

Stages of warehouse automation.

A guide in 5 steps.



 **JUNGHEINRICH**

Stages of warehouse automation.

Warehouse automation means replacing manual labour with machines and/or computers. This applies to both physical work – such as internal goods transport – and intellectual work, i.e. thinking work.

You will certainly recognise the terms “mechanisation” and “robotisation” alongside the term “automation”. When it involves machines which take physical processes away from humans, we call it mechanisation. This often also encompasses software, which takes over part of the thinking work. For example, planning the sequence of tasks or determining the quickest route through the warehouse. We refer to robotisation when people are no longer required to perform work – either in the workshop or in the office. Machines and systems then handle tasks with complete independence.

Contents

	REASONS	
1	WHY ARE WE REPLACING HUMAN LABOUR IN THE WAREHOUSE?	04
	STAGES	
2	STAGES OF AUTOMATION IN WAREHOUSE PROCESSES.	06
	FACTORS	
3	FACTORS PLAYING A SIGNIFICANT ROLE IN WAREHOUSE AUTOMATION.	10
	SERVICE LIFE	
4	SERVICE LIFE OF WAREHOUSE AUTOMATION.	14
	CONSULTING	
5	MAKING DECISIONS IN WAREHOUSE AUTOMATION	16



1

Why are we replacing manual labour in the warehouse?

The quality of your company's work increases because computers cannot be distracted, do not get tired and do not make mistakes.



PHYSICAL WORK.

Work in the warehouse is intensive and demanding, despite the use of helpful equipment such as forklift trucks, reach trucks and pedestrian pallet trucks. Your staff are constantly bending, stretching, turning and lifting goods in order to transport them.

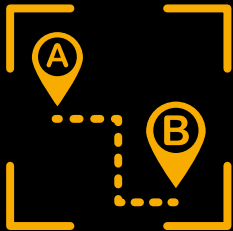
They frequently have to get in and out of their forklift trucks on the way to the next position in the warehouse. Moreover, they are often on the move. Not just in a forklift truck, but also on foot. In the logistics sector, the distances covered are often great.



INTELLECTUAL WORK.

The work of warehouse staff is not only physically demanding, but intellectually demanding as well. They have to search for products and storage locations, frequently with paper lists which they have constantly to read, make notes on and tick off.

Moreover, they have a lot to think about, for example, the most practical route through your warehouse and about the most efficient process, approach or sequence to use in carrying out their tasks. Ultimately, they have to consider the requests of your customers, who are becoming increasingly demanding. One customer does not want any pallets over a height of 1.2 metres, another only accepts pallets if the barcode label is stuck in the correct spot.



INEFFICIENT.

For some time now, not all the jobs that your warehouse staff do have been equal. Consider order picking, which can account for up to 60 percent of the work.

More than half of the work often involves going from one picking location to the next. A task for which your employees were not originally hired, yet is nevertheless necessary for processing orders.



VARIOUS PROBLEMS AND COMPLAINTS.

Human beings are not infallible. They make poor judgements, forget things, get distracted and then end up taking the wrong products. After several hours of hard work, tiredness sets in, concentration drops and the number of mistakes rises. This frequently happens at times when the pressure of work is at its greatest.

Your staff also have physical limitations. When your staff become tired, their work slows down, productivity falls and the likelihood of accidents rises. The more physical work they have to perform, the greater the risk of physical complaints. High sickness figures in warehouses are a well-known problem.



AUTOMATION REPLACES WORK WITH MACHINES.

Whether partial or complete, automation transforms work in the warehouse. Physical work is reduced, which in turn lowers labour costs. Productivity and capacity often rise, as machines and systems can manage certain tasks more efficiently than people.

It also improves workplace ergonomics, as staff have less heavy work to do. Tiredness, joint and muscle pain will arise less often and your staff will rarely be off sick. Just as important however: the quality of work in your firm will rise. That's because computers cannot be distracted, do not get tired and do not make mistakes.

Stages of automation in warehouse processes.

We have three distinct levels of automation for primary warehouse processes, such as storage and order picking. In each case, there is an IT system which controls processes in the hall. The main distinction is the level of mechanisation.

1

MANUAL OR TRADITIONAL WAREHOUSE.

In a manual or traditional warehouse, all processes are carried out by people – with or without assistance from forklift trucks or lift and transport equipment. In this instance, automation means managing employees through the use of software – typically with a Warehouse Management System.

A Warehouse Management System takes over the planning, optimisation and control of all manual processes. Your employees receive instructions on screens from hand-held and truck terminals, via hands-free devices with voice recognition or through smart glasses. It is not your employees, but the Warehouse Management System that determines the optimal sequence for order picking and calculates the most efficient route.

The Warehouse Management System:

- ▶ ensures that forklift trucks rarely move without pallets. For example, after depositing a pallet, the operator receives a new task for the return journey ("double-cycle journeys").
- ▶ considers the departure times of HGVs and organises the order picking tasks so that the correct goods are at the correct loading ramp at the correct time.
- ▶ reduces the physical strain on employees. Since all assignments are optimally planned, employees no longer need to cover so many long distances.
- ▶ reduces errors by integrating intelligent controls during order picking.

Example batch order picking: the Warehouse Management System intelligently compiles your customer orders into one batch. Your employees can take the entire batch with them, eliminating the need to navigate the racking for every order. Processes are regulated by scanning the barcode at the order-picking station or by speaking a control number into the hands-free device's microphone.



2

SEMI-AUTOMATED WAREHOUSE.

The advantage of a semi-automated warehouse is that you can gain plenty of time and save on labour costs with relatively low investment. A control system for your narrow aisle trucks, for example, enables automated travel to the next order picking location, so that the operator does not have to search, drive and manoeuvre themselves. Thanks to this navigation feature, a narrow aisle truck always takes the optimal curve, resulting in savings of up to 25 per cent.

Besides narrow aisle trucks, you can also link order pickers and reach trucks up to your Warehouse Management System.

As soon as your Warehouse Management System transmits the storage position to the reach truck, it automatically moves to the right height, while an order picker then stops automatically in front of the next order picking location after each removal. This means that the operator of the order picker no longer has to constantly get in and out in order to bring the fork lift truck a few metres into position. This can also lead to savings of 25 per cent or more.

Sometimes, it is sensible not to automate all physical tasks, but only a portion of them.

Example zone order picking: The area with order-picking stations is divided into separate zones. Employees pick items only within their designated zone, so do not need to cover the entire warehouse and therefore have less far to walk. The containers or boxes in which all products are placed are transported automatically from zone to zone by materials handling equipment and finally to the packing station.

Example combination – batch order picking and sorting: The Warehouse Management System collects a large number of orders into a batch, which is then assembled simultaneously by multiple order pickers in a sorting system. The system ensures that all products are picked out and sorted per customer. Items still have to be picked by hand, but the sorting process is automated.

3

FULLY AUTOMATED WAREHOUSE.

In a fully automated warehouse, many processes run smoothly, almost as if by themselves, and thanks to appropriate software and AI components, in an optimal way. The use of automatic materials handling and storage systems such as stacker cranes, shuttles, compact warehouse or materials handling equipment, which transports pallets, containers or boxes independently, stores and removes them, as well as supporting or independently executing order picking.

If you work exclusively with standardised load units such as pallets, containers or boxes, warehouse

processes can, in many cases, be almost fully automated. Manual intervention is then only required in a few areas, for instance, when placing pallets onto the materials handling equipment or when removing them at the end of the process.

Such a system is particularly suitable when standardised processes with high throughput need to be executed efficiently and in a space-saving manner. You benefit from a continuously optimised material flow and warehouse performance at its peak.

OTHER FORMS OF AUTOMATION.

In addition to storing, removal and order picking processes, further processes in the warehouse can be automated:

Transport within the warehouse: The internal material flow can be automated, for example, with mobile robots (MR) and Automated Guided Vehicle Systems (AGVS). These autonomous trucks transport pallets, containers etc., between storage areas, production lines or shipping zones. Modern systems can be flexibly integrated into existing infrastructures and can reliably detect obstacles thanks to advanced sensor technology, thus creating new routes.

Loading and unloading of HGVs: There are systems that allow an entire HGV load to be pushed into the cargo space in just a few minutes using appropriate technology. For this, an HGV is fitted with an adapted loading area; in applications such as shuttle transport between plants or plant sections, customers and freight forwarders rely on these technologies.

Automatic identification and traceability: By using recording systems such as 2D/3D barcodes, RFID technology, and camera-based scanning systems, goods movements can be automatically captured and seamlessly documented and logged.

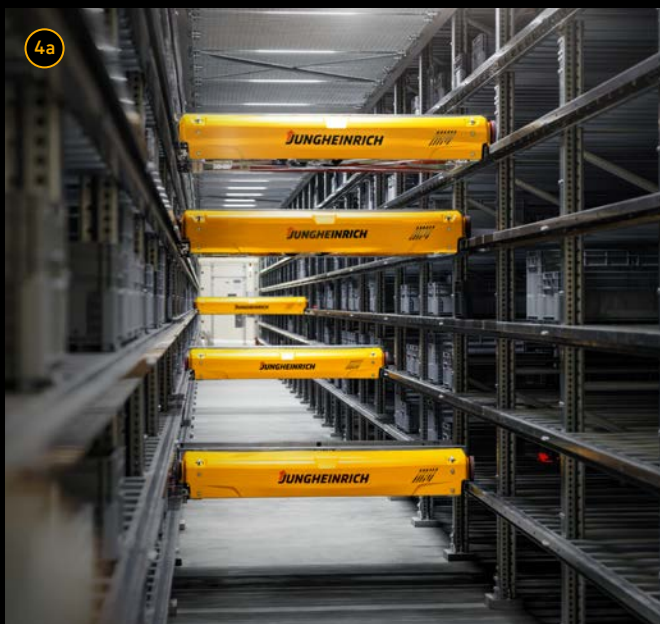
This improves inventory accuracy, accelerates processes and facilitates traceability, for instance, in recalls or batch tracking.

Warehouse management and data integration:

By integrating all logistics processes via a Warehouse Management System (WMS) into the customers' supply chain solution or ERP system, all information can be processed in real time for maximum transparency. This allows you to have an overview of stock levels, movements and process status at any time. With the help of data analyses, bottlenecks can be automatically identified and processes can be continuously optimised – to the satisfaction of your customers.

Energy and resource efficiency: Modern automation technology offers not only process advantages but can also reduce energy consumption. Intelligent controls ensure that trucks, conveyor systems, and stacker cranes operate only with the required power and when needed or are set to energy-saving mode. The overall space requirement can be significantly reduced through more compact warehouse systems and efficient processes.





3

Factors that play an important role in warehouse automation.

Whether you should automate or not is a complicated question. There are other factors which play a part besides the different levels of automation. For example, consider your product range and order patterns.

DIVERSITY OF THE PRODUCT RANGE.

For many companies, one warehouse system is not adequate – they require different warehouse systems for various product groups. If you are looking for fully automated warehouse and order picking systems, you can find solutions for pallets, plastic containers or boxes.

- ① Large, bulky items often fit well on pallets.
- ② Small items such as fastening materials, electro-technical components or office supplies benefit from a system with plastic containers.

Practice shows that most companies stock both voluminous and small products. Companies which sell products such as furniture, plumbing or construction materials have products in their ranges that are too large for even a pallet. The key factor is whether the volume of each product group is large enough for warehouse automation. Many warehouses combine fully automated storage systems with a manual process for goods that, for example, do not fit on a pallet.

THROUGHPUT SPEED.

Besides product dimensions, throughput is also a key factor in choosing the right system. The throughput speed is a measure of the frequency with which your customers order an item.

- ③ Small items with a low throughput frequency ("slow-moving goods") are suitable for a miniload system. In this system, a stacker crane operates in each aisle, handling the storing and removal of the containers with slow-moving goods.
- ④ For many "fast turnaround items" in the product range, the capacity of a miniload system is not sufficient. The stacker crane is not fast enough to satisfy the demand for frequently requested items. A good alternative is a shuttle system where several shuttles store and remove items in each aisle. Another option is a compact warehouse for containers in which numerous shuttles move beneath the racking system, storing and removing vertically stacked containers.

ORDER PATTERN.

A fully automated warehouse and order picking system only works optimally if there is enough capacity to process all orders, even during peak hours and days.

If you experience large peaks in your order pattern, for instance, receiving most orders in the weeks leading up to Christmas Eve, and then acquire a system designed for this peak, it is likely to remain idle for the rest of the year. Automation is then relatively expensive. Ultimately, a large portion of your investment will be returned through reduced labour costs. In this case, you gain more from a semi-automated system, for instance, by using controls for your narrow aisle trucks to the next picking location or zone picking, where several order pickers can be utilised in each zone.

Many trading companies opt for this method, even though their product range and throughput speed may justify a higher degree of automation.



COLLABORATION VIA THE WAREHOUSE MANAGEMENT SYSTEM.

One thing is clear, a single kind of system is rarely enough for the entire warehouse. In most cases, the optimal warehouse equipment comprises a combination of different, more or less automated warehouse and order picking systems. In any case, you need a good Warehouse Management System. This system ensures that your different systems are coordinated and operate seamlessly together. The Warehouse Management System, for instance, divides all orders into partial orders for the various systems and ensures that the partial orders are combined again after the order picking process. This will turn your warehouse into a well-oiled machine.





Service life of warehouse automation.

If your product range grows and the order volume increases, warehouse and processing capacities can be expanded flexibly and cost-effectively.

INVESTMENT WITH VISION.

The service life of automated warehouse and order picking systems deserves special attention. A fully automated system can operate smoothly for five, ten years, or even longer. With an interim overhaul of the system – replacing wear parts and modernising the controls – you can extend its service life. This means that you can almost always recoup investments if you leave enough time for this.

If you have an amortisation period of three years, you may be underestimating yourself. A service life of five or ten years requires vision. If you want to justify investing in automation, you need to answer the question of how your company will look in five, ten or fifteen years. Consider:

- ▶ What capacity must the system be able to handle then?
- ▶ How likely is it that the product range will still fit within the warehouse system?

FLEXIBLE AND EXPANDABLE.

Today, many companies find it difficult to look so far ahead. They must always adapt to changes in shorter and shorter intervals, which makes the future uncertain and predictions unreliable.

Who can guarantee that a system will still be sufficient after five or even ten years? The key is to determine how far you can look ahead, regardless of circumstances, then agree the amortisation period accordingly.

Designers of automated warehouse and order picking systems prepare themselves for this situation by designing solutions which are flexible and expandable. You will be starting with a system which is designed to meet the capacity required in the next few years.

If your range grows and the number of orders increases, you can expand warehouse and/or processing capacity relatively easily and cheaply with this system. In short: these systems grow with your company.

Decision-making in warehouse automation.

A warehouse can be automated in various ways
and to different extents.

WHICH SYSTEM IS THE RIGHT ONE?

It is clear that a single warehouse and order picking system is rarely enough for the whole firm. Most groups choose a combination of manual, partially and/or fully automated systems. In this scenario, it is vital that a Warehouse Management System plans and manages the entire operation, enabling the systems to work together like a single well-oiled machine.

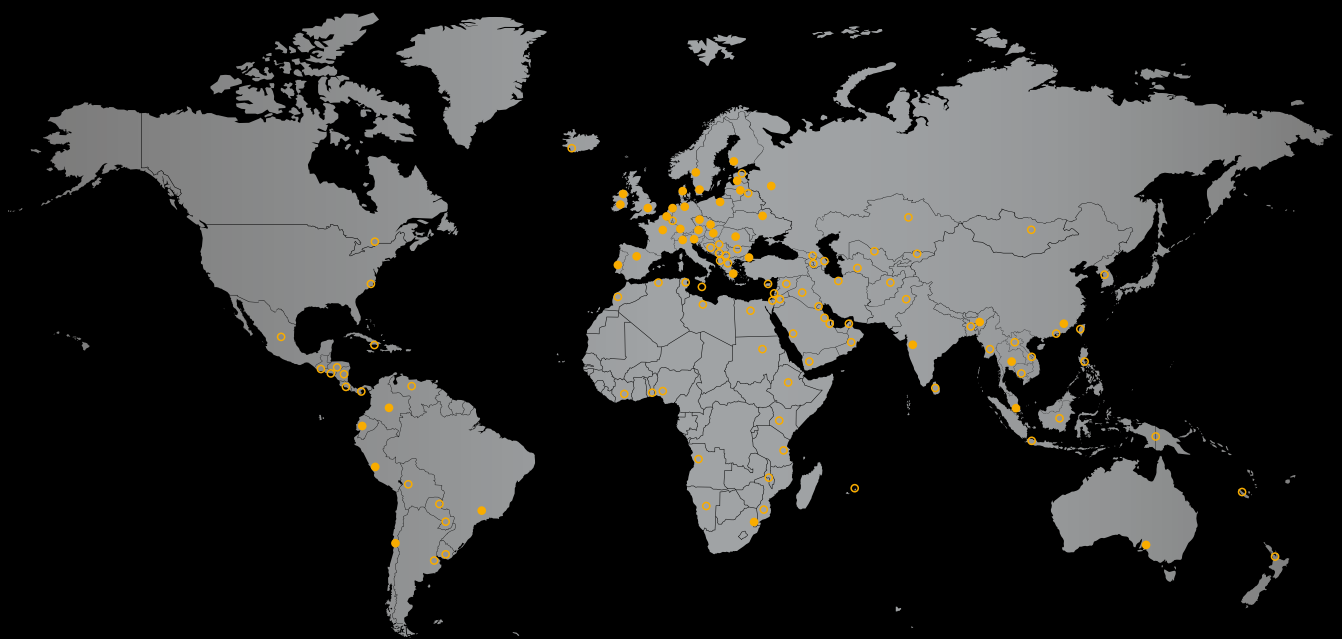
The useful life and desired amortisation period of the system should be taken into consideration. The moment in which an automated warehouse and order picking system is characterised lies far beyond the planning horizons for most companies. If this also applies to your company, you should favour systems with shorter amortisation periods. Alternatively, you can decide on a flexible and expandable system.

CONTACT US.

As a general contractor, we will take you step-by-step to a flexible and efficient automation solution. We can offer you more than 70 years of material handling experience, characterised by consultancy and manufacturing expertise compiled into one package. Our expert team always plans material handling comprehensively, from goods receipt to goods issue, incorporating all process steps and interfaces. From the start of the project, a personal contact person will be at your side, coordinating all the trades involved while maintaining an overview. With Jungheinrich, you'll have a partner who is 100% reliable on your side.



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in 42 countries.

○ Partner companies
in around 80 other countries.

More than
21,000 employees.

More than 6,200 service
engineers worldwide.

Founded in 1953, Jungheinrich is one of the world's leading providers of material handling solutions. With a comprehensive portfolio of industrial trucks and automated components, as well as services, we offer tailor-made solutions that allow you to devote your full attention to your core business. With our unique direct sales and service network, you can call upon a reliable partner who is at your side at all times, wherever you may be in the world.



AUTOMATION

Based on our comprehensive process knowledge and extensive experience in a wide range of industries, we can provide you with tailor-made automated systems, ranging from semi to fully automated solutions. We will thus work together to raise your efficiency and productivity to a whole new level.



NEW INDUSTRIAL TRUCKS

Lifting, stacking, transporting, order picking – electrically, by combustion engine or by hand? Our product portfolio contains the perfect trucks for your needs.



WAREHOUSE EQUIPMENT

From pallet racking to automated small parts warehouses, we have the right solution for every item and warehouses of all sizes. Combined with Jungheinrich industrial trucks and IT solutions, the result is a future-proof, integrated material handling concept of unique quality.



RENTAL

Forklift truck rental is not just an ideal solution for addressing short-term or seasonal requirements. Jungheinrich offers „power on demand“ for all companies, regardless of their size or industry. There are rental solutions available to suit all requirements, with trucks available instantly in a wide number of variants across the globe.



USED TRUCKS

JUNGSTARS are used trucks from Jungheinrich, which are among the best on the market. With high-end reconditioning according to our 5-star principle, every truck is returned to an outstanding technical and visual condition to satisfy the highest safety and sustainability standards.



DIGITAL SOLUTIONS

With intelligent software and sophisticated hardware components, we ensure complete digital networking within your warehouse. All processes can be monitored centrally and controlled with utmost efficiency. Systems from different manufacturers can also be integrated with ease.



CONSULTING

Products and services must meet your exact requirements. That is why our consulting service combines a high level of technical ability with process knowledge and in-depth industry expertise. We can thus work together to identify the perfect complete solution.



FINANCIAL SERVICES

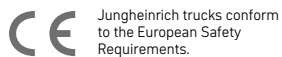
Jungheinrich Financial Services is your reliable partner throughout the entire life cycle of your Jungheinrich product. We offer individual solutions for trucks, racking, warehousing and system solutions, while taking your budget and the special requirements of your business into account.



SERVICE AND SUPPORT

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ISO 9001 The German production facilities
ISO 14001 in Norderstedt, Moosburg, Landsberg
and Kaltenkirchen are certified.



Jungheinrich trucks conform
to the European Safety
Requirements.

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