Controlling your mechanised systems using a WMS? Here's how it's done!

Smart and cost-effective mechanisation

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The ongoing boom in (e-)commerce, the COVID-19 pandemic and today's technological developments are changing the way people shop. As a result, you, as a logistics professional, need to be able to handle new forms of packaging, changing order profiles, and shifting customer demands, both in the B2C and the B2B domain.

To be able to keep up with all these changes, it is essential that you keep optimising your warehouse, such as by increasing throughput per square metre or reducing the lead time. This is prompting more and more logistics companies to turn to mechanisation for their operations.

Through this white paper, we want to give you insight into how to control mechanised systems in combination with a WMS and associated IT systems. How do you use a WMS to maintain an overview of your warehouse operations and be flexible in the face of unexpected events?

Warehouse mechanisation is no longer the sole preserve of large operations.

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The role of the WMS in a complex landscape

Warehouse mechanisation is no longer the sole preserve of large operations. We are increasingly seeing conveyors, AGVs, pick stations, pick robots and automated stacking machines take care of internal transport and repetitive actions, and cover distances in the warehouse; also in smaller warehouses. Vertical storage and tray systems ensure more efficient use of the available floor space, while yet other systems optimise productivity and quality within their specific possibilities. That said, human intervention continues to be indispensable in warehouses. Pallets needs destacking, storage trays need filling, most of the picking is done manually, and there is still an art to stacking that only humans can master fully.

Do you need a WMS to control mechanised systems?
Warehouse operations are never 100% mechanised. Take a warehouse that uses vertical lift modules for half of all the picks, for example. It is a smart investment, with the associated software that allocates space in the lift module and controls the supply of products to the picker. The application is geared towards making optimum use of the space available in the lift module and making it work as efficiently as possible. But is that software equally good at controlling the complete warehouse and the part of the operation that takes place in traditional pallet racks and shelf areas? The other half of the operation also deserves attention, where humans process the planned incoming and outgoing shipments. Because even though you use lift modules, you still need to get all the picks from the various sub–warehouses
to the right place at the right time. This is where a WMS comes in. If not controlled by a WMS, buffers for the dispatch dock are at risk of overflowing and chances are that congestion will impede a smooth flow of goods.

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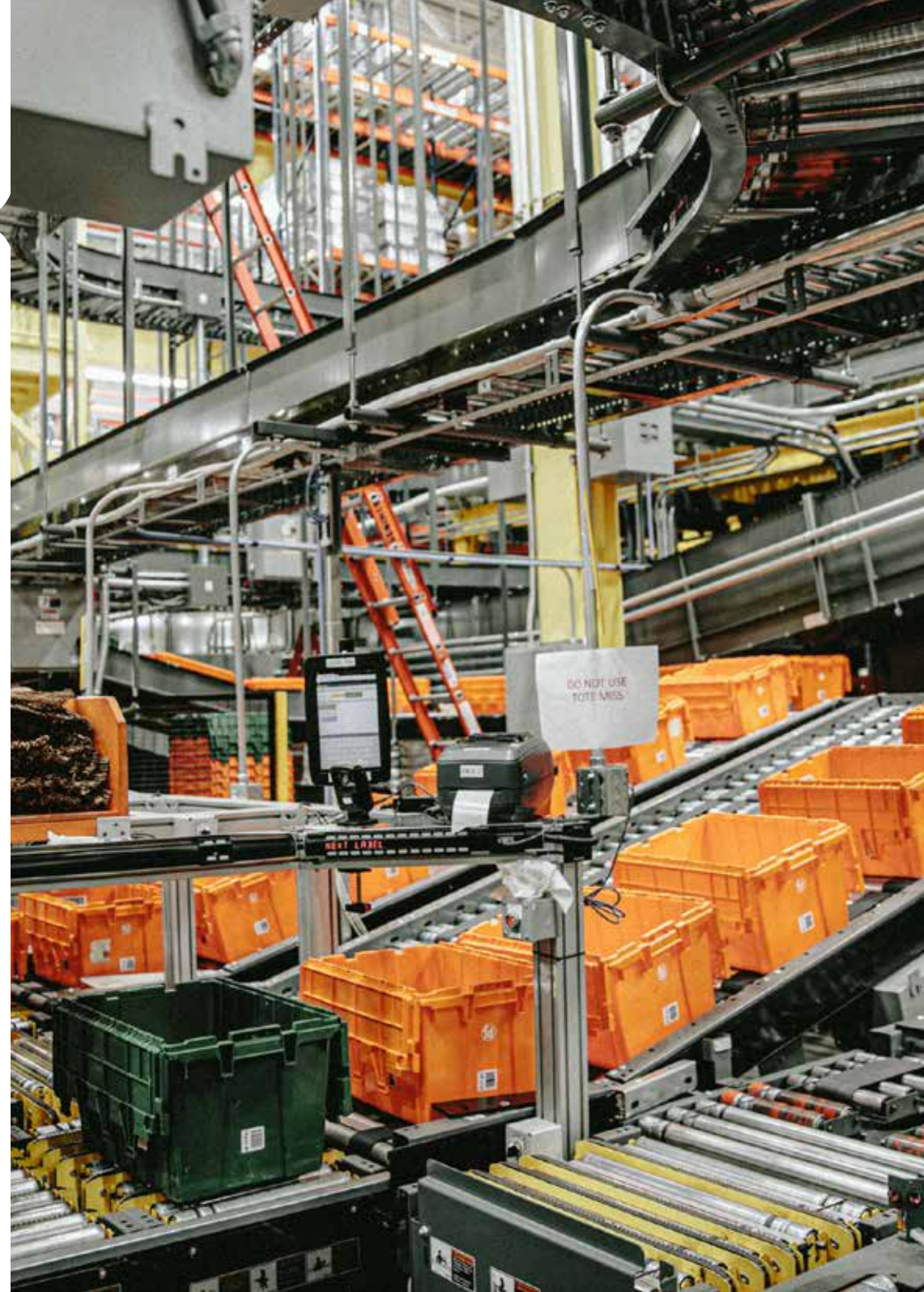
The role of a WMS in mechanised operations

A WMS controls the use of space and all movements within the warehouse, while also ensuring that the right people and machines are working in the right place at the right time. The WMS needs to be able to allocate the best possible space for stock based on a mix of parameters, such as logistical item properties (stackability, refrigerated), storage requirements (large or small, closed space) and rotation (fast or slow mover, ordered items). While factoring in pick history, order portfolio and variations in order size, the WMS can also streamline the processing of sales orders for goods from different zones and allocate goods or packaging to a zone of the warehouse that better suits the product's importance.

When introducing technological innovations in physical warehousing systems, providers of mechanised solutions also provide the required software components that control the hardware. This generally comes in the form of a stand−alone specific application, i.e. an application that is not integrated into existing systems or only to a limited degree. Due to the costs of such an application, especially when they exceed the investment in a WMS, many organisations look no further for additional functionality and/or do not consider future requirements. The broader the scale on which the WCS (Warehouse Control System) is used, the greater the degree of integration.

Normally, logistics movements concern the controlling, checking and registration of goods that are transferred from one container to
another. A WMS uses mobile applications on scanners, truck terminals and voice devices for that. As such, a WMS can also submit transactions performed by a human operator to a terminal. The details shown on the scanner screen match those that the mechanised system needs to be able to start a task. What the operator enters by scanning a bar code or pressing buttons or keys are the details that are fed back to the WMS to complete the transaction.

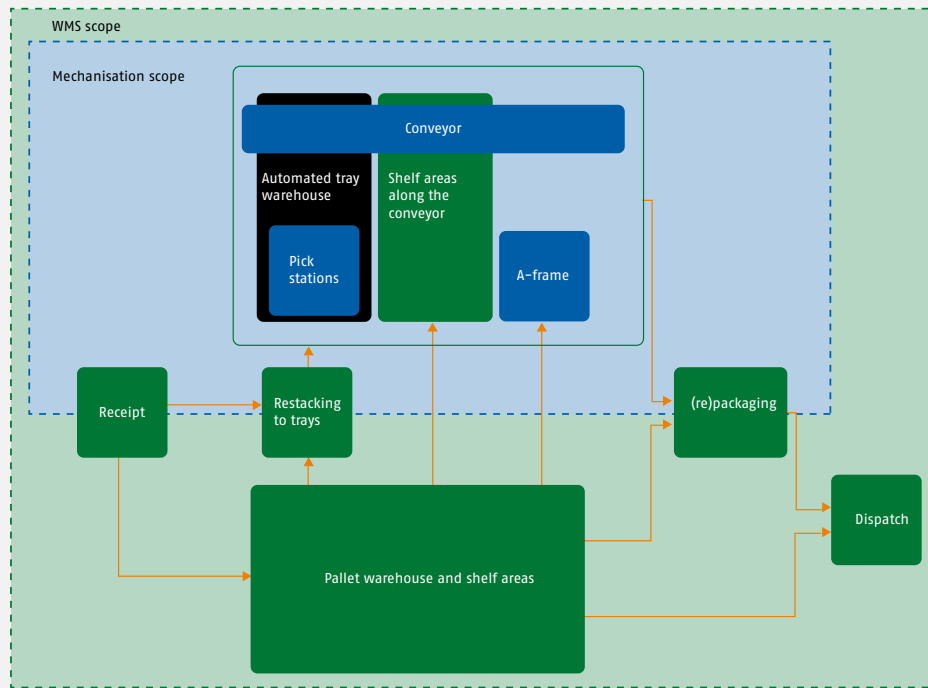centric

Quantore runs its DC using a WMS

In the following, we will show how important a WMS can be in a mixed environment based on the real-life example of office supplies distributor Quantore.

The majority of all picks at Quantore's warehouse are handled by a conveyor, which picks goods directly in various pick zones and places them in the shipping box. The WMS determines how many and what size boxes are needed. When boxes are launched onto the roller conveyor, the system factors in what items are to be picked in other zones for the same order. Slow movers come out of an AS/RS goods-to-man system, where they are also placed in the box sent by the WMS. Small-volume fast movers are automatically picked in an A-frame, which is a kind of dispenser that makes sure the boxes end up in the right shipping box. The other picks (goods that are too heavy or large for the roller conveyor) come from a traditional warehouse.
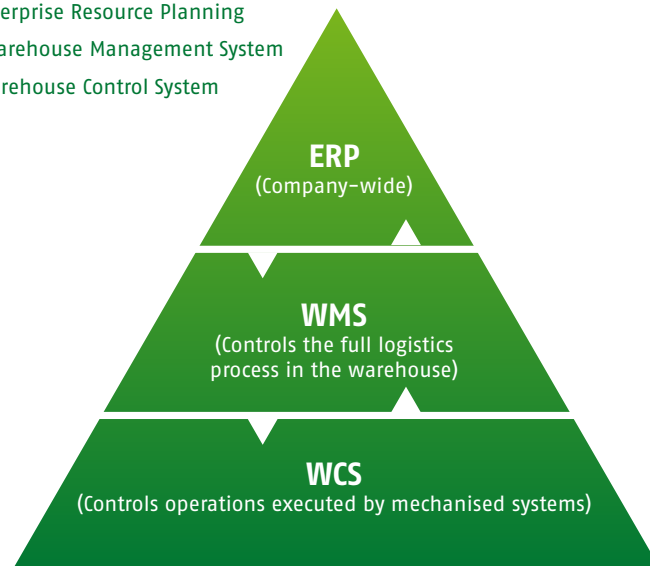
© Quantore

very incoming location determination and all movements are controlled by the WMS. The WMS has a full overall view of the stock and is, therefore, able to determine whether or not incoming goods need to go directly to one of the sub-warehouses. The WMS also keeps track of specific items that are not in stock and that need to be shipped quickly or later, along with other goods. The priorities for outgoing movements are determined by the goods' set warehouse exit time. Even when one of the zones has unnecessarily large capacity at that time, the WMS can still take the whole of the operation into consideration. The WMS can also see to it that job instructions be issued in a dosed manner, so as to be able to maintain a reasonably constant capacity for picking, packing and dispatch and make operations predictable.

WMS scope

Mechanisation scope

Conveyor

Automated tray warehouse

Shelf areas along the conveyor

Pick stations

A-frame

Receipt

Restacking to trays

(re)packaging

Dispatch

Pallet warehouse and shelf areas

A-Frame

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Can you support mechanised systems with a WMS alone?

The IT pyramid shows the responsibilities and interfaces between logistics systems. An ERP is a company-wide planning system that assigns the available and expected stock to requesting parties. A WMS ensures efficient control of warehouse operations. When using mechanised systems, a WCS or the WMS controls the hardware components.

ERP: Enterprise Resource Planning
WMS: Warehouse Management System
WCS: Warehouse Control System

ERP
(Company-wide)

WMS
(Controls the full logistics
process in the warehouse)

WCS
(Controls operations executed by mechanised systems)

ERP systems often lack the far-reaching configurability and control options that an advanced WMS offers, which makes them less suited for integration with mechanised systems. As a result, automated systems work entirely separately from the ERP system, which impedes adequate control of the whole operation.

When it comes to stock and warehouse operations, a WMS is the best option if you want to control mechanised systems as one of the aspects of the warehouse. Needless to say, this is about controlling where to use mechanised systems and where not to use them, not about the internal operations that the IT itself has to take care of (such as the internal storage strategy and internal transport for trays that are to be moved outside).

A WCS is designed to control mechanised systems for the stock movements that they handle, but is not as broadly scoped as an ERP or WMS. For automatic transport systems, a WCS is likely to be customised based on the physical situation of the warehouse. Automatic storage systems, which are generally built around standard components, have their own WCS or are controlled by an external controller to a certain degree.

A system that can ensure better integration is a WES (Warehouse Execution System). This system was designed as a link between legacy systems and new technology, and it grows into further optimisation within the scope provided by the various systems that are interconnected by the WES. An advanced WMS that receives logistics orders from the ERP can integrate both human-machine interfaces and mechanised system interfaces.

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Consider the WMS when mechanising

When choosing to go down the route of mechanisation, you should realise that every starting position comes with specific challenges. A greenfield design will offer you the opportunity to redesign your entire logistics process based on your capacity requirements. A well thought-out design will bring a modular structure and interfaces between carefully dimensioned systems, which you can scale up in phases. Adding automation to an existing operation could lead to a temporary lack of space and be demanding on the existing management system. In both cases, only a WMS will be able to control both manual and automated goods handling, allowing the old and the new situation to melt into each other. It may even be worthwhile to look into whether partial integration with automation or a controlling WMS should be prioritised.

Integration of current and future technology

An ERP, WMS or WCS must not be a factor that limits your options in choosing the automation mix. On the contrary, when technology and mechanised systems are required or need replacing, the WMS needs to also be able to support current and future technology interfaces, alongside its responsibility for the control of the full DC. Adding a WCS, just because an existing ERP or WMS is unable to accomplish that integration, is not a good future-driven choice.

Black box vs white box approach

In the world of systems engineering, a black box system can operate autonomously internally and interface only with the external environment to the degree that is strictly necessary. A white box system relates to the collaboration between different components to achieve a result like that produced by the black box system. A key difference is that in a white box system, decisions can be made by other components, because not everything is united in one single system.

	ERP	WMS	WMS in traditional storage environment	MHE with technical control only (conveyor, VLM, A-frame)	MHE with internal management of internal storage and internal movements (AS/RS)
Stock visibility	General overview, sales reservation	Detailed stock information for each site managed, and general overview of stock of MHE with internal storage	**WMS:** detailed information of stock on-site	**WCS:** no stock **WMS:** detailed information of stock on-site	**MHE:** detailed information per site **WMS:** general overview
Task management in the DC	N/A	Humans MHE	**WMS** controls humans through RF/voice	**WMS** controls **WCS**, which executes move tasks	**WMS** claims stock, runs **MHE** in sub-warehouse
Process visibility	N/A	View of the whole process	View of the whole process	**WCS:** has insight only into own system **WMS:** overall view of the whole process	**WCS:** controls the MHE system **WMS:** overall view of the whole process

This matrix is intended as an aid in making decisions on how to organise responsibilities in the control of various storage systems.

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The days that mechanised systems were stand-alone pieces of technology are well and truly behind us. That said, one logistics automation solution will be a better fit with these integration methods than the other. A WMS that can also handle WCS control is able to run all storage and processes ranging from inbound to outbound, both for task execution by humans and for task execution by material handling equipment, or a combination of the two.

Most mechanised systems are compatible with a white box approach. This concerns mainly systems that do not handle on-site stock management. There is generally a WCS between the WMS and the technological components of the system (conveyor, lift, light modules) to mask the complexity of the technology and let the outside world in through simple messages to control the most elementary features.

The WCS can also ensure a rapid response to events, provided it gets advance instruction as to what steps to take. The decision to send a box to the left or right on a conveyor position, for example, is one that can be submitted to the WCS beforehand. The internal transport of a shelf in a vertical lift, however, takes some time, meaning that the message response time is less critical and more gains can be made in optimising incoming and outgoing movements.

Systems such as an AS/RS shuttle (automatic storage/automatic retrieval) prefer to take care of allocating storage locations themselves. In doing so, they factor in the time needed for a transport and try to optimise and, where possible, combine the whole of all internal movements. The algorithm used for that is a differentiating strength to take into account when comparing providers of these kinds of systems. They are, as a result, offered only with black box control.

How the WMS relates to the black box is similar to how the WMS relates to the ERP: optimum logistic execution is handled by the system that is responsible for its area.

However, as pointed out earlier, it is not solely about who assigns a location within an automated system, or about getting the most out of the mechanised system alone. The whole of all movements in the warehouse needs to be in sync to achieve the required capacity in a predictable optimum flow.
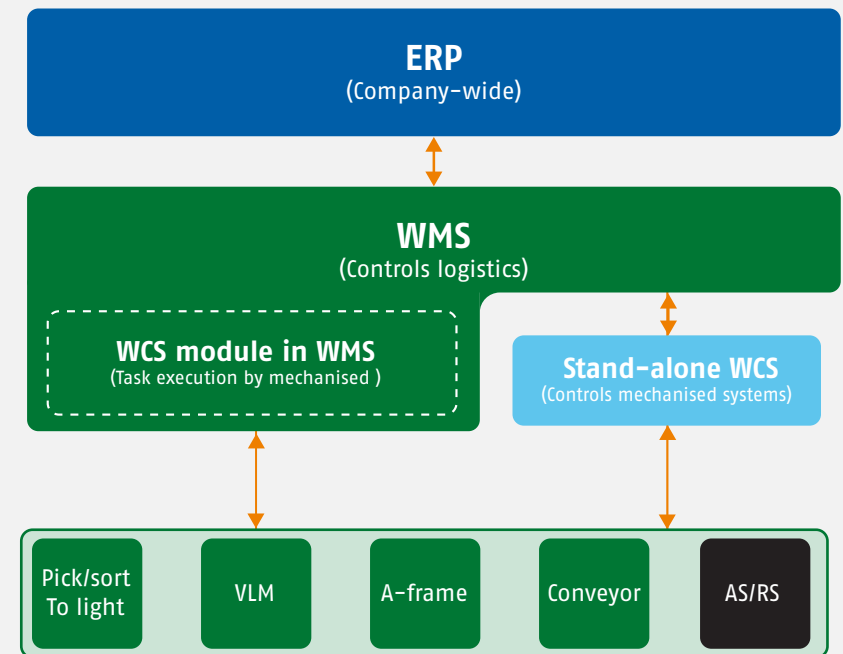
It is important to make a clear choice. When each component has a clearly defined area of responsibility, it can focus on optimising internal workings. For the WMS, this is the whole of the warehouse operation. For the mechanised systems, however, this is limited to what happens between the buffers along which goods are transferred.

A few real-life examples:

1. If picking along a conveyor is one of the tasks of a WCS, this may lead to conflicts when, for example, damage is detected. The additional integration efforts required in that case for an urgent restocking are more complex than having the WMS take care of both picking and restocking – which it already does outside the automated zones.

2. AGVs that move pallets along fixed routes do not need prior notice of all expected movements. After all, it takes far longer to pick up or drop off a pallet than it does to submit the next task. Assigning AGVs to movement tasks will then be the prerogative of the AGV traffic controller. When tasks are submitted one at a time, the WMS is able again to change priorities at the very last minute, keeping the complexity of the integration down.

3. When order components from different areas need to be supplied to a packing station, it is important that you be able to factor in the lead time for each zone. The moment that buffers at packing stations (are about to) become available can be used as a trigger to release the next tasks. Manual picks along a conveyor are controlled by the WMS: the WCS feeds out the target containers in the right zones. Away from the conveyor, all picking is controlled entirely by the WMS. Components that have to come out of an AS/RS are managed by the WCS. Picked goods from the three areas ultimately come together in the consolidation or packing stations. For optimum control or completeness of stock picked for orders and the downstream capacity, it is better to provide 90% of orders fully picked than provide 100% of orders only partly picked – even if the capacity of the components is sufficient to provide the output faster. This is due to the completeness of the stock for orders and the downstream capacity (availability of buffers for packing).

4. Shipping may impact on control. Single item orders, multiple item orders, pallet shipping, and the combination of large and small products merits a separate approach. When a barbecue and a barbecue cover need to be shipped, the question that arises is whether to ship them together or separately. A choice will have to be made between picking and packing efficiency and between transport costs & eco-friendliness and the risk of inconveniencing the customer with different delivery dates. The WMS has a general overview, which enables it to make the best choice. While the execution can be partly mechanised, the mechanised systems cannot determine the overall approach.

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Change is the only constant

As we already pointed out in the introduction, even the (seemingly) most streamlined organisations need to be able to handle new packaging, changing order profiles and shifting customer demands. Ever higher expectations – both in the B2C and the B2B domain – are leading to peaks and lulls in a logistics organisation. Every system, whether it be manual or automated, benefits from timely information. After all, preparation is conditional on having the required information on time. A tray-based system, for example, can execute internal movements at night, so as to be able to take the trays to the pick stations faster the next day.

Absorbing peak volumes

Mechanisering heeft een duidelijke, eindige capaciteit. Moet het over-
Mechanised systems have a clearly defined, finite capacity. Is overdimensioning needed to be able to handle peak volumes? Could sales play a role in levelling out peaks? Can peaks be absorbed in a manual flow? For companies with a variable order profile and short delivery time, these are constant concerns. Scaling mechanised systems accordingly is more difficult than (temporarily) changing working hours or staffing levels. If the peak endures, using mechanised systems for parts of the new flows again becomes an option to consider.
The level of integration is also a consideration in the automation of (part of) the logistics process. The advice, therefore, is to control based on expected flows and make adjustments in time in case of changes. By releasing tasks in manageable doses, work on the completion of one shipment can take place at the same time as preparations start for a subsequent shipment. This goes for all places in the process.

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Locus WMS by Centric

Centric supports organisations with Locus WMS, a controlling warehouse management system that creates efficiency in your warehouse by providing simplicity on the shop floor. This solution offers extensive applications for all logistics processes in the warehouse.

Locus WMS integrates mechanised systems in a way that ensures that they slot into your operations perfectly. Being the system that runs the DC, it decides which component is to execute which tasks, and when. Each task is controlled individually by Locus WMS, based on priorities set in the interest of the overall warehouse flow – irrespective of whether or not mechanised systems are used.
Given that Locus WMS calculates every time which task should take precedence, tasks are always allocated after weighing speed against efficiency. This makes it possible to create a serene work environment for all in a very busy warehouse.

Locus WMS offers a wide variety of extensive features:

- ✓ Support in and control of warehouse processes for fulfilment and omnichannel
- ✓ Support with multiple logistics flows within a zone or warehouse
- ✓ An advanced, configurable and user-friendly system
- ✓ A stable system that uses the latest technology
- ✓ A decision support system that allows employees to make decisions based on clear, correct information
- ✓ Support for the 'management by exception' principle, whereby employees can use multiple dashboards and alerts to see which areas require attention
- ✓ Compatibility with all working methods and procedures in the area of warehouse logistics
- ✓ Extensive tracking & tracing in accordance with the requirements of the General Food Law (GFL)

Short payback period
The following and other benefits mean that implementing Locus WMS comes with a positive Return on Investment (ROI):
- ✓ Significant improvement in general efficiency
- ✓ Higher throughput in the warehouse
- ✓ Higher stock reliability
- ✓ Dock-to-stock time reduction for tasks
- ✓ Correct and on-time sales order preparation for transport

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Some of our customers

Is your warehouse reaching its maximum capacity and are you searching for a solution? The savings achieved by installing a WMS compared to the initial costs (savings-to-investment ratio) are generally considerable. Moreover, a WMS helps the entire company move forward, because you can easily meet all existing and new market requirements. You can see here a selection of our customers who are managing their logistics processes in the warehouse via Locus WMS.

About Centric

Centric offers a wide range of integrated IT solutions to serve the entire supply chain, from manufacturer to consumer. Our solutions help to increase transparency across the supply chain. We have years of experience supplying high-quality standard solutions for the supply chain, which you can use to effectively and efficiently manage logistics processes. We support retailers, wholesalers, logistics service providers and transport companies with high-quality solutions and services, like our warehouse and transport management software, for example, but also with complete POS solutions and an integration platform for supply chain collaboration.

Contact

If you want to find out more about Locus WMS or Centric, please call Stephan Laan on +31(0)36 549 8666 or supplychain@centric.eu for a no-obligations appointment.

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