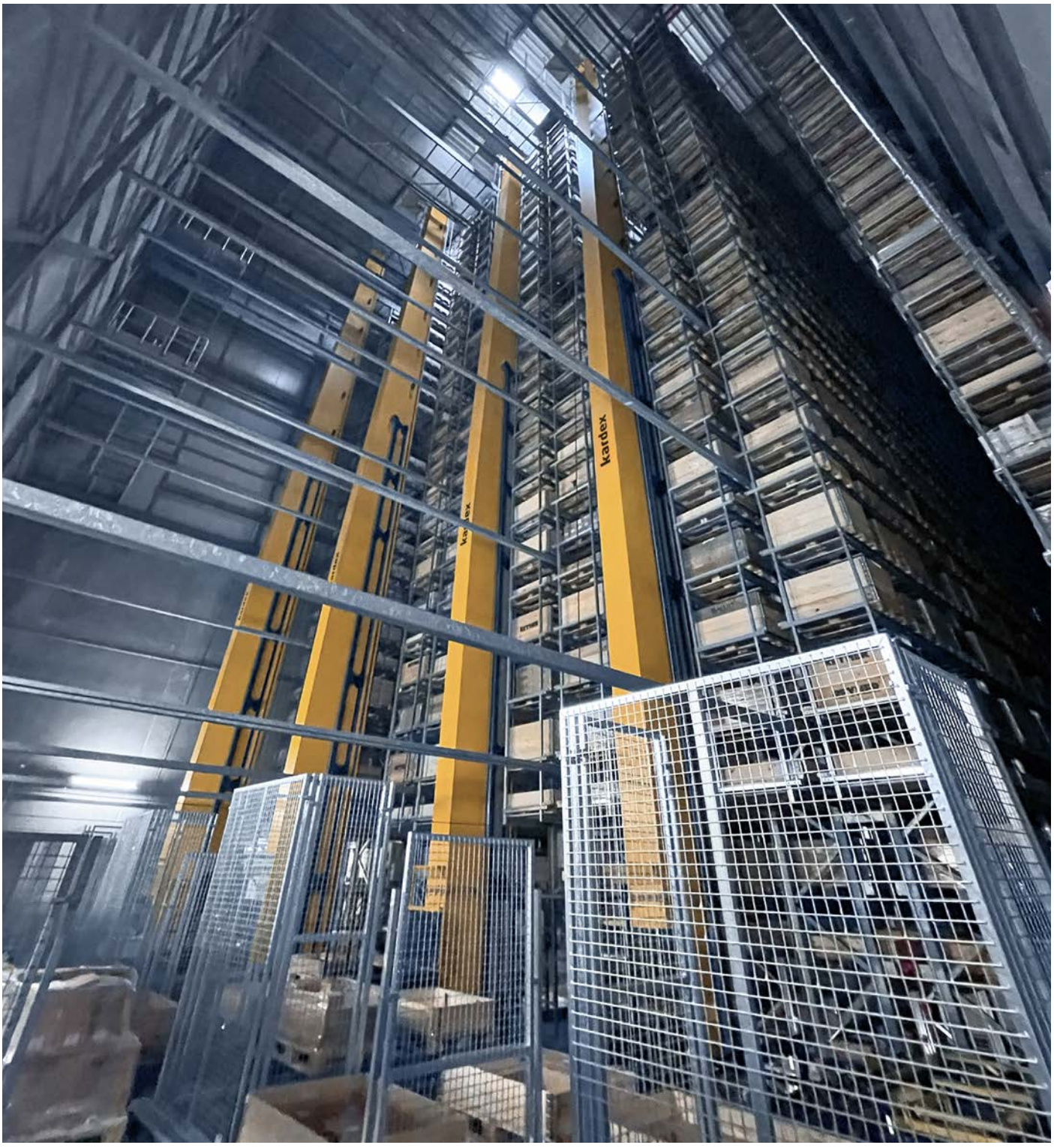
Warehouse Insights

Innovative Space Optimization



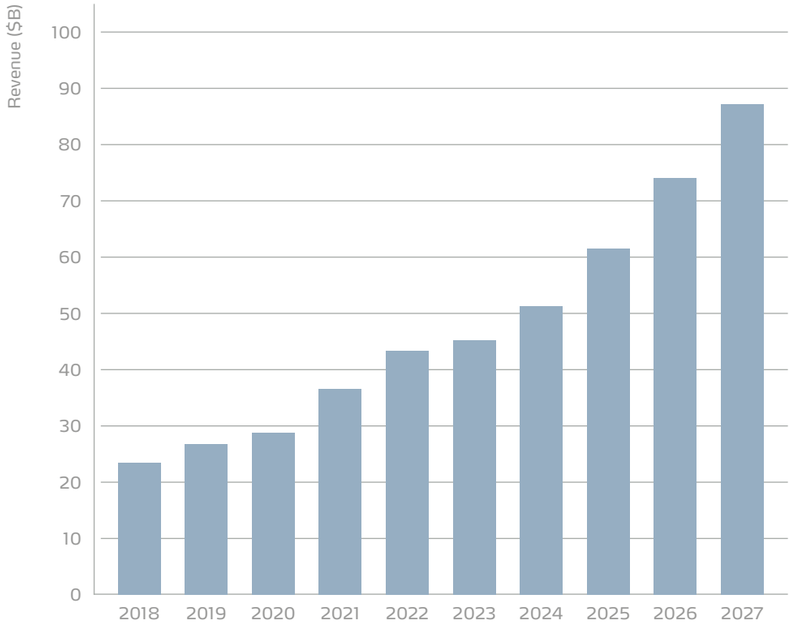
kardex

Introduction

In the ever-evolving world of intralogistics, space optimization has become a cornerstone of operational efficiency.

Sales and demands have increased drastically across the logistics industry in recent years. Manufacturers must navigate escalating inventory needs, lack of space, new safety guidelines, and changing consumer behaviors. As businesses grapple with these challenges, the importance of maximizing warehouse and distribution center layouts has never been greater. The global warehouse automation market is projected to steadily grow to an impressive €69 billion by 2027.[1] This sustained growth highlights a trend for companies: the increasing necessity to implement automated solutions for more effective warehouse space management. Leveraging automation has become an essential strategy for businesses aiming to maintain operational efficiency.

Global warehouse automation forecast



Source: Interact Analysis

[1] Interact Analysis. "Warehouse Automation: Despite Short-Term Pains, Long-term Growth Expected". Accessed December 2023. https://interactanalysis.com/warehouse-automation-long-term-growth

In this context, we explore key methods for optimization and technological advancements reshaping how businesses approach space management. From leveraging vertical space to increasing storage density, we outline how modern solutions are setting new standards. Choosing modular and scalable solutions is vital to stay flexible and future-proof.

The challenge of limited space

Businesses worldwide are contending with an increasing need for efficient space utilization, driven by expanding inventory varieties and surging consumer demands. Economic factors and evolving market dynamics further amplify the pressure. Coupled with limited logistics real estate, costs for the required space are rising.[2] In Germany, for example, rent for spaces of more than 5,000 m² increased year-on-year.[3] The challenge is, therefore, not just about finding more space but optimizing the existing space. With strategic planning, businesses can turn this challenge into an opportunity for growth and efficiency.

Investing in automated storage and retrieval systems (ASRS) is a strategic solution to this challenge. These systems allow for much denser storage, fitting the same amount of stock-keeping units (SKUs) as traditional shelving but 85% less space. This efficient use of space stores the same or more items and frees up significant floor space by utilizing height. The newly available space can be used for internal expansion or other revenue-generating activities.

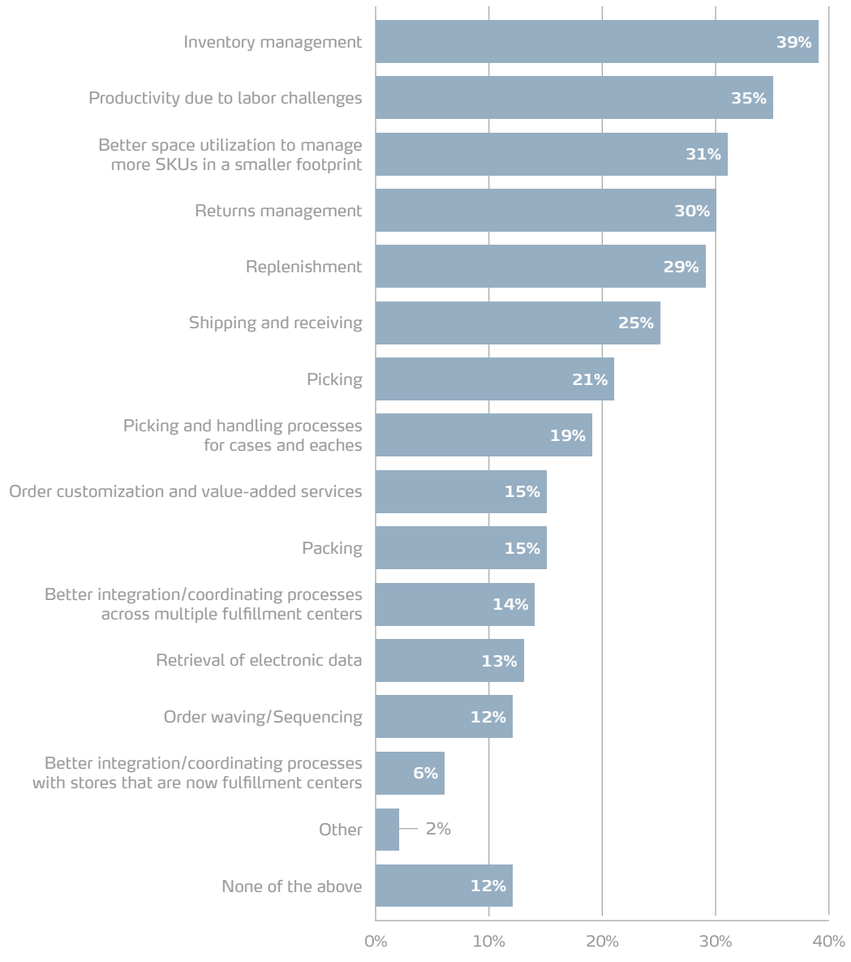
[2] Tagesschau. "Onlinehandel fehlt Platz zum Lagern". Accessed December 2023. https://www.tagesschau.de/wirtschaft/unternehmen/online-handel-lagerflaechen-101.html#:~:text=Deutschland%20steht%20ein%20Mangel%20an,Koepke%2C%20Logistikchef%20der%20Immobilienberatungsgesellschaft%20CBRE.

[3] JLL. "Spitzenmieten für Logistikflächen ziehen im Vorjahresvergleich weiter an". Accessed December 2023. https://www.jll.de/de/presse/spitzenmieten-fuer-logistikflaechen-ziehen-im-vorjahresvergleich-weiter-an

Effective space optimization

The future of space optimization in intralogistics is poised to be shaped by emerging trends and technologies. Better space utilization has been cited as the third most important aspect of current order fulfillment and distribution operations to improve and as the third most top priority for fulfillment and distribution operations in 2024.[4]

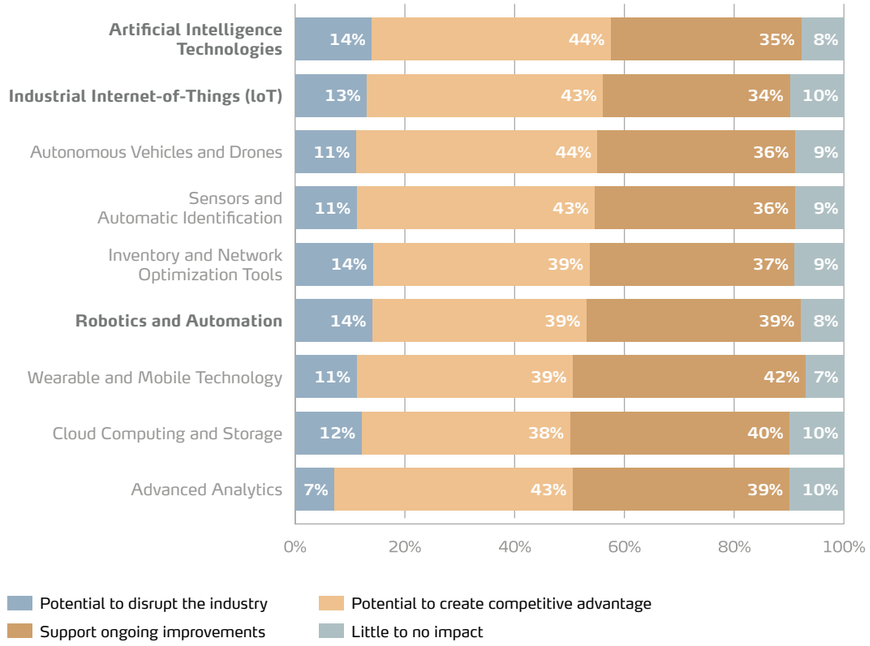
What aspects of your current order fulfillment and distribution operations would you like to improve?



[4] Kardex. "2024 Warehousing Industry Report". https://cdn.bfldr.com/EL3HU3A3/at/6w5sthpts6w3bc98n6hkv5n/WarehouseInsights_US_2024-Warehousing-Industry-Report

74% of warehouses are increasing their supply chain technology and innovation investment. This means funding key technologies like the Internet of Things (IoT) and Artificial Intelligence (AI), thus enabling smarter, more responsive warehouse operations. Robotics, particularly collaborative robots, will become more prevalent, working alongside humans to enhance efficiency. The design of warehouses and distribution centers will evolve to accommodate these technologies, focusing on modularity and flexibility. This will allow for rapid adaptation to changing market demands and technological advancements, ensuring that space utilization remains at the forefront of intralogistics strategy.[5]

Impact of technologies on industry's supply chain



Source: 2023 Annual Industry Report: The Responsible Supply Chain.

[5] MHI. "2023 Annual Industry Report: The Responsible Supply Chain". https://og.mhi.org/publications/report

Effective space optimization in intralogistics hinges on three core methods and accompanying technology, each addressing a specific aspect of space efficiency.

1. **Vertical space utilization**

2. **High-density storage**

3. **Flexible layout designs**

1. **Vertical space utilization:** Going beyond conventional shelving heights, vertical space utilization involves leveraging the full height of new and established warehouse facilities. Optimizing floor-to-ceiling storage space enables multi-access entry points and uses less floor space or existing greenspace. It is interchangeable, flexible, and suits various clients and products (e.g., small to large). With less floor space required and the scalability to accommodate new products, fixed real estate costs decrease and your warehouse can remain at its current location.

   A pivotal technology in this realm is ASRS, which allows for the rapid and ergonomic retrieval of items stored at various heights. Vertical Lift Modules (VLMs) or high-bay warehouse solutions are central to this approach.

   VLMs like the Kardex Shuttle require a minimum footprint while ensuring maximum space. Keeping items within a structured and organized storage system minimizes search times and fully uses the available space. This is particularly beneficial for warehouses with a large amount of SKUs and limited floor space. The key benefits of a Kardex Shuttle include up to 85% floor space savings, 99.9% pick accuracy, 67% labor force reduction, and 100% ergonomic access. This is an ideal, expandable, scalable approach to managing a wide range of products with various tray types and travel speeds.

   The versatility of ASRS solutions is evident in their application across various industries. In the pharmaceutical sector, for instance, where precision and safety are paramount, these systems ensure accurate and swift retrieval of the products at heights. In retail, these flexible storage solutions seamlessly manage rapid changes in product types, dimensions, and weights, especially during seasonal shifts.

2. **High-density storage:** This storage method focuses on minimizing wasted space and maximizing storage capacity.

   Solutions like deep-lane storage and high-density racking systems enable businesses to store more goods in less space. Technologies such as automated guided vehicles (AGVs) and shuttle systems with high storage density can be integrated to navigate these compact spaces efficiently, ensuring quick and accurate retrieval of goods while reducing the aisle space used by operators.

   Take AutoStore™, for instance, which is known for its compact grid storage system. It employs robotic bins for efficient storage and retrieval of items. The robots operate on top of a grid system, enabling them to navigate swiftly and accurately to the desired storage location. This method drastically reduces the need for traditional aisles, significantly increasing storage density. Integrating such robotic technologies optimizes space, accelerates operations and quadruples storage space within existing facilities.

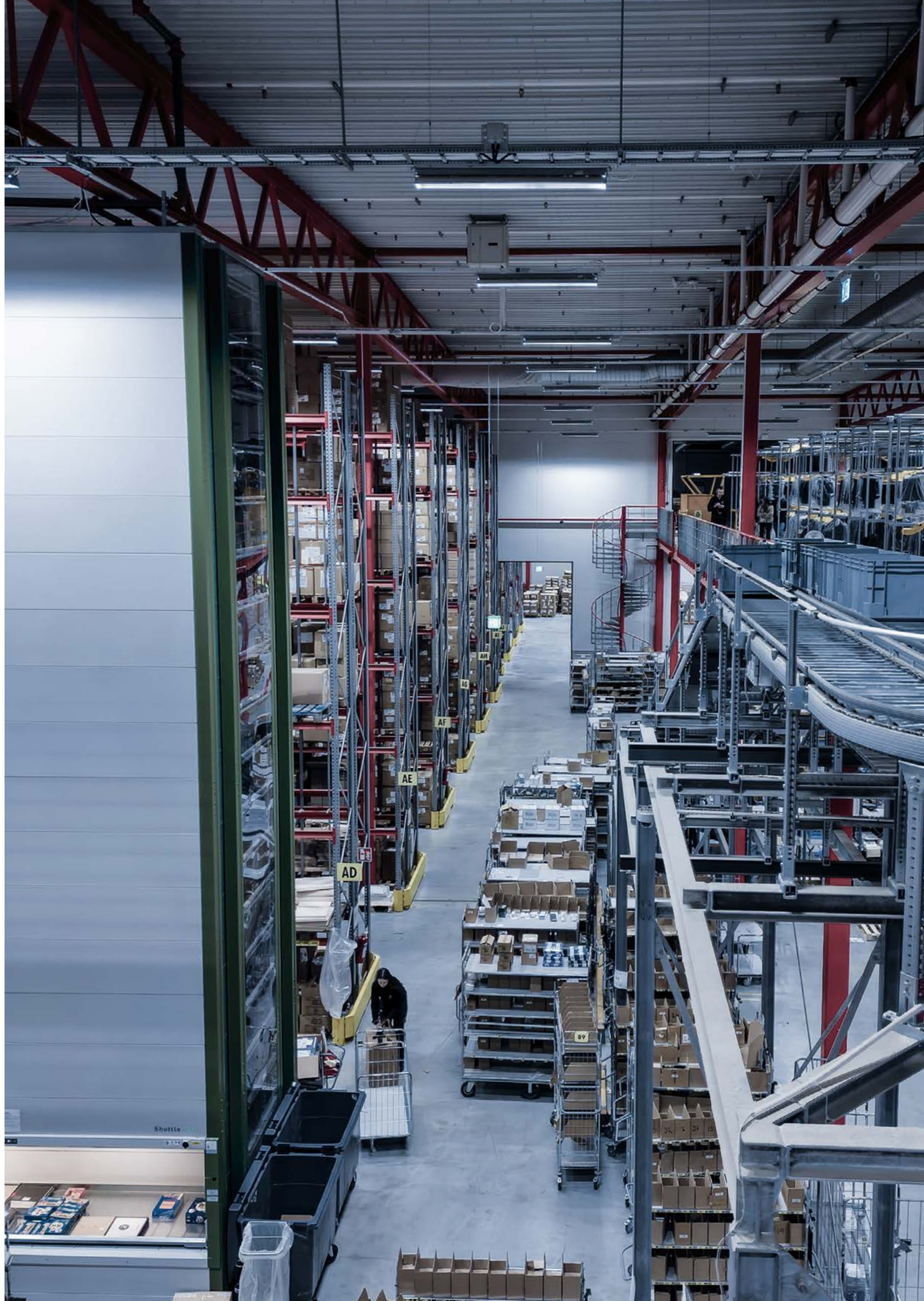
   Another example are Bin storage solutions with up to quadruple-deep storage and the ability to utilize the entire room height in combination with a small aisle width, providing excellent throughput and flexibility. They efficiently and optimally store items in various formats like totes, cartons, or trays. These systems utilize stacker cranes or shuttle vehicles in combination with lifts to manage all storage and retrieval operations.

   The aforementioned Vertical Lift Modules (VLMs) also facilitates high-density storage, yielding significant advantages in storage and retrieval times. This is particularly beneficial for the storage of small parts and tools.

3. **Flexible layout designs:** Flexible layout designs increasingly characterize the modern warehouse. This flexibility is achieved through scalable storage solutions and modular designs, which allow for expansion in response to changing business needs. Technologies supporting this kind of flexible design enable warehouses to effectively leverage every square meter of available space, including accommodating low ceilings or fitting into irregular spaces. The adaptability also allows for fully utilizing the warehouse's unique layout, including passages, transit tunnels, and galleries, or is shaped in an L-form.

   By implementing such solutions, warehouses optimize their current space usage and ensure they can adapt to future changes in storage needs or operational dynamics. These systems offer the flexibility to modify layouts with minimal disruption, thus supporting flexible design in warehouse management.

i Discover 7 space-saving automated technologies



Innovative solutions

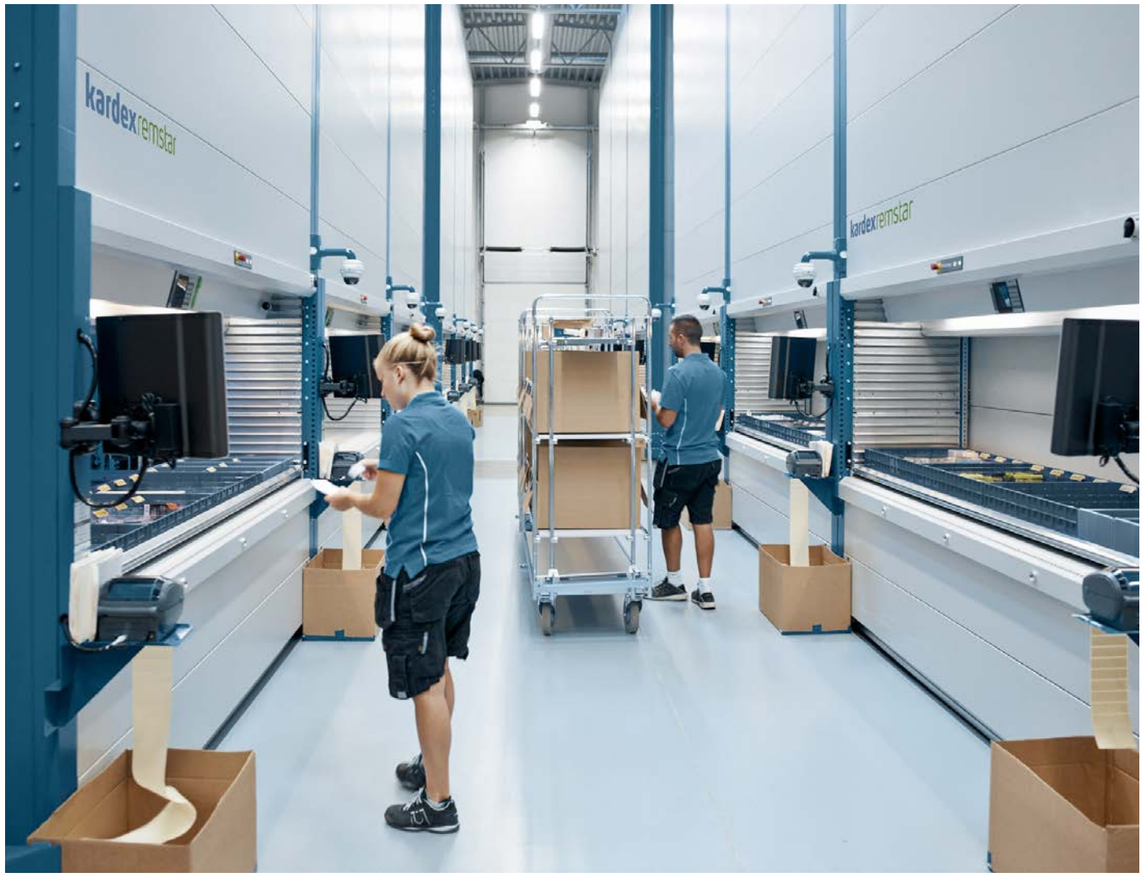
How companies overcame the space challenge

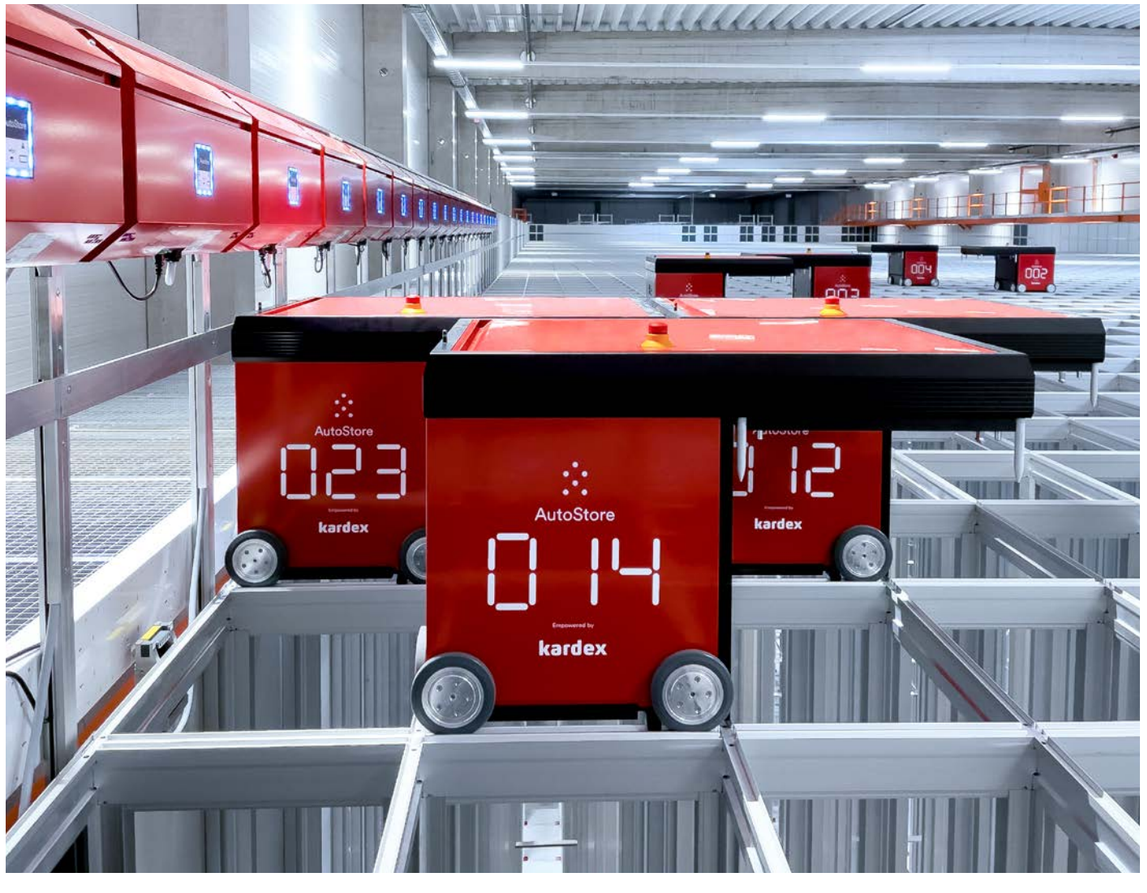
Kjell & Company, based in Sweden, sells accessories for home electronics and needed a flexible and efficient solution to manage online and in-store growth. With 12 Kardex Shuttles equipped with Kardex Color Pick Systems and Kardex JMIF software, space was reduced by 90% from 800 m² to just 80 m², and employees achieved an average of 120 order lines per hour compared to just 70 order lines per hour with the former shelving systems all in a more safe and ergonomic working environment.

Read Case Study: Multiple Batch Picking

Arbeitsschutz-Express, an e-commerce company, faced the challenge of needing more storage space and faster fulfillment processes. They were operating over capacity in a 3,000 m² area. The solution was an AutoStore system empowered by Kardex, which allowed them to store more items in just 1,400 m², effectively reducing the required floor space by over 50%. This high-density storage system, currently only at 60% capacity, offers room for further growth. It includes 54,000 storage bins managed by battery-powered robots, ensuring efficient use of space and scalability for future needs.

Read Case Study: More Storage in Less Space





Brauns-Heitmann, a company specializing in household chemicals and decorative items, partnered with Kardex to construct a high-bay warehouse at their German headquarters. The challenge was to create over 10,000 pallet storage spaces within a compact area of 1,500 m². The solution was a 40-meter high, three-aisle, silo-type warehouse optimized for space and efficiency. Brauns-Heitmann received a comprehensive solution, including steel racking, roof covering, façade, and a warehouse management system.

Read Case Study: Small Footprint, Major Benefits

Future trends

As we look toward the future of intralogistics space optimization, a convergence of emerging technologies is set to revolutionize the industry.

Central to this transformation is the integration of Artificial Intelligence (AI), which promises to redefine space management through intelligent algorithms capable of predictive analytics and real-time decision-making. This AI-driven optimization will maximize space utilization and enhance operational efficiency by anticipating and adapting to changing inventory needs.

Learn about the 4 ways AI transforms intralogistics

Another pivotal trend is the incorporation of the Internet of Things (IoT), which brings a new level of interconnectedness to intralogistics. IoT devices, from sensors to smart shelving, will provide a continuous data stream, allowing for more dynamic and responsive space management strategies.

Learn about IoT and its implications on intralogistics

Additionally, as sustainability becomes a driving force across industries, sustainable space utilization practices are gaining traction. These practices focus on optimizing space use to reduce environmental impact, such as implementing green warehousing technologies and recycling initiatives. These advancements signal a shift towards more intelligent, interconnected, and sustainable intralogistics operations, promising significant gains in space efficiency and operational effectiveness.

Conclusion

In summary, these options, supported by cutting-edge technology, can transform warehouses into highly efficient, space-optimized environments.

By exploiting the full height of a warehouse, valuable floor-to-ceiling space is efficiently utilized, preventing any potential space loss. Compact storage goes beyond mere space saving. It involves a strategic reduction in floor space usage and minimizes the number of aisles, thereby enhancing storage density. This approach not only optimizes the use of available space but also frees up more area for other profitable aspects of the operation in a production facility. Flexible design is not just about adaptability; it's about implementing technologies that can be expanded to meet evolving business needs.

Integrating ASRSs and intelligent software solutions ensures businesses can adapt to market demands while maximizing their existing space and enhancing overall operational efficiency and productivity.

As a leader in providing smart intralogistics solutions, Kardex offers space-efficient and scalable systems to the changing needs of businesses. Our expertise ensures that every square meter of warehouse space is used to its fullest potential, setting a new benchmark in space optimization.

Contact us