Omni-Channel's Next Wave will be Waveless

Waveless fulfillment can help warehouses move at the speed of omni-channel business.

›› By Gordon Hellberg

Not too long ago, retail consumers could obtain products through mail order catalogs, through retail stores via cash-and-carry, through store delivery, and through something new called the Internet which major retailers were just starting to embrace with the concept of e-commerce. These four channels were known as multi-channel fulfillment. Even though this revolution began well over a decade ago, a majority of retailers are still trying to establish a workable balance between e-commerce fulfillment and retail store replenishment. Now add the emergence of omni-channel fulfillment (OCF) and distributed order management (DOM) to the mix, giving customers a dozen or more fulfillment options, and things start to get complicated.

Today, not only can consumers go into a store and do cash-and carry, but they can place an order on the Internet or through their mobile devices, or while on an airplane flight, with the expectation that it can be picked up at a local store. If consumers prefer, they can opt for direct-to-consumer delivery from the retailer's central e-commerce warehouse. If the retailer has a catalog, the consumer can order via mail order. The consumer can go into a store, and if that store does not have the item they are looking for in stock, it can be shipped over from another store for the consumer to pick up, or it could be delivered to their home that same day. And if that purchased item was scheduled to be delivered to the customer's home, but now they want it delivered to their office, the item can be redirected for same-day delivery, even while it is in transit.

Internet fulfillment needs to factor in seasonal spikes and continuous order volume growth driven by new-item releases. Thousands of orders per hour of single-item and multi-SKU orders, a wide variety of product cubes, and the customer-driven demand for the lowest cost transportation methods needed to ship direct-to-consumer orders—as these options increase, they are continually raising the bar for logistics executives.

Omni-channel fulfillment is multi-channel, but the number of customer fulfillment options is continuing to grow, with the expanding needs of retail store replenishment added to the mix.

DISTRIBUTION PLANS RARELY EXECUTE EXACTLY ACCORDING TO PLAN. THERE ARE INEVITABLY EXCEPTIONS THAT NEED TO BE ADDRESSED.

Distribution operations must process a mix of LTL (less-than-truckload) shipments with full-pallet/mixed-case-pallet orders, be able to fluid-load direct to the trailer, and balance the complexities compounded by the growing demand for combined split-case and mixed-case store and distribution center orders. Further complicating the order mix are retailers' specific shipment compliance labeling and order shipment documentation requirements, and manifesting rules.

Omni-channel fulfillment and distributed order management are essentially the strategy and system of making merchandise available for store replenishment and the customer in many different ways. It is a delivery perspective. Consumers, and stores, want flexibility and they want options. They are requesting different service levels. Speed of delivery, improving the management of inventory, and for customers a better delivery experience, are the factors that are driving omni-channel fulfillment and distributed order management.

Wave Fulfillment Limitations with Omni-Channel

OCF and DOM have emerged as the solution to support the ever-expanding demands of retail customers and store replenishment.

For decades, warehouse management systems (WMS) have been the mainstay for managing inventory and material handling processes within warehouses. The objective of WMS is to provide a set of computerized procedures to manage the movement of inventory and orders within the warehouse, and enable a seamless link to order processing, logistics management and material handling equipment systems within the facility.

For order fulfillment, a WMS is basically a planning tool that is coupled to an execution tool that drives or pushes the distribution processes. The WMS allows distribution executives to determine what work is going to be accomplished, and the sequence of that work, within the content of a fixed wave. The execution or processing of the wave is directed by the WMS by pushing the planned tasks to workers and associated equipment.

Similarly, warehouse control sys-

tems provide real-time direction of primarily equipment as specified by a work plan, defined by an upper-level WMS. While some warehouse control systems (WCS) implementations may direct the work efforts of associates, the direction of the work is in accordance with the pre-determined work plan within the context of a wave.

A wave plan is only as good as having the planned-for conditions matching the conditions actually encountered during the execution. Distribution plans rarely execute exactly according to the plan. There are inevitably exceptions, and those exceptions must be addressed during processing.

OCF/DOM demands a faster and more flexible level of fulfillment than what can be achieved with wave processing in a conventional WMS or WCS. It requires a streamlined, interconnected system in play, which fulfills and tracks inventory in real-time throughout the entire distribution center. It needs to be able to facilitate optimized processing by assessing order parameters and delivery options for each order placed, and initiate an optimized solution for fulfillment and delivery in real time. It must include highly-scalable software architecture, providing functionality developed to deliver a higher performance of order fulfillment with process automation—managing material handling systems, robots and other complex automation technologies. Such a control system needs to contain automation modules developed to balance waveless order release and workflow across receiving, picking, packing and shipping processes.

Benefits of Waveless, Pull-Driven Process

As an order-processing method, a waveless pull-driven operation permits new orders to be added into the current batch of work seamlessly, facilitating the flexibility that OCF and DOM require. In the wave-based push-driven method, a wave of orders has a beginning and an end as the individual orders are processed, whereas waveless is continuous.

In the complexities of omni-channel fulfillment, waveless processing has efficiency benefits over wave-based fulfillment:

- Ability to incorporate new work (orders) into the current batch. This allows seamless processing of priority work.
- Waveless processing maintains a constant batch size as new order units are added to the current pick path, whereas in a wave-based operation the batch size diminishes as orders in the wave are completed.
- Completion of individual orders is distributed evenly over time, rather than having many orders complete near the end of a wave.
- Elimination of wave buffers to hold future waves awaiting completion of the current wave.

Warehouse execution systems are changing the way retailers like American Eagle Outfitters move goods through their distribution centers.

- Ability to create a constant flow of work, eliminating idle time transitions between waves, and normalizing worker workloads.
- Reduction in hospital zone orders as additional time is available to hold individual problem orders awaiting resolution.
- Reduction in peak requirements of equipment to handle reciprocating waves of activity.

As opposed to wave-based, push-driven fulfillment, a waveless pull-driven operation looks at the output, and makes adjustments automatically to achieve the objective. When exceptions are encountered those exceptions are accounted for in determining what actions to do next. If outbound processing is reduced, a pull-driven system will reduce the work being released to be pulled from inventory. As outbound processing is increased, the system will see the increase and adjust the picking to produce more to maintain the objective.

The primary objective of a waveless, pull-driven system is to establish a continual workflow balanced between all processing steps, and to match the total available labor. This objective can be stated in another way—to drive work so as to not create large deviations in the work-in-progress between processing steps. Minimizing work-in-progress allows the system to quickly respond to changing requirements and available labor.

How WES Can Support Omni-Channel Fulfillment

The latest generation of warehouse execution systems (WES) are able to synchronize and sequence work across all work resources—both people and machines. These WES solutions can address the demands of omni-channel fulfillment and distributed order management. Functioning on a significantly differing operating structure to WMS/WCS, utilizing a waveless pull-driven operation, these latest generation WES focus on meeting production objectives, as opposed to following a production plan. They continuously optimize the work to maintain a constant workflow, keeping all available work resources constantly working in the most efficient manner. The WES organizes the work, as necessary, to meet production objectives.

The WES paradigm assumes that there will be exceptions encountered in the execution of individual work tasks. WES avoid planning ahead, knowing that the plan may need to be changed if an exception occurs. By minimizing the planned work, the WES can adapt quickly to changing conditions—critical

to successful processing of omni-channel orders. The synchronization and coordination of all work resources is key to keeping the work constantly flowing.

The latest generation of WES controls all work resources—machinery and labor—and organizes, optimizes, sequences and synchronizes the work effort. These systems also process orders without waves. While the overall efforts of fulfilling many individual orders may be performed at the same time, there is no systemic requirement for the connection or dependencies between the efforts. The efforts for each order start and complete independently from the efforts on all other orders. Processing of a continuously maximized pool of orders helps to reduce complexity and inefficiency in comparison to the traditional wave-method of fulfillment.

Such WES are typically installed between the WMS and the various resources that perform the work, including people and material handling subsystems. It orchestrates and balances the work across the DC's various processes, simultaneously running a full mix of order fulfillment processes in real-time, including: receiving, receiving reconciliation, dynamic put-away, replenishment, picking, sortation routing, conveyor and sorting control, and the information required for packing. It integrates and synchronizes the DC's workers with the operation of the equipment, with real-time, system-directed labor balancing across multiple work zones.

Dynamic assignment of inventory optimizes inventory placement, and ensures ready access to all items needed for orders. As soon as the inventory is inside of the DC, the WES knows where that inventory is located. Being real-time, the system uses all available sensory inputs to determine how to adjust the current operation to meet optimal performance. It knows where the workers are within the building, and it is making real-time decisions to move people and drive the processes.

The signature aspect of new-generation WES operation is the continuous fulfillment processing engine that is constantly monitoring and adjusting as necessary to achieve the production objectives as specified by configuration. This engine is always aware of the current conditions, the work backlog, configured work prioritization rules, and available work resources. It is always directing efforts to complete existing work before starting new work in order to achieve minimal order cycle times while reaching maximum production with available resources.

The latest WES utilizes advanced neural decision logic in making complex decisions that are a function of multiple factors. This allows all the decision factors to simultaneously be evaluated and their relative values to be considered in the decision. The neural decision logic is configured to determine the impact that particular factors will have on the decision.

Most latest-generation WES are designed to be scalable and modular for specific applications, such as

for put-away, replenishment, picking, routing, induction, sorting, speedpack matching, shipping, shadow stock, workflow management, and user authorization.

To facilitate easier availability, the latest WES can also be acquired as software as a service (SaaS). A SaaS license is one where there is a usage fee for the software which is paid over the contract period. The value of such a software license is ease of affordability, proven effectiveness and depth of functionality.

One Inventory, One Labor Force

Over the past decade, retailers have built direct-to-consumer e-commerce fulfillment centers, segregating inventory that was put there specifically to fill online orders for one- and two-day delivery. Inventory and distribution processes for handling retail store replenishment have been handled separately, frequently in different locations.

The latest-generation WES have eliminated this requirement, enabling a universal inventory for picking, packing and shipping processes. By having a single inventory available for e-commerce and store replenishment, the overall inventory required may be lessened.

There are many common actions that occur between distribution channels, such as inbound processes, inventory processes, picking and packing. An omni-channel solution using the latest WES offers the opportunity to universally use processes and equipment across multiple channels. It also allows the infrastructure to be more fully utilized without the need for replication in a separate facility.

Retail and e-commerce typically work with separate workflows, but with the latest WES workers can pick orders for both, which downstream are then consolidated for e-commerce packing and shipping or destined for retail store fulfillment. This allows seasonal changes to the balance between e-commerce and retail to be normalized, reducing the overall required labor. It also reduces training requirements and improves overall quality as the procedures are common, reducing the probability of errors due to lack of training.

A WES-functioning omni-channel operation also has the opportunity to offer temporary workers longer work engagements as the production demand is extended in time due to the simultaneous needs of the channels.

Streamlined Fulfillment

The latest generation of highly-flexible and scalable WES presents a new paradigm in operational efficiency for picking, packing and shipping operations in omni-channel fulfillment. Supply chain and distribution executives looking to deploy more streamlined fulfillment solutions would be well served to investigate the latest generation of warehouse execution systems to accelerate their operational goals. **MH&L**

Gordon Hellberg is vice president of VARGO (www.vargosolutions.com), a team of fulfillment and distribution center specialists with expertise in intelligent warehouse execution systems, integration and distribution center process improvement, and specialized material handling equipment.

FOR RELATED CONTENT, GO TO:
mhlnews.com/omni-fulfillment