

Material Handling Automation Driving Wider Adoption of WES

Warehouse Execution Systems (WES) Evolve to Meet E-commerce Demands

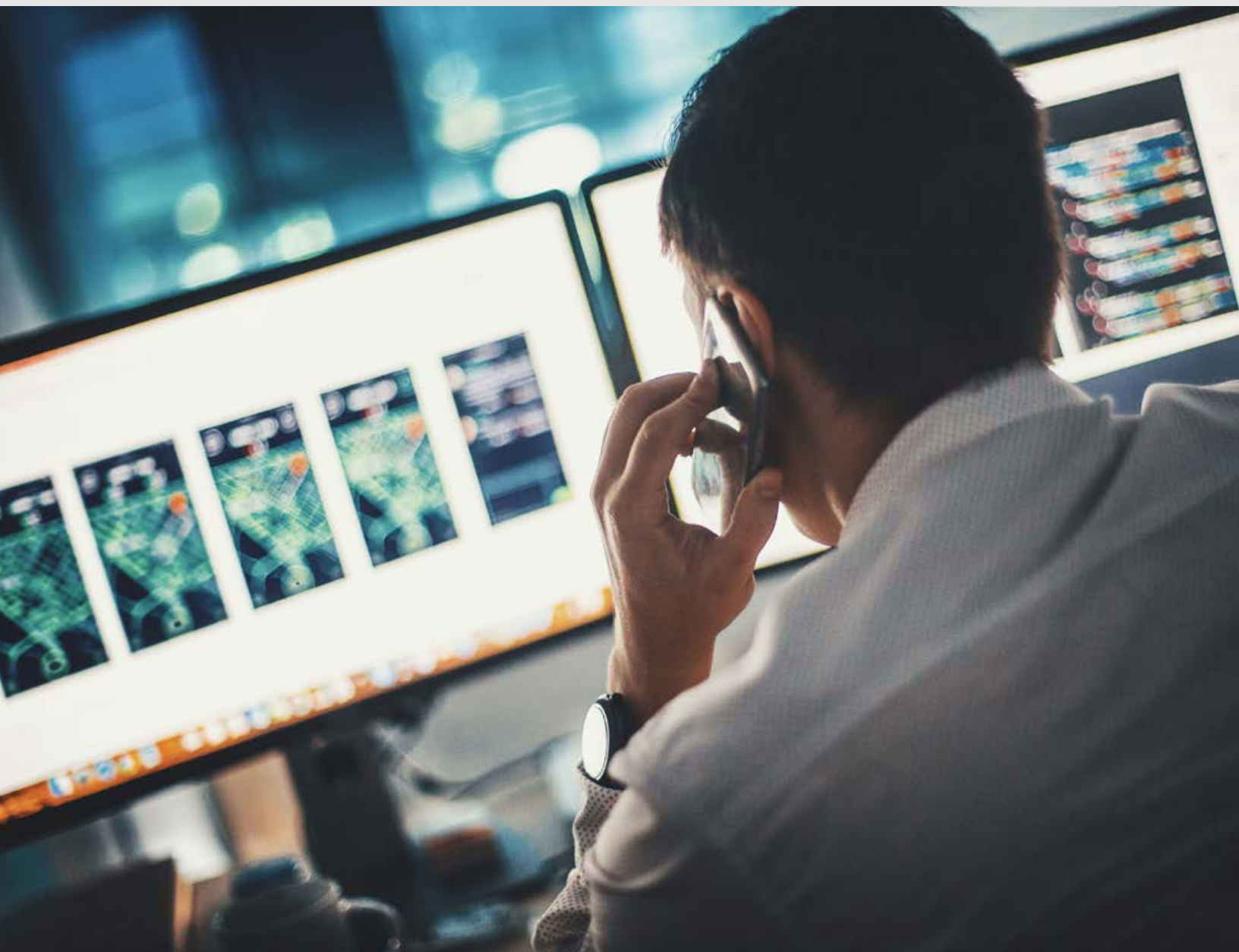


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Warehouse Execution Systems (WES) Evolve to Meet E-commerce Demands

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To address the escalating complexities of modern distribution and fulfillment operations, many companies are accelerating their transitions from manual to automated processes. Manual processes that may have once been effective are simply unable to match the current speed of e-commerce. Shorter delivery windows are causing order errors and disappointed customers, while returns processing is only adding to labor demands and shipping costs. As distribution center (DC) operators struggle to find qualified labor, they're also realizing that their manual resources have reached the limits of their productivity levels. To protect profit margins and succeed in this ultra-competitive environment, operators are introducing more automation into their DCs. This will require the integration of new material handling equipment, processes and distribution software – which can seem like daunting prospects to many operators.

In response to this rapid evolution, the concept of Warehouse Execution Systems (WES) has matured quickly in recent years. The increasing need for automation has helped to carve out WES' role among other legacy distribution software. While Warehouse Control Systems (WCS) and Warehouse Management Systems (WMS) still play necessary roles, only the WES enables visibility into disparate automation systems, allowing it to orchestrate the entire order fulfillment process within the four walls of a DC.

This white paper will explore the importance of the WES in the transition to greater automation and discuss its potential to continue assuming more critical warehouse functions within a single, unified system.



Traditional Roles of Warehouse System Software

When we think of warehouse system software, we're typically referring to one of three platforms: WMS, WCS and WES. The extent and overlap of their functionalities are often the subject of some debate, so it's important to first understand the historic role of each system and, to some degree, how they have evolved in light of modern challenges.

Warehouse Management System

The WMS has long been utilized to enable connectivity to Enterprise Resource Planning (ERP) systems. It provides core order fulfillment functions, including: inbound and outbound product flow; inventory tracking; order management; and waving. The WMS has very limited decision-making capabilities when it comes to the management of fulfillment activities and the dynamic reprioritization of orders and tasks once they are released to the warehouse floor. This is in part due to its lack of out-of-the-box integration with modern automation systems.

However, the WMS excels at inventory management, providing the financial records of transactions and updates to the ERP or order management system (OMS) so that orders are sourced to the correct DCs. The ERP

typically will handle all necessary sourcing and allocation outside the four walls of the DC to ensure proper order fulfillment.

Warehouse Control System

The WCS has a much smaller scope of responsibilities, the extent of which is dependent upon the amount of material handling equipment and automation systems present in a warehouse. It provides the machine-level integration that allows material handling equipment to take instructions (data inputs) from other systems — typically a WMS — and performs specific, pre-defined functions (outputs). The WCS is limited in that it lacks the visibility to inventory, orders and people necessary to provide on-demand decision-making capabilities.





Warehouse Execution System

The WES is the latest distribution software to emerge among these systems. Its purpose is to enable greater degrees of automation and address new DC challenges, such as the need for higher throughput and an effective means to deal with tighter service level agreements, SKU proliferation and rising order velocities.

Unlike the WMS and WCS, the WES connects disparate material handling equipment and automation systems throughout the facility to enable the coordination needed to execute sophisticated automation workflows. Recent WES offerings have evolved to provide integrated, machine-level control with varying degrees of automation to address the full spectrum of modern order fulfillment needs, including:

- AS/RS utilizing shuttles and cranes
- Robotic picking
- Automatic palletizing and depalletizing

What really differentiates the WES from its counterparts is its robust order fulfillment capabilities. The WES enables dynamic, real-time decision making for order prioritization and release execution. It provides smart workflow allocation based on available capacity in downstream picking zones or order consolidation processes like put walls or unit sortation. Simply put, the WES fills the gaps left by the WMS and its inability to integrate with the automation technologies necessary to compete in the fast-paced, high-stakes world of e-commerce.



WES-enabled Automation Delivers Greater Throughput and DC Workflow Efficiencies

You needn't look further than a modern fulfillment operation to see where the WES is being used to enable real-time decision making and increased levels of automation. You'll find that order release and execution functions have been assumed by the WES in these operations, particularly where the dynamic prioritization of orders is needed. Unlike the WMS, it's in these scenarios where the WES demonstrates its flexibility and visibility into real-time product flows and order fulfillment lifecycles.

Order Fulfillment and Release

DC operators who've relied on the WMS for order fulfillment are accustomed to it releasing a large group of orders, and unable to make adjustments throughout the shift, causing a struggle to ensure delivery time frames are met as plans change. The WES, however, makes decisions to expedite order fulfillment throughout the process.

The WES utilizes a pull model for order release, analyzing downstream capacity across various areas of the DC to intelligently coordinate the proper execution. As such, the WES is able to prioritize "hot" orders as they are received,

instructing operators to perform the next best tasks to complete orders in a timely fashion.

Real-world Example: Intelligent Order Release

Consolidating and shipping orders comprised of products from varying locations in a DC is a common challenge shared by many fulfillment centers, especially when some items are perishable or have unique handling requirements. The WES delivers intelligent order planning and release to make sure all products from various DC locations arrive at the shipping dock at the same time.

The WES has the visibility to take all aspects related to discrete order fulfillment into consideration, such as: labor and workstation availability, product attributes, value-added services, product travel routes and DC congestion. In doing so, the WES prioritizes and escalates orders to meet SLAs while reducing congestion, bottlenecks and overloading of resources.





AS/RS Automation

Many companies look to automated storage and retrieval systems (AS/RS) as their introduction to automation. AS/RS helps companies reduce labor requirements and avoid capital expansion by exploiting unused vertical space, while laying the foundation for greater long-term productivity. When AS/RS is integrated into the WES' automated workflows, it can provide maximum utilization of a facility's footprint by enabling the ability to store different container sizes dynamically within the array based on space availability.

The integration of AS/RS with a WMS results in limited visibility to the inventory location or container within the AS/RS and often requires an additional system to enable the desired level of automation. Not only can the WES see and maintain the AS/RS order inventory, it also utilizes rules and algorithms within the array of inventory to integrate the AS/RS for optimized order fulfillment. And while the WMS is unable to track inventory down to its exact location, the WES notifies the WMS in real time about any inventory variances, allowing it to create accurate inventory records.

Real-world Example: Automated Store Replenishment With WES and AS/RS Integration

Many retailers are experiencing diminishing results when adding labor and are therefore

seeking to expand upon their automation capabilities. With the WES, the integration of an AS/RS crane system for bulk storage and an AS/RS shuttle system for residual inventory delivers advanced store replenishment automation.

In this scenario, the WES receives a wave of orders from the WMS and aggregates the store demand by specific items to determine the best source of allocation and instructs the AS/RS for execution. For instance, smaller quantities can be fulfilled from residual inventory utilizing the AS/RS shuttle system while an AS/RS crane system pulls full pallets from bulk storage for stores with a demand for larger quantities. Pallets are then routed to available automatic depalletizing stations so that they can be broken down into case quantities.

With full programmable logic control (PLC) integration, the WES gives the depalletizer instructions to de-layer the pallet. Cartons are then placed on a conveyor for sorting and routing to individual stores.

Real-world Example: AS/RS Goods-to-robot Each Picking to Sorter

To improve picking accuracies and reduce labor touches, some e-commerce retailers are automating goods-to-operator (GTO), each-picking stations with the addition of robotic capabilities. Instead of having an operator manning a GTO station, a robotic arm stands at the ready to pick items — and the WES instructs and coordinates the entire automated workflow.

First, the AS/RS brings a tote of single-SKU items to the robotic picking station. Then, the WES sends pick quantity and placement instructions to the robotic arm, telling it to either place items directly into an order carton or onto a unit sorter. For a fully automated fulfillment workflow, operators can pair an automated chute closing process with the unit sorter utilizing a shuttle for carton take-away when orders are completed.



Real-world Example: Just-in-time Put Wall Allocation and Order Consolidation

Put walls have become integral tools for order consolidation in automated DCs, and the WES only enhances their usefulness. Where the WMS monitors complete waves and is unable to release individual orders based on put wall location availability, the WES takes a real-time view of order prioritization and put wall availability during upstream picking, and then allocates orders to the best-available put wall.

The marriage of put walls and the WES combines the benefits of wave picking with just-in-time cubby assignment for increased throughput and decreased put wall congestion. The WES effectively coordinates order picking with put wall station availability.

The Growing Importance of WES

What these examples illustrate is that the more the industry moves toward automation, the more the WES is needed. The WMS is not equipped to handle advanced, real-time decision making and fulfillment prioritization. Because of this, some of the WMS providers are recognizing the value of the WES' automation-enabling capabilities and seeking to incorporate these

features into their WMS. But, the reality is, adding WES capabilities to an existing WMS adds complexity and can lead to modifications that may put the WMS platform stability at risk.

Today, leading WES vendors manufacture both hardware and distribution software for optimum system integration. The next generation of WES is built upon stable software platforms to reduce integration complexities while offering clear upgrade paths and the extensibility to meet unique workflow and business requirements. In the near future, the WES' capabilities will grow to include inbound logic capabilities related to receiving, put-away, increased inventory capabilities and advanced decision making with machine learning.

To limit the need for multiple software systems and their mounting integration complexities, DC operators are also seeking single systems that can accomplish all the order fulfillment tasks that have been traditionally siloed into WCS, WMS and other distribution software.

As leading vendors, like Honeywell Intelligrated, continue to build upon their WES software platforms — from a clean-slate, unified approach to a complete solution that encompasses the WCS and the WMS — the potential for a single-source, simplified warehouse is on the horizon.

