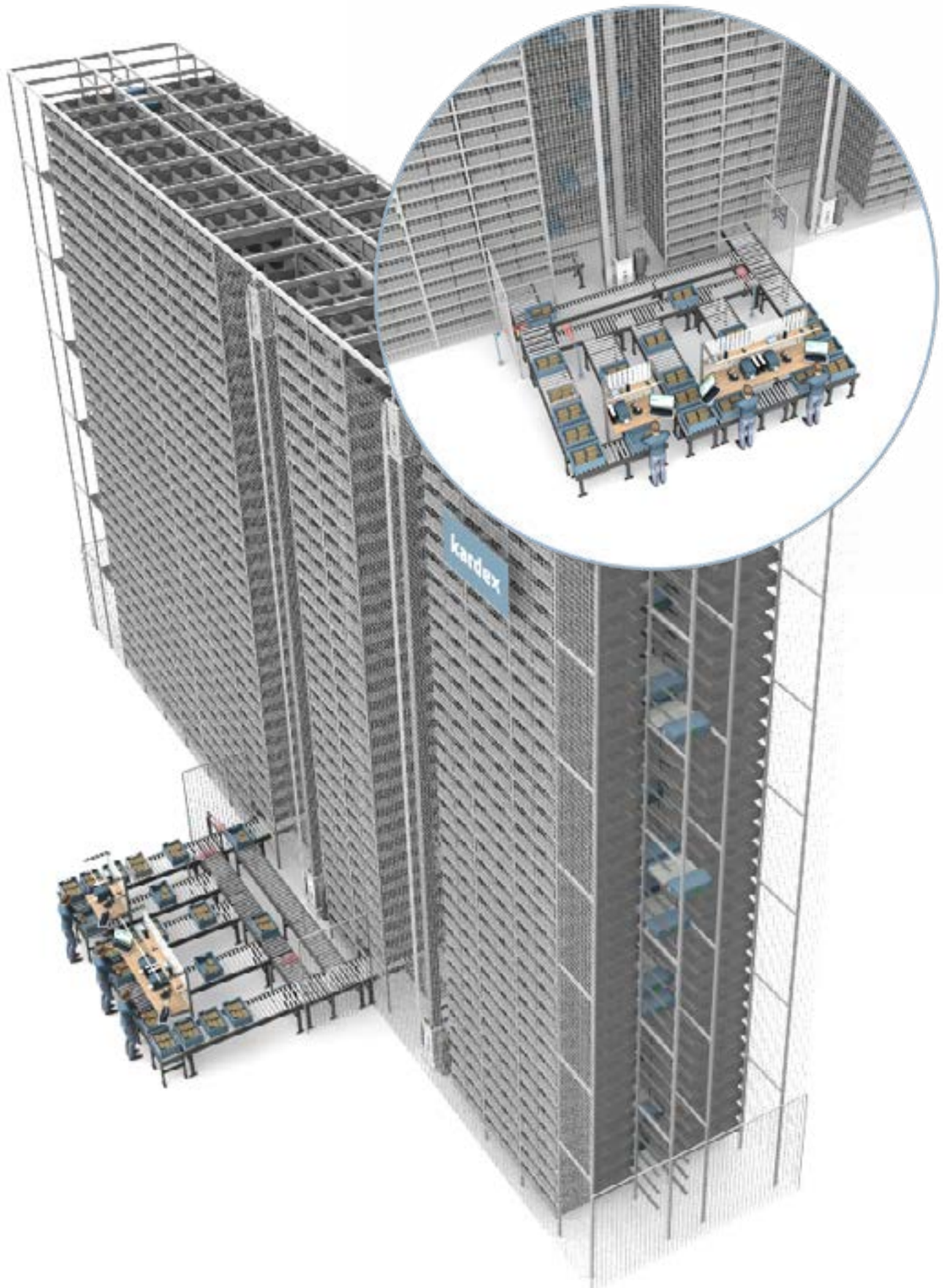
The automated bin shuttle system was installed on this aisle, consisting of 15 shuttles serving over 25,000 bin storage spaces on 35 levels. Two vertical lift devices in the central aisle bring the shuttles and bins to the required position height. The number of shuttles can be increased at any time, making the performance scalable.

A fleet of 55 Automated Guided Vehicles (AGVs) handles the onward transport of the goods to and from the racking and to the connected storage areas. The driverless vehicles can pick up pallets and small load carriers for the intralogistics system.

As part of the conversion project, the former four-story shelf picking was converted into an AGV-controlled pallet warehouse with goods-to-person picking on the ground floor. With up to 70 pallets per hour, a double vertical lift device handles the required pallet transports across all levels. Also, as part of the conversion project, the company significantly extended its product range – more than 40,000 new articles were added to its tools and technology catalog.

In practice:

In this example, scalability was also an important criterion. Future growth can be catered for at any time through extensions to the plant – additional aisles and shuttles can be added to the shuttle warehouse, and the number of autonomous transport robots can be increased. It was important that the shuttle warehouse be integrated into the existing building structure. Therefore, the available building height and floorspace were essential in planning. Focus was also placed on implementation during ongoing operations to ensure the company's ability to continue deliveries at all times.



Combined small-parts warehouse for tool manufacturer

A tool manufacturer faced the challenge of restructuring their warehouse and production halls at the company headquarters – the existing hall had reached its capacity limits. The plan was to continue to store the tools centrally in this hall and to carry out order-related picking, with all orders picked from the central warehouse and then transported to the shipping point.

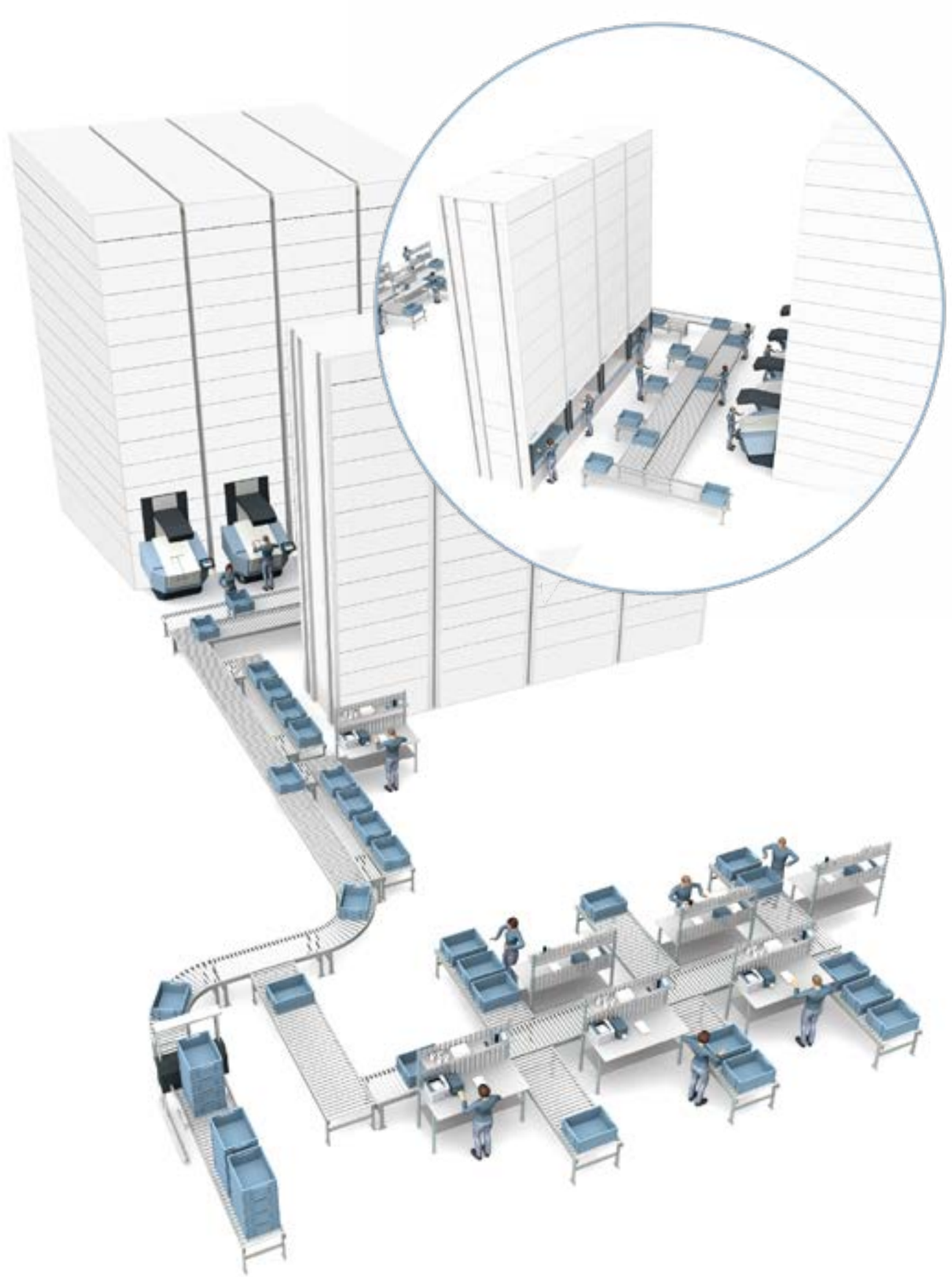
The tools consist of small parts stored in 600 × 400 mm bins and large, bulky, and heavy components that must be stored, retrieved, and picked. The solution consists of a combination of four warehouse lifts (Kardex Shuttle 1000) and a four-aisle, automated small-parts warehouse (Kardex Miniload-in-a-Box). This way, the customer benefits from a perfect storage mix for small and large-volume parts.

Both solutions operate according to the "goods to person" principle – they have a modular and flexible design and thus enable future modifications. In this concrete example, the small-parts warehouse can accommodate 5,000 bins with different heights.

At the beginning of order processing, the warehouse management system (WMS) matches one or more empty bins with the relevant order at the exit of the empty-bin stacker, which is then transported to the picking area via the conveying technology. In the loop at the picking area, the bin is filled at the individual picking stations until all the relevant articles have been picked before being transported to the shipping area. The new layout meant that throughput could be doubled with the same number of employees.

In practice:

In this example, the focus was on the parameters of scalability, available floorspace, and the building height. The existing warehouse was to remain in use. Through the mix of storage systems, the customer could significantly increase the storage density and, therefore, find space to store all articles. The saved floorspace can be used for additional storage modules if required. Previously, it would not have been possible to achieve growth as the capacity of the warehouse had been reached.



Combination warehouse for pallets and small parts for an online B2B retail company

The strong growth of an online retailer for work clothes and safety shoes called for a new space-saving solution at the existing premises for order fulfillment.

Using shelving racks in a storage space of around 3,000 m², the company had already reached the limits of its capacity. For this e-commerce company, the key requirements of the new storage system were optimal usage of the existing storage space, fast processing of customer orders, and minimal downtime risk.

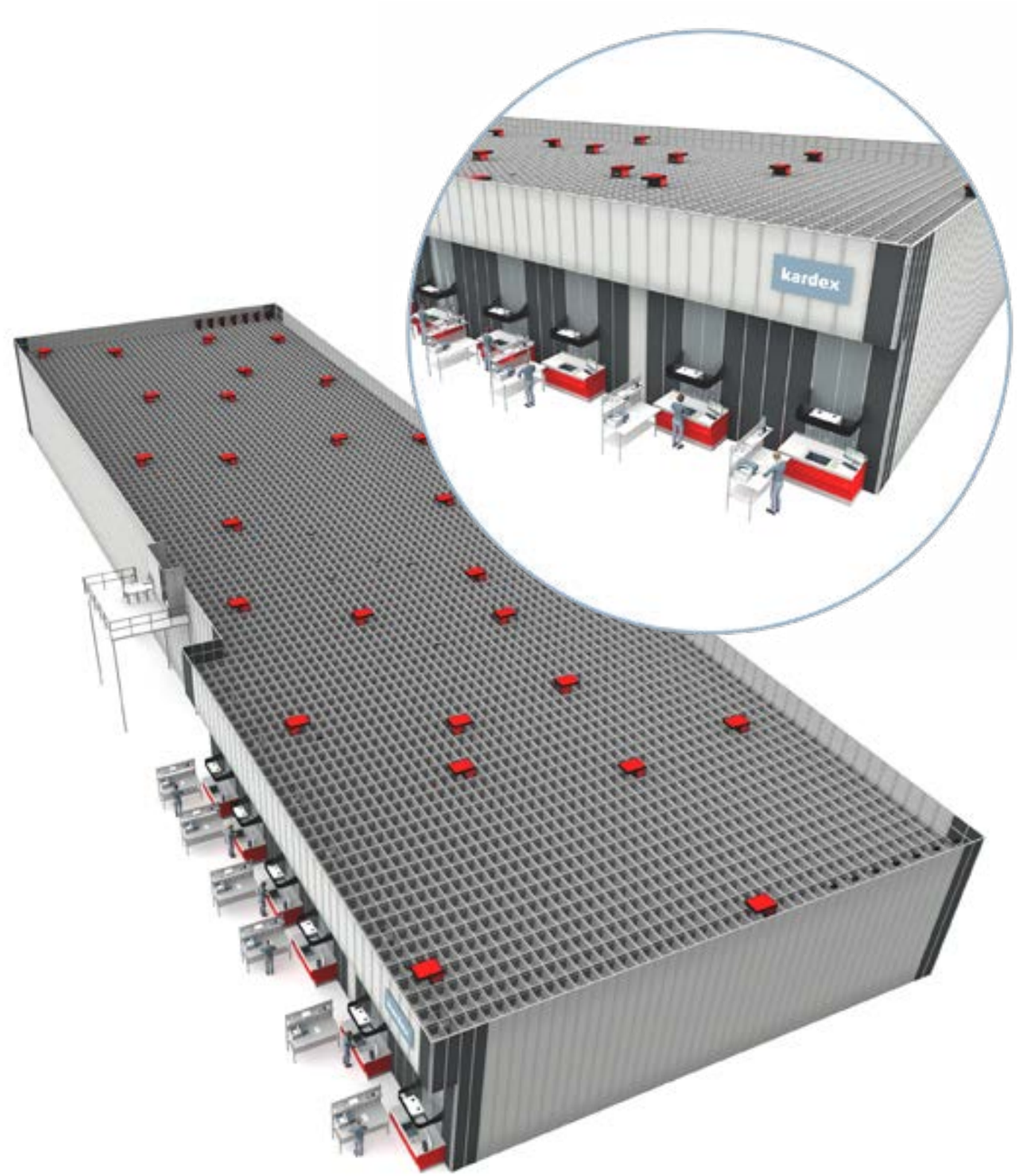
With this in mind, the online retailer looked at a cube storage solution with AutoStore. This plant, installed on a floorspace of 1,400 m², provides storage space for 54,000 bins. 26 robots move across the aluminum grid, pick up bins, sort them, and place them at ergonomically designed workstations for replenishment and picking. The solution is complemented by a wide-aisle warehouse for pallets and an external warehouse that serves as block storage for pallets.

The results of the conversion are impressive: From order receipt right up to order dispatch, the online retailer can now process orders within just 30 minutes – whether the goods are stored in the upper section of the grid or up to 7 meters below ground level.

In practice:

In the retailer's investment decision, the parameters in focus were the realization period, scalability, and storage capacity. To ensure the company's continued supply capability, the logistical areas had to be reorganized within a reliable timeframe and during ongoing operations. Also, the available floorspace and the available building height played a key role since the storage system had to be integrated into an existing building.

The scalability is the result of the saved floorspace: The high-density storage means that the company can now store even more goods on a smaller floorspace of just 1,400 m². 40 percent of the storage spaces are unoccupied, allowing for further growth. During the installation of the current solution, consideration was given to a future extension with workstations for goods storage. If the performance requirements increase, this can be achieved anytime with the needs-based introduction of additional robots.



Overview of the key storage types for small parts

Automated small-parts storage with stacker crane

Automated small-parts storage with stacker crane is available in various sizes. In principle, this is a modular system for handling bins. It consists of the following components: a stacker crane, conveying technology, racking, and a warehouse management computer. It is used as an independent warehouse for direct picking or as a replenishment warehouse.

Advantages of an automated small-parts warehouse with stacker crane from Kardex:

- Optimal space utilization up to 24 m in height
- High storage capacity coupled with optimal value for money
- High throughput requirements even with a load capacity of up to 50 kg

There are also standardized solutions available, such as the Kardex Miniload-in-a-Box. This solution covers a wide range of automated storage and staging systems applications and is optimally suited as a buffer, kitting, or picking solution.

Advantages of Kardex Miniload-in-a-Box:

- Short realization period in association with low investment budget
- Process buffer – high-density storage
- Utilization of the full height of the existing building

Cube-storage system

A cube-storage system consists of modularly designed plastic bins stacked on top of each other in a high-density, grid-like system. The bins are transported automatically by robots, restacked, and brought to the picker or the picking robot when required for the withdrawal of individual parts.

Advantages of an AutoStore system:

- High scalability with regard to storage capacity and throughput
- Maximum storage density on minimal floorspace, also suitable for buildings with non-standard geometry
- Short planning and realization periods alongside extensibility

Bin shuttle system

A bin shuttle system can provide warehouses with an automated and cost-effective service. This system uses transport shuttles – autonomous vehicles that store, retrieve, and relocate stored goods. The shuttles can access all storage levels and channels, ensuring high throughput performance. The latest solutions enable four-deep storage, which makes for extremely compact storage. They also enable high storage and retrieval performance and almost unlimited flexibility in the configuration of integrated facilities.

Advantages of a bin shuttle system powered by ROCKETSOLUTION:

- High, sequenced performance
- Compact with regard to storage density, construction height and depth
- Load capacity of up to 50 kg

About Kardex

Kardex is a leading global partner for intralogistics solutions in an attractive and growing market. In addition to first-class automated products and standardized systems, which guarantee reliable operational readiness and low overall operating costs, the Group also provides extensive services along the entire life cycle.

With dynamic storage and staging systems, Kardex enables an intelligent introduction to automation. In addition to integrated material flow systems, small-parts storage, and automated high-bay warehouses, the company is a global AutoStore™ partner with a range of flexible and modular storage and order processing solutions in its portfolio. The Group employs some 2,500 people in more than 30 countries. Kardex Holding AG has been listed on the SIX Swiss Exchange since 1989

Contact