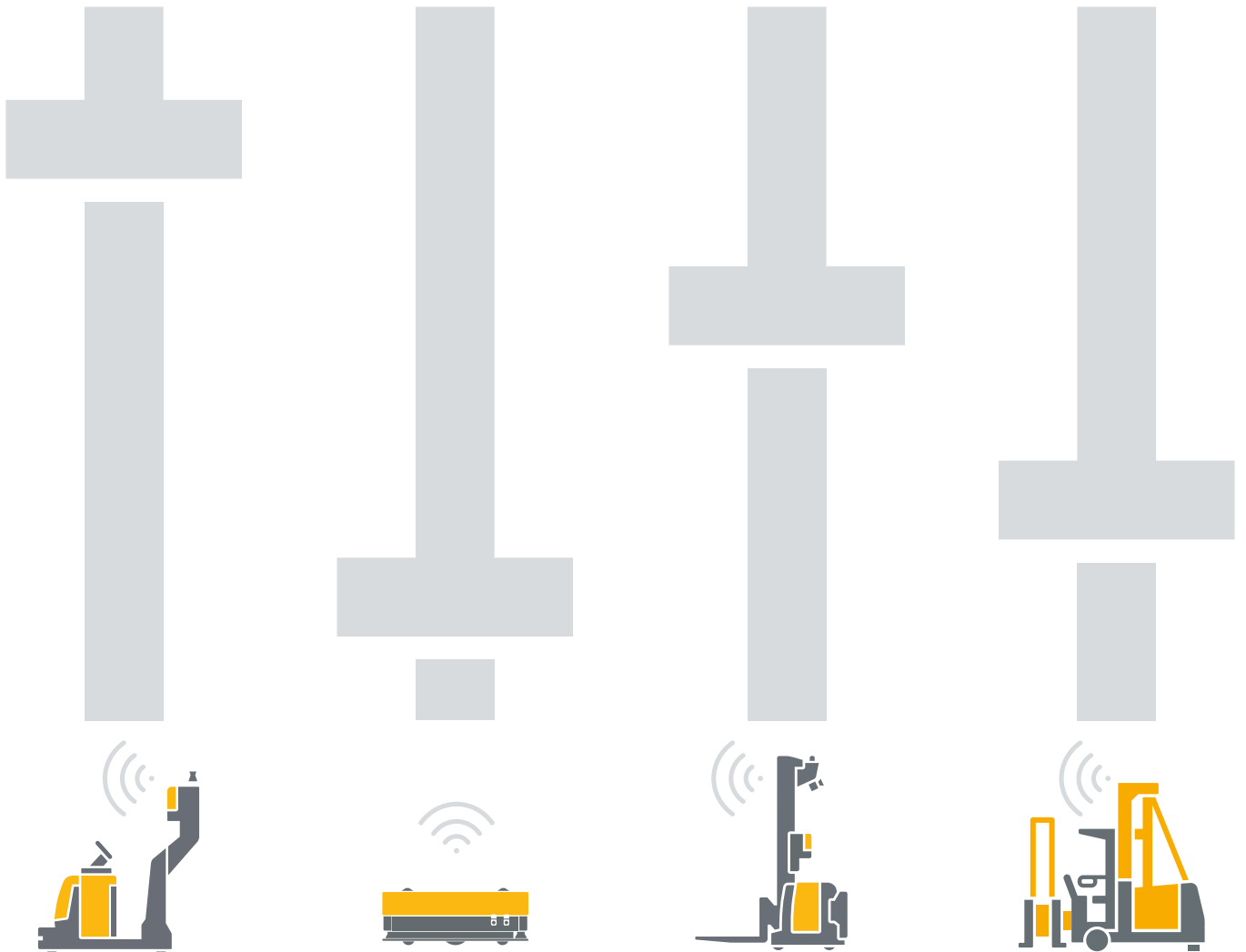


How hybrid automated systems can make your warehouse flexible, efficient and future-proof.



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The need for automation in warehouse processes is high, and the market offers a wide range of automation solutions. But which solution is preferable? In most cases, there isn't a single optimal solution, but a combination of them. We call these 'hybrid automated systems'.

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What are hybrid automated systems?

It is rare for one single solution to offer the best performance in every situation. Take city centre travel, for example. The tram, bus or underground are often the most efficient modes of transport during rush hours. A car in the city is often only useful for weekly shopping trips. Sometimes, a bicycle can be most convenient for quick trips. It's a similar picture in most warehouses.

Hybrid automated systems

A single automation solution is rarely the most efficient option for every warehouse process. This is certainly true of warehouses used to store a wide variety of items and with a varied ordering pattern. An automatic system that is suitable for storing and retrieving full pallets will be less efficient at picking boxes of nuts and bolts. For some products and processes, a manual solution with pallet racking or shelf racking is the most suitable.

A hybrid solution combines different storage and order-picking systems that can operate independently of one another. These could be fully automated or semi-automated systems as well as manual systems. The combination that is most appropriate varies from one warehouse to the next. Hybrid automated systems are defined as those which incorporate at least one automatic system.

Functioning as a single unit

The most important characteristic of a hybrid automated system is that all systems operate together as a single unit. Compare this with a hybrid vehicle - the petrol engine and the electric motor work together flawlessly without the driver having to intervene. By working together in this way, the system ensures optimal driving performance in any situation, both in the city and out on the motorway. Similarly, the systems in a hybrid warehouse are integrated together in such a way that the overall solution performs optimally in every situation.

In this whitepaper, we shall look more closely at hybrid automated systems. Which indicators determine when a hybrid automated system should be the preferred option? What are examples of frequently occurring situations and combinations? And what is required to enable the different systems to function together as a single unit?





Six indicators for hybrid automated systems.

When should a hybrid automated system be the preferred option? There is no one-size-fits-all answer to this question, so we need to conduct a thorough analysis of existing processes and the data available. What is certain is that the following indicators will have an impact on the decision to opt for a hybrid automated system.

1. Range

The storage and order-picking systems that are most appropriate depend, to one degree or another, on the products that the warehouse stocks. The greater the diversity in dimensions and weights, the greater the number of systems required to handle the wide range of items. Consider a spare parts warehouse operated by a machinery manufacturer stocking nuts and bolts as well as complete drive motors.

Order units and turnover rate are also important here. Do customers order a pallet of products or one unit at a time? And are those items ordered hundreds of times each day or once a month? Each will require different storage and order-picking methods.

2. Ordering pattern

The order unit and turnover rate are related to the ordering pattern, that is, the point in time at which customers place orders. Are orders received in a regular pattern throughout the day, or is there a peak in orders at the end of the day that needs to be processed immediately? In the latter case, the warehouse needs a system that is calibrated to peak capacity.

In e-commerce, many orders are placed only in the evening hours and need to be dispatched the following day. In that case, some automation is often required in order to be able to cope with the evening peak. The throughput times of a manual system are simply too lengthy.

Another important question to ask is which items are most frequently ordered together. A smart approach can be to place those articles in the same system, even though the product specifications may mean this is not strictly logical. A consumer who purchases a new laptop may also be looking for a new mouse. If both products are in different systems, extra effort is needed to ensure that both items are packed in the same box for dispatch.

3. Space

Is the automated system for an existing or new warehouse? If it's a new warehouse, is it on existing or new premises? With new-build situations, there are scarcely any restrictions - so all options are on the table. This is often not the case with existing premises where the area available and the height of the ceiling may be limiting factors. In addition, automation often imposes requirements on the quality and load-bearing capacity of the floor.

In an existing warehouse, it is important to consider potential future scenarios. What are the anticipated volumes over three, five or ten years? Do the premises offer enough space to accommodate increasing volumes? If yes, the automated systems could have a longer amortisation period. Another aspect is purely practical in nature – can processes be automated without endangering the continuity of ongoing operations?

4. Scalability

Not every organisation is in a position to reliably predict future scenarios. Some organisations operate in volatile markets that are sensitive to fashion trends, weather conditions, innovations, exchange rates and trade embargoes, which means that systems need to be scalable. These systems need to have easily expandable capacity.

We can divide the requisite capacity into warehouse capacity and storage and removal capacity. To increase warehouse capacity, additional racks are required. To increase storage and removal capacity, additional people and/or machines are required. The scalability of a manual system is usually greater than that of an automated system, although the latest generation of automated systems has shown considerable improvement in this area.

A combination of systems, as with hybrid automated systems, may be of interest to small and medium-sized enterprises as they offer the capacity to automate only part of an organisation's operational processes, thereby minimising investment costs. If the situation permits, they can then take the next step in automating the warehouse.





5. Flexibility

In these times of extreme flux, organisations are changing more than ever before. They are embracing new markets, introducing new product groups and ceasing activities that no longer contribute to profit. This means that ranges and ordering patterns are also changing, which can have consequences for the warehouse. An automatic storage and order-picking system that is perfectly adequate today may well be inadequate tomorrow.

Logistics service providers in particular value flexibility highly, given the often short-term contracts they have with customers. Traditionally, service providers have expressed a preference for manual systems, but automated systems are becoming increasingly flexible. A combination of manual and automated system may offer a reasonable compromise between efficiency and flexibility.

6. Amortisation period

The amortisation period is an important indicator for any organisation and is often decisive in opting for one system over another. Automating a warehouse requires considerable investment which, in many cases, may not be recovered within one or two years. The question is, what amortisation period is acceptable? The answer to this question is closely related to the reliability of future scenarios - how far into the future can the organisation see? The shorter the required amortisation period, the more limited the options for automation.

The amortisation period itself is largely determined by labour costs, which in warehouses are usually the most significant cost component. In a warehouse operating two or three shifts, an automated system is likely to offer a greater return than one operated in a warehouse running just day shifts - simply because there's greater potential to save a higher number of labour hours. The costs of failure also play an important role. Will automation lead to an amortisation period that is unacceptable to the financial director? If so, leasing may be an option.

Four examples of hybrid automated systems.



In warehouses with uniform products and straightforward processes, one automated system is often sufficient. This kind of warehouse may be found at the end of a production line, where full pallets are deposited and retrieved. Anything more than an automatic storage system with cranes or a semi-automatic storage system with narrow aisle trucks would be unnecessary.

In warehouses with more complex processes, the optimum is often a mixture of different systems, which ensures efficient and cost-effective operation with shorter throughput times. The following are a number of frequently occurring uses of hybrid automation.

1. Large and small items

Many warehouses make a necessary distinction between large and small products. Large products are stored on pallets in, for example, an automated warehouse with pallet cranes. Small products are stored in the plastic containers of a system operating small load carrier cranes or pallet carriers. An alternative option is a standard reach truck warehouse for pallets and lift racking or another vertical storage system for small products.

In most warehouses, an automatic storage system is available for more than 80 percent of the range. However, there may always be products that are unsuitable for an automatic pallet warehouse, such as radiators and bathtubs. An automatic storage system for these 'uglies' requires customisation, which is often expensive. For these products, a manual system is often the only solution.





2. Fast and slow-moving items

In manual warehouses with a relatively high number of slow-moving items, order picking is often paired with lengthy walking distances and low productivity. Automation can offer a solution, for example by placing slow-moving items in a goods-to-operator system. A system with this configuration brings the items to an order picking station staffed by an employee who only needs to pack the correct products and needs waste no time walking through the warehouse to identify the correct locations.

When storing products with a high turnover rate, a goods-to-operator system is often of lesser interest. When, for example, the latest iPhone hits the market, placing the phones in plastic containers from the start would be inconvenient. Instead, the more efficient solution would be to pick the phones straight from a pallet.

3. Peaks and troughs

Many warehouses see the majority of their orders arrive later in the day. In many cases, those orders need to be dispatched on the same day, which leads to peaks at the end of the working day. Anyone who wishes to automate the entire process must invest in a system with a capacity that is calibrated to these order peaks. The result is a system whose full capacity may only be utilised for a few hours every week.

Hybrid automation enables alternative solutions, such as an automatic storage and order-picking system that offers perhaps 60 or 70 percent of the requisite capacity. During those hours during the week when additional capacity is required, an additional manual or semi-automatic system can be used. Such systems could include a pick-to-light system with drive-through racking for fast-moving items.

4. Additional buffer

In some warehouses, buffers can offer a solution and can help to solve differences in processing speed between different departments. Consider the use of an APM which transports pallets from the production line to the warehouse. An automatic buffer system can prevent the warehouse from needing to be operational 24 hours a day. Pallets that are placed in the buffer overnight can be processed in the warehouse the following day by the morning shift.

Another example is a warehouse where shipments are collected at the end of the day. To prevent the goods outward area from becoming clogged throughout the day with packages ready for dispatch, they can instead be stored in an automatic goods outward buffer. When the vehicle arrives to collect the packages, the system then sends the respective pallets to the correct dock in the correct order.

4.

Challenges in hybrid automation.

In many warehouses, hybrid automation can help to maximise performance when it comes to efficiency, productivity, throughput time, quality and costs. Hybrid automated systems also offer an advantage for organisations - particularly small and medium-sized enterprises - that value the benefits offered by phasing the automation project.

Someone opting for a mixture of different systems does not need to implement all of the systems at the same time. By phasing, investments can be spread out over time. Phasing can also be an option if automation is not currently needed for every process or product group. The next step only needs to be taken when the volumes are sufficiently large.

The need for consolidation

Hybrid automation does have one drawback - the need for consolidation. This applies to orders where the products required are distributed among different storage systems. Those orders will need to be split up so that the correct products can be picked from the correct system. Once all part orders have been picked, they will need to be consolidated into a single package at the end of the process.

Opting for a mixture of different storage and order picking systems creates additional activities in the warehouse. Hybrid automation is only of value if the advantages of the mixture outweigh the drawbacks of the additional activities. Whether or not this can be achieved depends on how the consolidation process is designed. In some cases, an additional sorting or packing process may be required, but a goods outward buffer can also offer support to the consolidation of part-orders.





The need for integration

Another challenge is the integration of different systems. A hybrid concept can only work to its fullest extent if all systems interact with one another flawlessly. This requires the activities in different systems to be coordinated with one another so that part-orders can come together at the right location at the right time.

Integration can present a challenge, especially if different providers have been involved in the systems. Even in today's digital era, it is not a given that different operating systems will all be able to reliably exchange data with one another. This requires time, attention and a great deal of testing to verify that all systems do what they are intended to do.

A wms as a success factor

In a hybrid concept, the Warehouse Management System (WMS) has a crucial role to play. The WMS is the overarching system that coordinates all storage and order-picking systems. It knows which product is stored in which system and, based on that knowledge, it can split orders into part-orders. In addition, the WMS ensures that part-orders are dealt with effectively and come together at the correct location.

Consequently, opting for a hybrid automated system means opting for an advanced WMS which uses smart rules and algorithms to control and coordinate processes. This requires a WMS that is integrated with all underlying systems, whether that is a small load carrier warehouse, an APM, a semi-automatic narrow aisle truck or an order picker with barcode scanner. Only with this structure in place can you create a warehouse that offers the best solution for every situation without managers or supervisors needing to intervene continuously.

And finally - two tips for a successful project.

5.

There is no single set answer to which form of hybrid automated system is of most value to you. Rather, the answer depends on a wide range of factors, which vary from one warehouse to the next. Each problem should, therefore, start with a thorough analysis of the current situation. This means asking a series of questions:

- How effective are current processes?
- What are the current operational costs?
- What are the characteristics of the range?
- What does the ordering pattern look like?
- What boundary conditions have been determined by the premises?
- What are the organisation's future expectations?
- What amortisation period is acceptable?

Tip 1

Ask the warehouse organiser to carry out a thorough analysis of the current situation. An analysis of this kind – disassociated from any subsequent project – can help to ensure better decision making when it comes to investing (or not) in a hybrid automated system. It may be useful to reserve a separate budget for the analysis phase. The additional costs will be earned back several times over in any subsequent project.

A hybrid automation project is not straightforward. Implementing an effective combination of automatic and manual storage and order-picking systems requires customisation. Integrating different systems can be a challenge. Linking up with an overarching WMS can be a challenge too, but it's an essential requirement for ensuring all systems function together as a single unit.

Tip 2

Choose a warehouse organiser who can provide all systems, including the WMS, from a single source. That way, you can be confident that all systems are mutually coordinated and can communicate with one another. Doing this also ensures that there is only one point of contact for the project as a whole.



Get the answers you need with our automation survey.

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Any warehouse automated system study should start by mapping the current situation. How is the warehouse set up? How effective are processes? What are the characteristics of the material flow?

With this inventory list, you can then map much of your operation by yourself. Your answers will give you a clearer picture of how things currently stand. In addition, the list will enable your supplier to give you some initial advice on points for improvement in your operation and on possible automated system solutions.

Take a few minutes to complete our online questionnaire and take the first steps to optimising your operation.

[Start survey >](#)



Jungheinrich Intralogistic Solutions

Jungheinrich Intralogistic Solutions is the division of Jungheinrich that is responsible for the design, sales and realisation of warehouse equipment projects. Jungheinrich is one of the largest suppliers of intralogistics solutions in the world. We are specialists in the equipment and optimisation of warehouse and distribution centre logistics; from installing warehouse racks through to warehouse software, warehouse automation and robotisation.

We not only offer a wide range of warehouse and transport systems, but also retain all expertise in house. We analyse existing processes, identify potential and develop optimised strategies, including for your future requirements. And we do all of this on the basis of your individual needs.

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