

CONTROL of the WCS

Warehouse control systems are driving big productivity gains in highly automated facilities. Here's a look at how these systems are evolving.

By **Bob Trebilcock**, Executive Editor

If you read this month's cover story on Oriental Trading, you'll notice something different going on: The order fulfillment processes are being managed by a warehouse control system, or WCS, and not by a warehouse management system (WMS).

That's not to say that Oriental Trading doesn't have a WMS. It does. The system manages receiving, putaway and inventory management; it replenishes pick faces and assigns shipping lanes; it is the communication link with the order management system; it even takes a first pass at grouping thousands of orders into a wave. Those are all standard operating procedure for a WMS.

But when it comes to breaking down that big wave into packets of work, assigning picking tasks through the facility's voice recognition system and directing the packing stations—activities normally associated with a WMS—the WCS is firmly in control.

The reason, says John Niemeyer, an executive at W&H Systems, the systems integrator whose control

system drives the processes, is that the WCS is closer to the action. In this system, that proximity to real-time events puts it in a better position to dynamically determine which parts to pick and release to the sorter than the WMS. And if a WCS is going to make decisions about what to pick and release, better that it speaks directly to the voice system, the sorter, the packing stations and the shipping sorters than a WMS.

This is a new model for directing order fulfillment operations, one that is primarily showing up in highly automated DCs with complex order profiles, like direct-to-consumer distribution and mixed SKU pallets. While it is still an emerging trend, more large end users like Oriental Trading are implementing sophisticated materials handling automation to optimize order fulfillment processes. As a result, the WCS is evolving from an equipment control system that turns conveyors and sorters on and off at the right time to a powerful order fulfillment engine.



Now, before we go any further, there are two sides to this story. The first is the perspective of the WCS providers, who see the increase in automation as an opportunity for them. Some will argue that in the right circumstances, you don't even need a WMS. The other perspective, which we'll see later, comes from WMS vendors who argue that they remain relevant and necessary, even in highly automated facilities. We'll start with the WCS point of view.

Beyond equipment control

What's driving the evolution of the WCS?

"Money," says Jean Belanger, founder and CEO of Reddwerks. "More than half the variable cost in a typical DC is associated with order processing." Any efficiencies or gains in productivity go right to the bottom line. Or, in the fierce competition for direct-to-consumer and Internet e-commerce business, a gain in efficiency might deliver a competitive advantage. "The convenience that consumers enjoy from ordering online comes out of the hide of the retailer," Belanger adds. "Direct-to-consumer retailers have to react very fast and minutes count where hours and days used to suffice."

WCS vendors tout their ability to make dynamic order fulfillment decisions, such as the ability to reassign an order sitting at a packout station from one consumer with standard shipping to a consumer that just placed an order for next day delivery. "By monitoring events in real time, the system can automatically react to events that in the past probably required human intervention," Belanger says.

Another trend at work is goods-to-person picking. This is a methodology that integrates an automated storage system, conveyors and voice, pick-to-light or a screen display to deliver the goods to be picked in the sequence required to fill the order.

"Goods-to-person has been used in Europe for a few years and is now taking off in North America on a wider basis," says Kevin Tedford, vice presi-



WCS or WMS? In highly automated distribution centers, warehouse control systems are taking on more order fulfillment responsibilities.

dent of software engineering for TGW. "You're seeing fewer new facilities that will have 600 associates picking and packing orders. Companies are asking questions about what they can do to reduce the labor component."

That is leading to more sophisticated and technical order fulfillment systems that require a lot more real-time information. "A WMS doesn't have enough information to manage all of the components of these systems effectively," Tedford says.

Beyond equipment control

It wasn't always so. Today's order fulfillment capabilities represent a progressive leap forward for WCS. In the early days, they were primarily equipment control systems that told a conveyor to convey, a sorter to sort, or an automated storage system to put product away. "The WCS traditionally focused on material flow," says Jerry Koch, director of corporate marketing and product management for Intelligrated. "The shift we're seeing is how you direct resources to get the most efficient operations for that day."

That shift from material flow through an island of automation to a fulfillment engine began a decade or so ago with the advent of programmable logic control-

lers, or PLCs, to carry out commands. PLCs allowed for more sophisticated automation control. Early PLCs, however, had limited processing capabilities.

"The PLC didn't have memory to hold a database, and it couldn't make a real-time decision," says Carlos Ysasi, vice president of engineering for Vargo Adaptive Software. "We needed a brain to hold a database and we needed something that could analyze data and make a real-time decision in milliseconds because a high-speed sorter couldn't wait while we accessed a host system."

From material flow to resource management

In the old material flow model, the WMS was still the supervisor that directed warehouse operations and executed order fulfillment tasks. "The WMS would tell us where to send the product that was on the equipment," says Jerry List, vice president of QC Software. "It was up to the WCS to figure out the best route to get there, but the ultimate destination was determined by the WMS."

When it came to managing the resources of the warehouse, the WMS tended to handle labor intensive conventional processes, such as lift truck operators and manual pickers while the



WCS focused on the equipment.

In the emerging model of highly automated warehouses, the WCS looks at resource management, which would include automation, but also labor and conventional processes. “You’re trying to orchestrate all of those components to get product out of the facility in the most optimal way,” says David Adams, global product management for software for Dematic. “To the WCS, it doesn’t matter whether you have people or equipment performing a task. The WCS is going to orchestrate the fulfillment operations to get the lowest cost per case out the door.”

The WCS does this, in part, by balancing the workload across the equipment. Rather than peaks and valleys during the day, the idea is to maintain a steady flow of work from picking to the conveyor and sorter to packing stations. WCS vendors refer to this as a pull system: Rather than pushing work out to associates on the floor, the WCS uses a piece of equipment to drive the processes.

“With the WCS, we can apply lean manufacturing methodologies to distribution,” says Vargo’s Ysasi. “In a piece-picking facility, we use the unit sorter to set the pace. As soon as packing sta-

tions become available, we drop more orders upstream and sort the work to the available resource. Instead of a pre-planned set of orders, we can wait until the last second to make a decision on what someone should do next.”

That type of approach allows the WCS to proactively react to events in real time. “If we look forward in the order queue and see a spike in demand for a particular SKU, we can also look to see if there’s enough stock at that pick location to fill demand,” says Reddwerks’ Belanger. “If not, we can send an order to replenish that location to eliminate a short or out of stock position.”

Wrap it up

Like WMS systems of the past, WCS systems from providers like Reddwerks, QC Software, Vargo as well as system integrators like Dematic and Intelligrated, are moving from custom-coded projects to something closer to off-the-shelf products. Reddwerks, for instance, offers a suite of applications that includes a conveyor control system for equipment, warehouse control for order processing, and a WMS system for inventory management.

Likewise, QC Software has developed a series of standard modules

with hooks to business rules that can be configured according to the needs of the end user. “A WCS will never be shrink-wrapped because the operational requirements of every system is a little different,” says Jerry List, a vice president at QC. “But as the package becomes more standard, we can make most changes through configuration changes rather than custom coding.”

What about the WMS?

Now, even though the WCS is handling order fulfillment processes, the WMS still has an important role to play, even in highly automated facilities. “The WMS has been promoted from a task engine, concerned with how to get the work done, to a planning tool,” says QC Software’s List. “It is still managing inventory, and it is still allocating inventory as it drops orders down to the WCS. It is planning the labor and in a multi-warehouse scenario, it is determining which warehouse to source an order from.”

In most of the facilities employing this new model, the WMS is still managing replenishment—even if it directs the WCS to execute the replenishment—and it is often managing shipping operations. “The WMS has a bigger view of the extended supply chain,” says Intelligrated’s Koch. “The WCS is only focused on the operations within the facility.”

Yet, to hear the WCS vendors tell it, that set-up may be changing. “In an automated facility, the lines of responsibility are getting blurry,” says Koch. “Cycle counting is something you would typically associate with a WMS, but when it comes to managing the storage in a carousel, the WCS can execute triggers to cycle count as work is being done and report back to the WMS.”

Indeed, WCS providers are moving into WMS turf. Through its acquisition of HK Systems, Dematic inherited WMS functionality. “The WCS is increasing its footprint to do classic receiving and shipping and can interface all the way to the ERP,” argues Dematic’s Adams. Similarly, QC



Even in automated DCs, the WMS remains the system of record for inventory management, communicates with the ERP, and directs conventional processes.

Software and Reddwerks are expanding the reach of their systems.

“We see opportunities for the WCS to move into basic inventory management, crossdocking, and print and apply on outbound shipments, especially in facilities where the warehouse is being controlled by an ERP system,” says List. “As a company grows, it may need a full-blown WMS, but until then the WCS can be a stepping stone.”

WMS strikes back

If it sounds as if a WMS is becoming irrelevant in highly automated facilities, WMS vendors would differ.

“The WMS is moving up the stack and taking on more supply chain processes,” contends Chad Collins, vice president of marketing and strategy for HighJump Software. “We have visibility into inbound shipments, we manage the flow of inventory from the yard into the facility, and we’re going to plan and track labor. Those are tasks that a WCS just can’t perform.”

Other WMS vendors make similar arguments. “Manhattan Associates is in some very highly automated facilities with a WCS controlling some order fulfillment activities,” says Eric Lamphier, Manhattan’s senior director of product management. “We’re still firing off as many messages as we are at any comparable conventional warehouse. What’s different

is that the WCS is using our data to re-prioritize and re-sequence operations to drive productivity. But, they still use our data.”

While the WCS is running a lot of very fast what-if scenarios to determine the right movements to keep the trays full on the tilt tray sorter, “we’re doing inventory allocation, task creation and cartonization along with tracking the availability of equipment and labor,” Lamphier adds.

In fact, both RedPrairie and SAP argue that their systems are capable of handling the decision making that is being taken on by a WCS. “More and more, we are being asked to talk directly to PLCs and eliminate the layer of communication handled by a WCS,” says Tom Kozenski, RedPrairie’s vice president of product strategy. “I would argue that the whole idea of feeding out the work flow in a dynamic way, which is the primary selling point of the WCS vendors, is fully supportable by a WMS.”

Indeed, SAP has introduced a material flow system control, something it calls MFS, into its full-featured WMS product. “The module is able to model conveyor, sortation and automated storage segments and communicate directly with the PLCs to take out that layer of control software that would typically run automation,” says Richard Kirker, director of solutions management for SAP. According to Kirker, the solution is already running a number of highly

automated facilities in Europe; two customers are preparing to implement it in North America. “In one facility we are operating, 89% of the response times are in less than 300 milliseconds,” he adds.

WCS or WMS? Which then is the best approach? There is little doubt that warehouse control systems are making inroads on WMS turf in highly automated facilities and have success stories to tell. At the same time, WMS systems continue to evolve and add functionality. “There’s no one answer,” says RedPrairie’s Kozenski. “You have to look at what you’re trying to accomplish and ask where is the best place to put the picking logic.” □

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