

VERTICAL LIFT MODULES

Functionality - Variants - Application

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VERTICAL LIFT MODULES - THE IDEAL TOOL FOR THE DIGITAL TRANSFORMATION OF THE SUPPLY CHAIN

Digital transformation is changing intralogistic processes. It is having a particularly large impact on the supply chain: The new, digitized supply chain is more interconnected, intelligent, scalable, and flexible. Whether used as a stand-alone solution, in a network or integrated in an automated application with warehouse management software - Vertical Lift Modules are the ideal solution to meet the challenges of digitization. In addition, Vertical Lift Modules lead to a significant reduction in costs. Thanks to the considerable space savings and the optimized use of space, they minimize transport distances and picking times and thus require less personnel.

Vertical Lift Modules are the ideal solution to meet the challenges of digitization.

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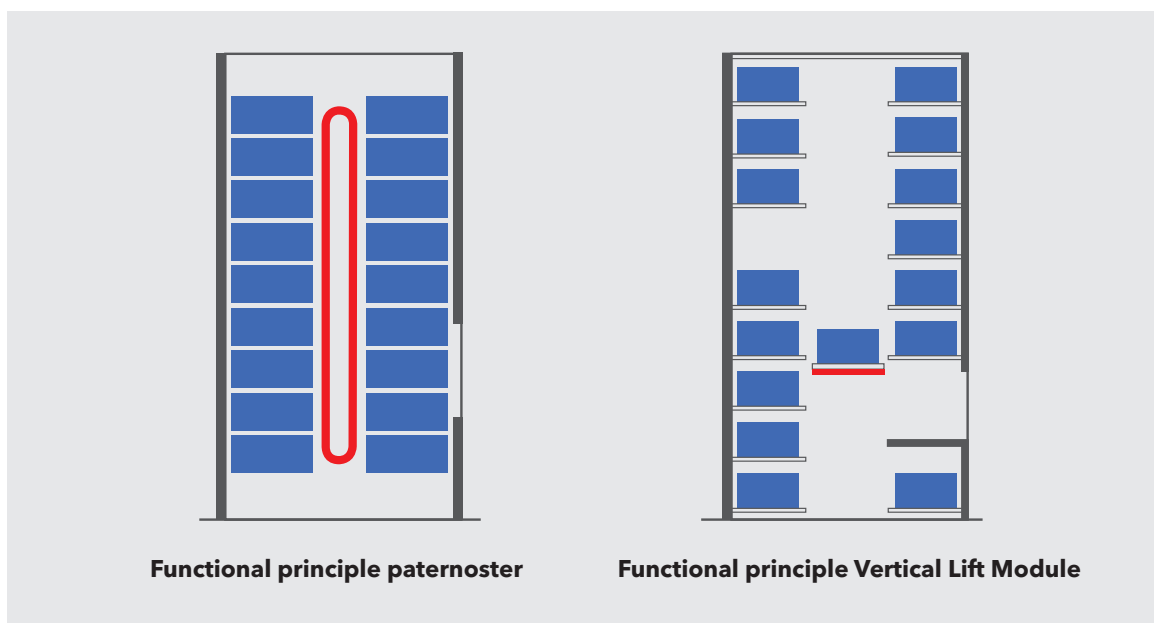


TERMINOLOGY AND DEFINITION

In intralogistics, Vertical Lift Modules are also known by other names. For example, terms such as "storage lift", "tray storage", "storage tower", "lift rack" or "vertical lift" are often used.

In contrast to paternosters or circulation racks, which are often and mistakenly thought to be similar to Vertical Lift Module, a storage lift is not a circulating system. The reason for the confusion is often that both are dynamic racking systems that operate on the **goods-to-person principle**. With paternosters however, all storage containers are brought to the control station using cyclic circulation, the stored goods are thus moved together with the entire storage rack. With a paternoster, the stored goods are moved on one side downwards and at the same time on the other parallel side upwards.

A Vertical Lift Module can be compared to an super-sized drawer cabinet with two rows of trays - at the front and at the rear. Between the two rows is a lift, which pulls out the individual trays and moves them to the respective position of the opening. The individual layers are thus completely independent of each other and do not move by themselves. ▶





With Vertical Lift Modules, goods and articles of all kinds are stored on trays. Storage lifts offer many advantages compared to conventional storage on shelves: a full utilization of the room height based on the goods-to-person principle, increased safety for workers and a simplification of the warehouse management thanks to warehouse management software.

While the Vertical Lift Module fetches a new tray, the order picker has time to perform other tasks, such as: packaging or labeling recalled goods or picking from another storage lift. That significantly increases the efficiency of the warehouse.

No overloading

Another advantage of a Vertical Lift Module compared to a paternoster is that no overloading has to be considered. With the paternoster, everything hangs from a chain, so you always have to consider what is on the other side. It is similar to a ferris wheel, in which the gondolas always have to maintain a balance, which is why you sometimes have to let several empty gondolas pass before one climbs in. Such burdens cannot arise with storage lifts. It is therefore faster and easier to fill and articles can be removed easily on one side without having to take corrective action. ■





BELT DRIVE, CHAIN DRIVE OR RACK-AND-PINION DRIVE

Vertical Lift Modules are made with different types of drives.

Overview:

- Belt drives are widely used similar to V-belts in vehicle engines.
- Some manufacturers use a chain drive similar to that of a bicycle.
- Another drive technology is the rack-and-pinion drive, which works purely on a mechanical basis and has significantly fewer parts which are susceptible to wear. The latter was installed for the first time in a storage lift by the Danish manufacturer Handler in order to reduce service costs.

In addition, the type of control used is crucial for maintenance and independence from a supplier. Some Vertical Lift Modules are equipped with a fully-fledged PLC that allows the user to purchase spare parts on the open market. However, the majority of storage lifts are equipped with a manufacturer-specific control technology that cannot be repaired independently. ■



AREAS OF APPLICATION FOR VERTICAL LIFT MODULES

Storage lifts are used for the storage and retrieval of small and medium sized goods, such as health and beauty products, parts for technical goods, books, shoes and many other goods or supplies for production.

In eCommerce, companies use Vertical Lift Modules for storing small parts and managing smaller individual orders. Storage lifts are available in a variety of configurations, sizes and types. ■



THE HISTORY OF VERTICAL LIFT MODULES

You might say that storage lifts have several parents. On the one hand, the paternoster, which in turn is based on driving skills from the mining industry. Previously conventional bag lifts with endless, vertical conveyor belts had a similar design principle. Likewise, early bucket elevators and belt conveyors are also among the precursors.

What is known today as the paternoster was developed in England. The world's first known paternoster lift was built at the General Post Office in London in 1876. However, it did not fully comply with the later developed technology and served for the transport of parcels. It did already combine all the features of the paternoster technology, namely the constantly circulating, always upright cabins and even containers. In 1882, the English designer Hart developed the idea of a circulating elevator for people, his Cyclic Lift.

There was also an impulse that came from the USA. In the early 1950s, the Supreme Company presented a new innovative concept at a US trade show: the vertical storage carousel. The prototype never went into production, but other companies continued to develop the same concept.

In 1957, White Systems, a manufacturer of horizontal carousel systems, introduced the Power File vertical carousel for use in offices. Later that year, Sperry Rand launched the Lektriever vertical carousel. As a result, development started to move faster.

By the late 1960s, several companies had launched vertical carousel products and the concept was expanding beyond office applications. From this came the vertical lift module or VLM, developed in the late 1980s which was the direct ancestor of today's storage lifts. Many companies quickly recognized the VLM as the ideal solution for saving space and increasing productivity. ■



MAIN ADVANTAGES OF VERTICAL LIFT MODULES

There are many good reasons for using storage lifts. Most important, however, are the following four main arguments.

5.1 STORAGE DENSITY AND SPACE OPTIMIZATION

Space is one of the most important factors in every warehouse. Since Vertical Lift Modules are built upwards and not horizontally, they lead to a significant densification of the warehouse area over a few square meters and at the same time, they make retrieval easier. If required, storage lifts can also be fully installed outside a given warehouse and in their own enclosure and thus shift the required storage area completely out of the warehouse. To store a similar number of articles in shelving racks would require much more area, not to mention the ergonomic disadvantages.

Space is one of the most important factors in every warehouse.

5.2 SPEED

One argument that is often made against the use of Vertical Lift Modules is their slow speed as the user has to wait until the desired location has been brought to them.

In the context of a single order from a single storage lift, the key feature is, indeed, the response time, which is the total time needed to retrieve an order. The storage and picking performance achievable with a Vertical Lift Modules depends on a number of factors. These range from the speed and acceleration of the lift, to optimal storage space allocation and order processing, to the delivery of the tray and the visual support of the picking process.

While picking times can hardly be improved, the traveling time depends on the location of the individual articles and the picking sequence and can therefore be optimized. The situation is quite different for systems with two or more Vertical Lift Modules. Because when several storage lifts are set up next to each other, an employee can significantly increase their working speed. ▶



While he picks up and checks the goods from the first sVertical Lift Module, the second can already move into position. When the employee arrives there, the goods are already at hand. At the same time, the first storage lift brings the next item into position.

5.3 STOCK AND PROCESS SAFETY

Classic storage shelves often suffer from problems related to the organization and order of the items. The classification of shelves is fraught with errors, as well as the removal from the shelves being hard. Often missing or wrong items are only discovered during the inventory. Or they show up when an employee wants to remove an article and does not find it at the specified location. That often results in time-consuming searching.

On any given day an employee takes something, writes it down on a piece of paper and then puts it in his pocket wanting to hand it in later at the overseer's office. It is then forgotten and the withdrawal is never recorded. The result is a difference in stock.

As the contents of a Vertical Lift Module are not visible, the user is forced to work with software. Each withdrawal is booked directly at the storage lift and can be imported directly into the Enterprise Resource Planning system. The order picking list is directly visible on the display of the Vertical Lift Module and can be processed there immediately and a receipt can be produced. That means: The stocks are always up to date and no more paper is needed.

5.4 ERGONOMICS

Shelving racks often have lower levels near the floor and upper levels that are high up. Some material is also stored on pallets in the pallet rack, but a forklift must be used or the employee has to go upstairs.

With Vertical Lift Modules, the goods are presented at an ergonomically comfortable height of approximately 800 mm. Some storage lifts also tilt the trays automatically, so that goods can be removed from lower-mounted containers conveniently and without the picker having to stretch. The picker can access the goods from above and does not have to pull out any containers, as with a classic warehouse paternoster. ■



OPTIMUM USE OF VERTICAL LIFT MODULES

Although a storage lift saves storage space and picking distances, in order to reach its full potential, two additional points must be met: seamless integration into the entire storage and picking process as well as optimization of the positioning of the stored goods in the Vertical Lift Module itself.

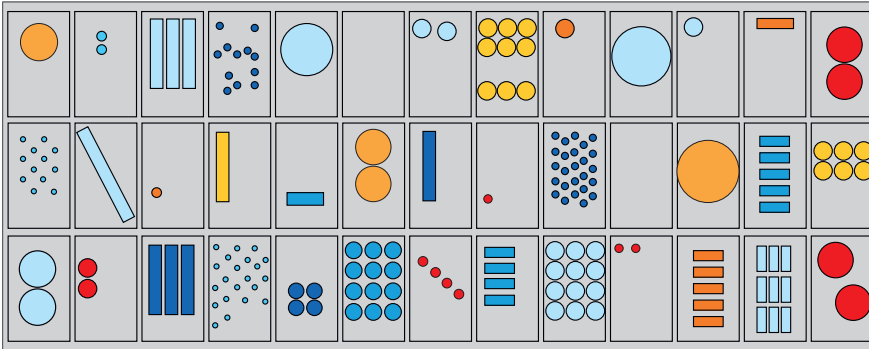
6.1 SEAMLESS INTEGRATION IN THE STORAGE AND PICKING PROCESS

Despite all the advantages of Vertical Lift Modules, there may be situations where it pays off to work with a combination of shelving rack and a storage lift. If, for example, bulky items are to be stored and picked, the space gained by the storage lift can be counteracted by the smaller number of possible (bulky) items which means that the solution does not have any great economic advantages.

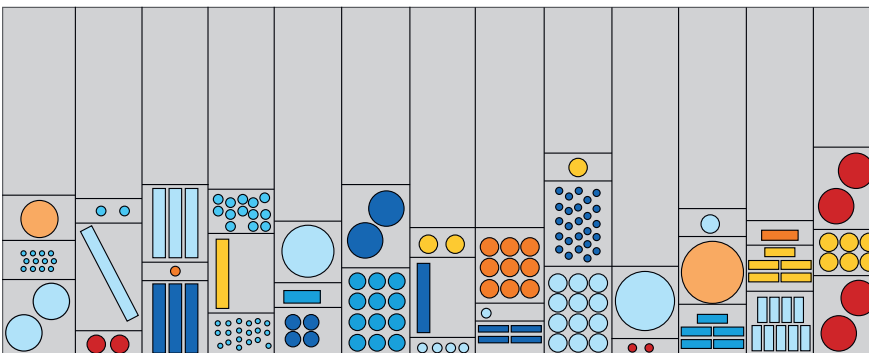
6.2 OPTIMIZATION OF THE STORED GOODS IN VERTICAL LIFT MODULES

Due to their capacity, storage lifts can often be misused to store goods in containers without optimization. Studies show that up to 60 percent more items could be stored in a Vertical Lift Module with a defined size depending on the storage strategy. A lot of space can be wasted in storage lifts – up to two-thirds of its capacity. ►

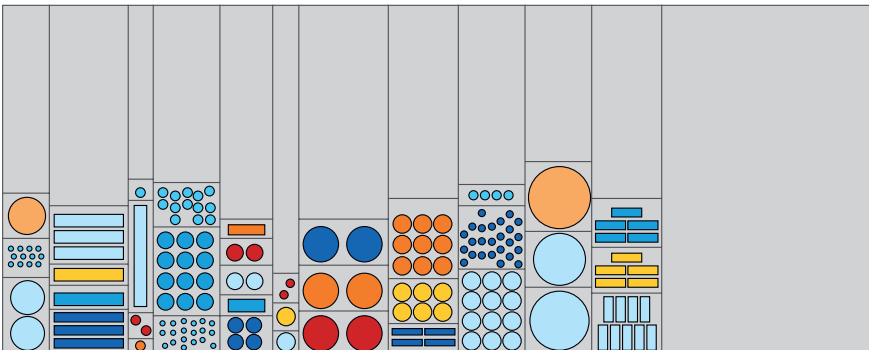
An example can illustrate this:



Here we see a tray of a Vertical Lift Module with unsystematically distributed containers, some of which are filled in a slapdash way. At first glance, it becomes clear which storage container is wasting space.



An initial optimization through the use of flexible partition material could result in significant space savings.



Another step is an optimization of the tableting in terms of width. This saves additional space and significantly increases the capacity of the Vertical Lift Module.

6.3 HEIGHT OPTIMIZATION OR SPACE OPTIMIZATION?

When it comes to bulkier parts, height optimization is done intuitively. However, practice shows that this usually leaves a lot of volume unused, which can be prevented by optimizing the area. Even if there are situations in which height optimization makes sense, the majority of storage tasks can be solved by optimizing the area or surface. Because: Any height optimization means wasted space.

For maximum space optimization, suitable storage containers and partition material are required. Which is why there are special storage lift containers with a length of 800 mm, which can be subdivided to the greatest effect. With the help of a professional consultation, the storage capacities can be significantly increased. ■



VERTICAL LIFT MODULES IN VARIOUS INDUSTRIES

Generally speaking, the use of storage lifts is conceivable in all sectors in which many small parts are to be stored and picked. At an average warehouse workplace, each shift will often move goods weighing up to one ton or more. With so many hundreds of movements and hits per hour efficiency, quality and speed are key. Here, Vertical Lift Modules can be an essential help.

7.1 eCOMMERCE: STORAGE AND PICKING OF SMALL PARTS FOR ONLINE SHIPPING

In the digital age, people's shopping habits are undergoing rapid change: More and more products and services are ordered via the Internet at online shops and eCommerce platforms - in the area of B2C as well as in the B2B area. This presents providers, whether manufacturers, suppliers or wholesalers, with major logistical challenges. They need to optimize their in-house processes for online commerce so as to ensure the best possible delivery quality for their customers.

More and more frequently, branches and online customers are being supplied from a single warehouse. This trend towards "omni-channel distribution" leads to smaller quantities and packaging units. Accordingly, the logistical workload increases.

This is where Vertical Lift Modules can help. This applies in particular to the storage and order picking of small parts. The potential for optimization lies above all in the efficient utilization of storage space capacities and the minimization of picking error rates and travel times. The bottom line is a significant reduction in order throughput times for shipping.

A Vertical Lift Module offers significantly more items with the principle of goods-to-person. Also, picking performance is increased by the elimination of long travel times and the parallel processing of multiple orders. The automated processes of a storage lift minimize sources of error, while flexible interfaces enable uncomplicated connection to ERP systems or higher-level warehouse management systems. Order prioritization, creation of dynamic picking zones or batch picking are made easy.



7.2 SPARE PARTS LOGISTICS: EASY STORAGE AND PICKING OF OPERATIONAL SPARE PARTS

Almost every company with its own production or its own machinery is faced with the task of having small parts for maintenance in stock. Hardly any other branch of the logistics industry is as challenging as spare parts logistics. Increasing complexity leads to an ever-increasing variance of spare parts. At the same time, the pressure on availability increases. In highly automated factories, maintenance becomes one of the core competencies of companies. Well-thought-out solutions for the storage and order picking of spare parts are required to ensure smooth processes in industrial automation.

Using Vertical Lift Modules, large quantities of spare parts can be stored and order as well as stock security are ensured. Inventories can be viewed clearly and comprehensibly using appropriate warehouse management software. With a storage lift, not only the delivery times are reduced by the higher order picking speed, the picking error rate is also minimized.

7.3 PRODUCTION LOGISTICS: STORAGE AND PICKING OF SMALL PARTS FOR SUPPLYING ONGOING PRODUCTION

To ensure lean, highly efficient processes in production, the interaction between production and logistics must be optimized. Here, a Vertical Lift Module offers a flexible, modular system solution that can be individually adapted to a wide variety of customer requirements. Thus, not only raw materials, semi-finished or finished goods from or for production can be stored and picked in a space-saving way thanks to a storage lift, but also small parts for production supplies.

Buffering

Vertical Lift Modules in a production environment allow parts to be removed from the buffer when needed, rather than waiting for parts from the main warehouse. This can be helpful in particular during shift changes or peak times in the warehouse. The same thing can happen but the other way round: Finished products from production can be stored in storage lifts before final storage or picking for shipment. By using multiple access ports, both operations can be performed simultaneously.

Kanban and Milkrun

Vertical Lift Modules provide excellent support for Kanban processes, which aim to reduce the local stocks of precursors in and near production. With Kanban, the withdrawals from buffer storage and the replenishment of the same buffer storage take place asynchronously. By distributing the buffer stores in production along the integration chain, an optimal solution is achieved by simple means of information and with short transport distances. Storage lifts can be a major help with this. ▶



This also applies to the Milkrun concept, which is based on the basic idea that the material is replenished only in the quantity in which it has been consumed. The batch size is set once. The replacement cycle and the route are also set in advance. The items are transported from a "supermarket" to the Vertical Lift Modules near the places of installation or even act as a supermarket.

A storage lift can also be used to store semi-finished products that have been prepared for production, but only enter the process later. This solution makes it possible to store a large volume of articles without taking up much space in the warehouse.

With Vertical Lift Modules, picking performance can also be significantly increased through a job creation process. Different articles can be picked and used to create sets.

Many small parts are needed by car manufacturers during the pre-assembly, which are often stored on shelves. Several combined storage lifts offer a solution. They guarantee a high picking speed with short running distances and maximum pick safety, not to mention the space savings. They can thus be positioned near the production line and thus offer shorter distances to the place of installation.

The integration of Vertical Lift Modules into an existing ERP environment (for example SAP) is a worthwhile goal in order to ensure complete integration into the intelligent material flow of a manufacturing company. But it is not mandatory. For simply storing and managing items, the machine does not have to be integrated into a higher-level ERP system, but can be implemented directly out-of-the-box. ■



CONCLUSION

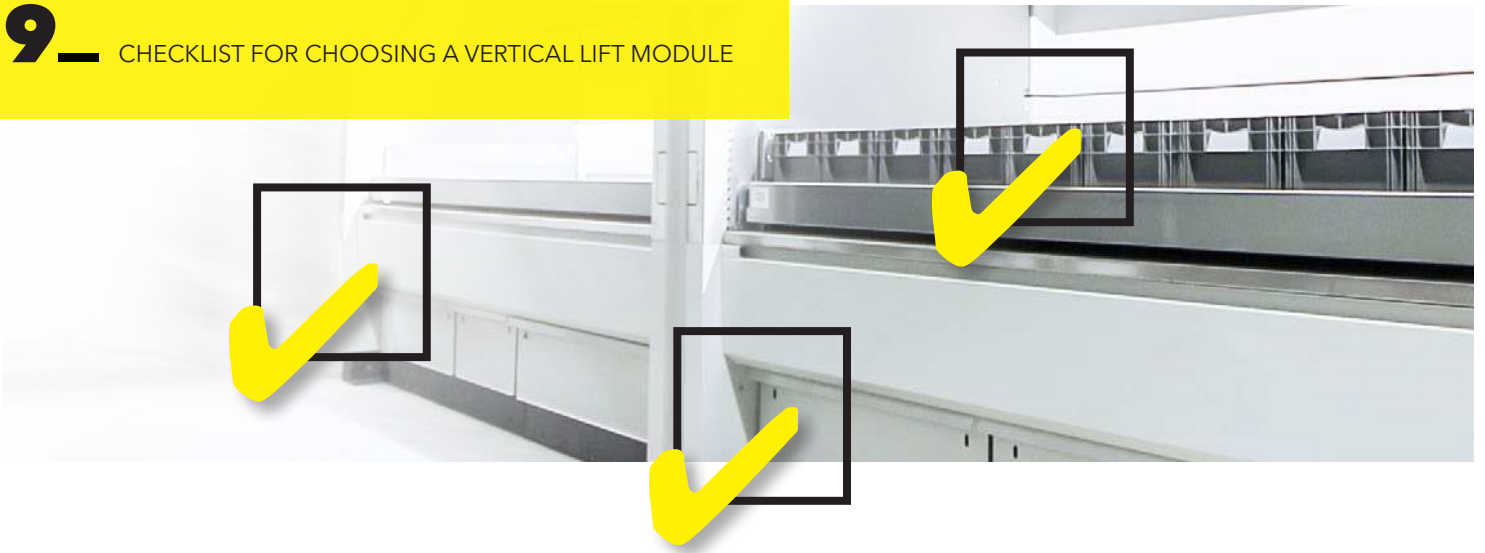
A Vertical Lift Module is a space-saving automatic small parts storage and picking solution in a system that focuses on ergonomics, safety and economy. A storage lift can be used in any industry and supports internal processes particularly efficiently and goal-oriented. Thus, a Vertical Lift Module also represents a perfect introduction to automation, especially for small and medium-sized companies.

Wherever optimal use of the available storage height is of vital importance, Vertical Lift Modules offer the ideal solution. With their compact design, they adapt to almost any spatial situation and function according to the principle of goods-to-person. Compared with conventional static storage systems, a storage lift requires only a fraction of the storage space.

However, it should be mentioned that a Vertical Lift Module is only one component in the storage and picking process. That is why an initial, holistic consultation should be obtained prior to purchase, which identifies optimization potential and determines an individually tailored solution. Only then can the anticipated efficiency and cost benefits be achieved. ■

The advantages of a Vertical Lift Module at a glance:

- Streamlined warehouse processes (picking and material flow)
- Scalability and easy connection to existing processes
- Up to 90 % less required storage space compared to static storage solutions
- Elimination of unnecessary work steps: Reduction of travel times by more than 70 %
- Automated processes and ergonomic design improve performance by over 20 %
- Minimizing the picking error rate
- Order and inventory security in the warehouse, reduction of losses
- Connection to higher-level ERP systems



CHECKLIST: WHAT YOU SHOULD FOCUS ON WHEN CHOOSING A VERTICAL LIFT MODULE

- ✓ **Which materials do you want to store and is a Vertical Lift Module suitable for them?**
The storage lift is not the right storage system for every material.
- ✓ **Is there a container concept? Have the container types been defined?**
Experience shows that space is often wasted in well-established structures due to poorly thought-out use of the containers.
- ✓ **Have the possibilities of ERP integration been checked?**
As a rule, almost every ERP system offers interfaces that enable paperless and efficient work.
- ✓ **Has the ideal location been identified?**
Short distances / high room height / suitable workplace for employees - e.g. no forklift traffic.
- ✓ **What experiences does the provider of the Vertical Lift Module have in warehouse logistics?**
For warehouse optimization, whether with or without a storage lift, a lot of know-how is required, which goes far beyond the technical knowledge of a Vertical Lift Module.
- ✓ **What solutions does the supplier offer regarding availability and service?**
Quality and accessibility of after-sales service are crucial to avoid or minimize downtime.
- ✓ **Does the storage lift have a full PLC or just a proprietary controller?**
A full-fledged PLC means more independence from the supplier.
- ✓ **Does the Vertical Lift Module have a tilting device for better ergonomics and a tray output that can be adapted to the size of the employees?**
Relieving employees is a key factor in increasing productivity.



ABOUT SSI SCHAEFER

SSI SCHAEFER is the world's leading solution provider for intralogistics products and systems. From containers to shelving systems to fully automated systems, we manufacture both components and complete solutions from a single source, using state-of-the-art technology at our own production facilities.

The manufacture of containers made of plastic and other materials has been a core competence of SSI SCHAEFER for many years. The production of all components from a single source guarantees the highest quality and on-time delivery from the initial planning to delivery.

Sources

Nelly Litvak, Maria Vlasidou: A Survey on Performance Analysis of Warehouse | Carousel Systems, 2010
Logistik Know-how: logistikknowhow.com