ORDER STREAMING

A WAVELESS ORDER FULFILMENT SOLUTION FOR OMNICHANNEL DISTRIBUTION CENTRES

ıllı Manhattan Associates®

INTRODUCTION

The roles of manufacturers, wholesalers, retailers, employees, technology, and robotics are all rapidly transforming in today's evolving e-commerce landscape. Changing consumer behaviours and new digital initiatives have also changed the game for distribution centres (DCs) and supply chains, who are now expected to skillfully handle large B2B wholesale orders, retail store replenishment orders, as well as urgent, small e-commerce orders.

Unified channel fulfilment is a goal for many distribution leaders, and developing a holistic approach that takes into account the complexities and uniqueness associated with each channel is a top priority.

As a result, DCs now play an increasingly significant part in delivering orders accurately and on a very short time schedule. Managers must tackle the complexity and frequency of e-commerce orders, including streamlining processes, boosting productivity, and expediting order fulfilment. This requires more advanced technologies and processes, alongside traditional procedures for filling orders that account for the balance of demand across other channels.

The DC plays a critical role in the e-commerce experience, which, when well-executed, increases the likelihood of a repeat order. Conversely, failing to meet or exceed fulfilment expectations could lead to negative reviews about the retailer or brand and a permanently lost customer.

To avoid such failures, rapid and efficient e-commerce order fulfilment in the DC has become a top priority. Consumers expect it, shippers promise it, parcel carriers hustle to deliver the goods, and supply chain solution providers work hard to develop and deploy innovative approaches. Speed is vital, but order accuracy cannot be sacrificed, and the supply chain operation needs to be retooled to maximise efficiency and profitability. In this demanding environment, distribution centres are transforming, giving birth to new requirements, workflows, solutions, and opportunities.

THE CHANGING NEEDS OF THE WAREHOUSE

Today's distribution industry has reached the point where companies have committed to new and transformative business practices. Manufacturers, wholesalers, and retailers now increasingly operate sophisticated omnichannel distribution centres designed to satisfy around-the-clock customer demands.

These DCs are carefully crafted to help win the race for the "last mile"— the final delivery of goods from the DC to the retail store or to the consumer's front door. Retail supply chains are also being enhanced by adding new services and distribution solutions, such as buy online and pick-up in store (BOPIS), and ship from store. In nearly all of these scenarios, order fulfilment processing windows are shrinking, while rapid, low-cost parcel shipping decisions and flawless execution are the new normal. Widespread adoption of mobile technologies places great power in the hands of consumers, and their expectations continue to grow in relation to product availability, delivery options, and convenience.

The new challenges posed by e-commerce deeply impact traditional order fulfilment strategy in the DC, known as "wave processing," which is still used by many to process large batch orders. In wave processing, as each batch of orders nears completion, the next is started. This approach is known as a "push model," meaning that orders are "pushed" into the DC operation for execution in batches, based on assumed processing capacity.

Wave processing is a strong choice for traditional wholesale channel order fulfilment, where it is beneficial to organise picking, consolidation, labeling, inspection, and loading activities for very large orders with similar SKUs and shipping requirements. For an e-commerce operation, it can be a different story, as each order is unique, and small shipments need to be sent to customers' homes on a daily basis. For that reason, wave processing can make it difficult to reprioritise work after the batch has been determined. If the distribution centre receives high-priority orders in the middle of a wave cycle, those orders must either wait until the next wave runs or be expedited manually. Under-utilised assets can therefore reduce overall fulfilment capacity.
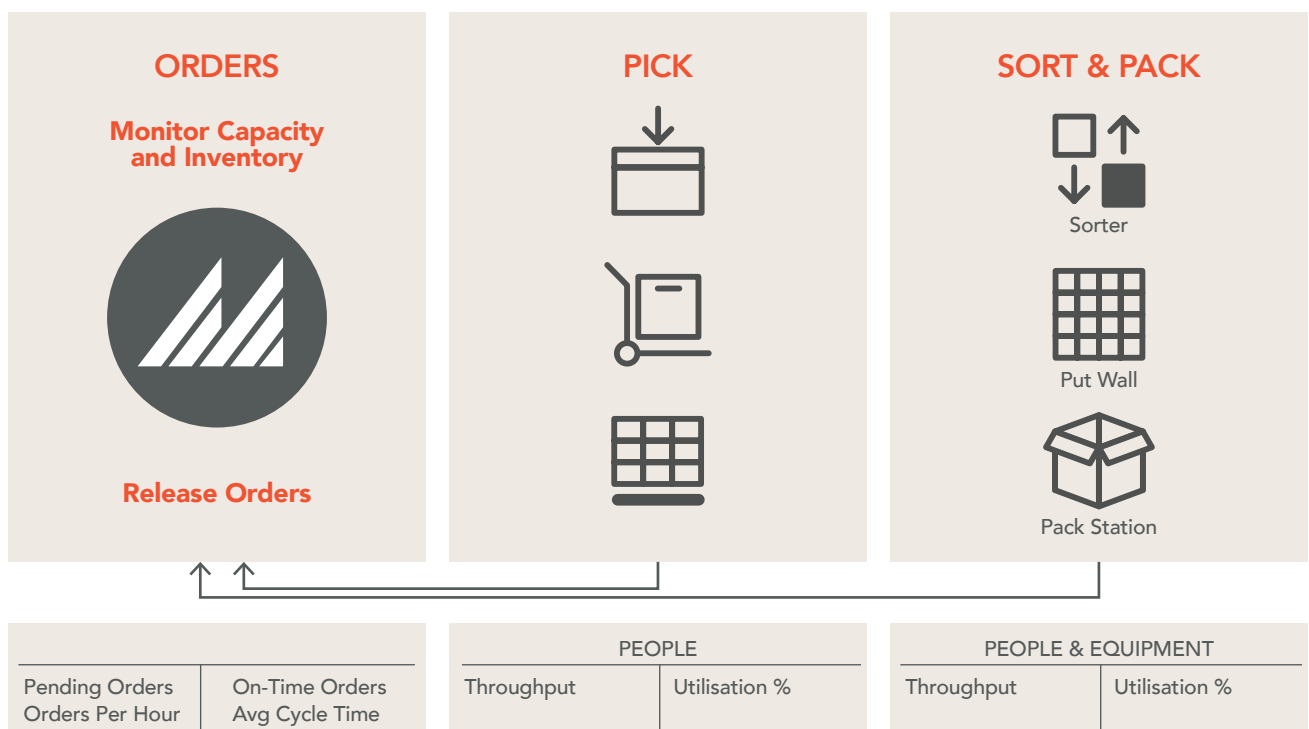
ORDER STREAMING

Order Streaming, a form of waveless picking, reimagines traditional order fulfilment logic and offers a more flexible, e-commerce-centric fulfilment method. Order Streaming supports rapid fulfilment from distribution centres of all types and sizes — both smaller, local, quick-response facilities as well as larger, regional, high-volume, automated e-commerce sites — while efficiently fulfilling traditional, larger orders.

Rather than batching orders and dropping them into the DC operation in waves, Order Streaming continuously evaluates the order pool and automatically releases work based on variables such as order priorities and facility processing capacities. Unlike the push model, Order Streaming operates under a "pull model," meaning that as soon as there is capacity in the fulfilment operation, new orders are "pulled" into the workflow to the available asset. This results in immediate action, as orders are not held until they can fit into the next batch; as soon as an order can be addressed, it is pulled in, and processing begins.

This next-generation functionality brings the visibility and reactivity of a warehouse execution system (WES) into the footprint of a complete, best-of-breed WMS. It takes action on newly received orders instantaneously, operates without waves, continuously monitors the state of all resources (human and automation), and releases work just in time, even in anticipation of open processing capacity.

On the warehouse floor, employees and equipment receive a constant stream of work thanks to this native orchestration logic, keeping everyone steady and productive. Supervisors oversee the streaming process via responsive User Interfaces (UIs) that are available across browsers and/ or mobile devices which provide an unprecedented level of visibility and control into outbound processes.

Manhattan Associates' WMS, including embedded Order Streaming and WES functionality, can be implemented as part of a broader, pre-integrated platform, including Omnichannel Commerce solutions that encompass Order Management, Customer Engagement, Point of Sale, Clienteling, and Store Fulfilment solutions. This broad set of capabilities helps to make decisions regarding fulfilment and delivery across the supply chain network. Uniting the point of sale, inventory tracking, and management of both home delivery and BOPIS, these capabilities serve as the foundation for digital initiatives and omnichannel transformations in many of today's leading enterprises.

ORDERS	PICK	SORT & PACK
Monitor Capacity and Inventory		Sorter
		Put Wall
Release Orders		Pack Station

| Pending Orders Orders Per Hour	On-Time Orders Avg Cycle Time	PEOPLE		PEOPLE & EQUIPMENT	
		Throughput	Utilisation %	Throughput	Utilisation %

HOW ORDER STREAMING WORKS

The Order Streaming approach ensures real-time alignment between orders and available inventory, while constantly synchronising labour utilisation and equipment availability. The WMS supports Order Streaming with the help of native science-driven algorithms that learn and adapt based on the current and expected state of the distribution centre. Traditional, solely rule-driven systems will fail in this new retail world, as they are too difficult to configure manually and too rigid to respond to the dynamic nature of fulfilment challenges.

Instead, the WMS needs to continuously evaluate and adjust the execution plan, allowing it to react at once to a pull request triggered by resource availability. The algorithms are capable of optimising multiple objectives (such as minimising cost and maximising service levels) by simultaneously deciding:

– Which orders to select for processing, based on order priority and promised service level, inventory availability, and expected resource capacity
– How to build efficient tasks to minimise travel on the floor and maximise pick density
– Which tasks to release to the floor for execution to ensure labour efficiency and work saturation

This flexible system blends cutting-edge optimisation engines driven by mathematical formulations and heuristics methods with strong, state-of-the-art prediction models. The models constantly receive signals and process feedback from floor operations, using machine learning techniques to estimate unknown or hidden information, such as expected order arrivals, system congestion, effective material handling equipment (MHE) capacity, and labour performance. Optimisation engines that utilise these predictive models produce reliable and executable plans, resulting in maximum throughput and improved customer satisfaction.

Traditional wave-based fulfilment results in peaks and valleys in both labour and automation, while Order Streaming provides more consistency.

TRADITIONAL WAVE PICKING

PICKING   SORTER   PACKING

ORDER STREAMING

PICKING   SORTER   PACKING

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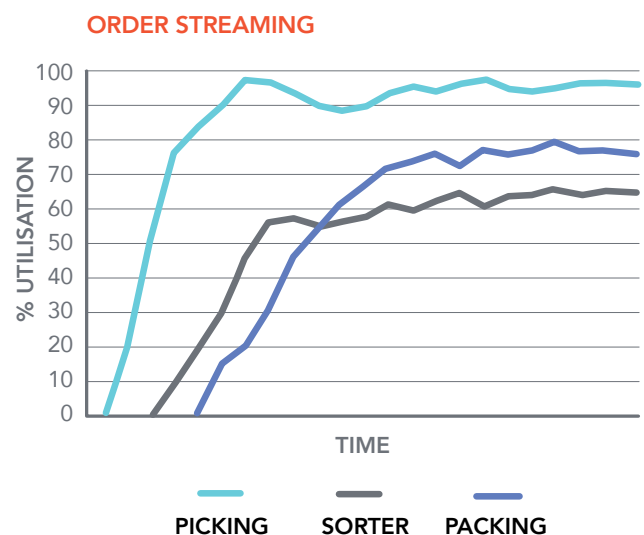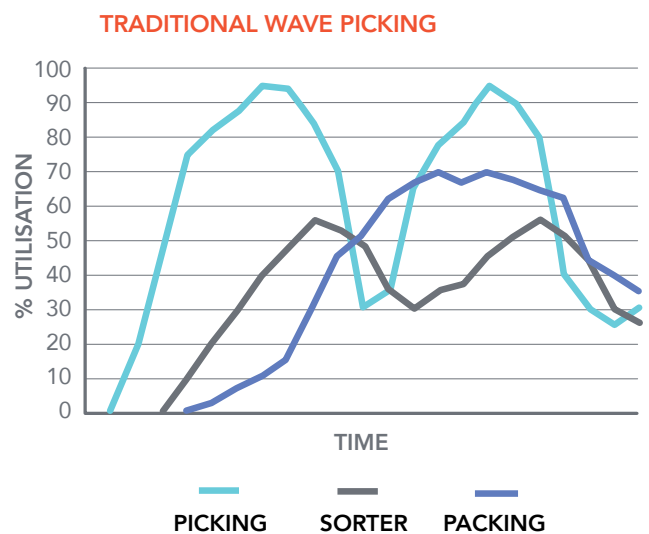
OPTIMISATION-DRIVEN ORDER STREAMING

The core benefit of these adaptive optimisation algorithms is their ability to release the correct amount of work at the right "pace" onto the floor, versus outputting a major, complete execution plan for the whole batch at once. This allows specific fulfilment decisions to be delayed as much as possible to take advantage of the most up-to-date information.

As a result, instead of queuing up many fixed tasks for a large batch of accumulated orders with different needs or priorities, orders can be dealt with in real time, on an individual level, which is optimal for small e-commerce orders. DCs can then execute on high-priority orders with same-day or even hourly delivery promises, at the lowest operational cost, while utilising expensive material handling equipment and labour resources with the highest level of efficiency at all times.

Moreover, by releasing the correct "type" of work, an optimisation-driven Order Streaming system can balance the workload across multiple areas of the DC, synchronise the simultaneous execution of replenishments, and oversee picking and packing activities – even if some of the work is being executed via manual workflows. This also eliminates bottlenecks by smoothing material flow and reduces manual interventions, such as ad hoc replenishment requests and frequent worker transfers across zones.

TWO USE CASES FOR ORDER STREAMING

Order Streaming involves constant analysis and adjustment as the work is being executed on the floor. For a successful process, the WMS should also be able to support execution-level decisions.

For example, let's consider assigning the correct set of picks (pick set) to the right picker. The correct task is defined based on the instantaneous distance between the worker and the pick locations. As well as the speed of the worker, with respect to the items picked and the walking distance. To make such a dynamic execution-level decision, the WMS combines the power of online optimisation algorithms, internet of things (IoT) technology integrated with robust location and layout information, and predictive models generated by machine learning.

Second, let's consider a dynamic creation and adjustment of pick paths that responds to a picker's spontaneous decision to execute on multiple tasks, such as combining multiple pick totes into a pick cart. The properly integrated WMS will not slow down pickers to execute the plan. Instead, it is powered by scalable algorithms with the flexibility to respond to reasonable ad hoc decisions made by the worker in real time.

Sample Order Streaming dashboard for managing KPIs

ORDER STREAMING WITH ROBOTICS

Whether the infrastructure relies on a hybrid of manual and partially automated processes or a fully automated, robotic system, Order Streaming supports the requirements of adaptive, changeable fulfilment and delivery.

For instance, robotic Goods to Person (GTP) sub-systems may rely on autonomous intelligent bots and conveyors that move products, totes, and/or cartons around the distribution centre to personnel at processing stations. It is well known that Amazon.com uses robots from Amazon Robotics (formerly Kiva Systems) to lift and transport product shelving to and from personnel based on order requirements. Other emerging devices include the implementation of a robotic arm for each GTP station or an autonomous robot to pick and place the products in the appropriate tote, without the need for human picking labour.

Today's trends toward sophisticated autonomous robotics open an exciting set of opportunities for Order Streaming and its impact on business strategies. Automated devices clearly help to reduce labour needs, as robots do not suffer from injuries, illness, or variability in cost and performance. Robots are also much safer in some cases, helping to manage large, heavy, or hazardous loads to protect both worker health and the company's liability.

The investment in these CapEx automated systems is clearly higher. Depending on the products being distributed, the channels being served, and the service level agreements, supply chain executives will need to decide on the most strategic technologies and capabilities for the DC. Based on such investments, Order Streaming provides a flexible, consistent foundation for order fulfilment orchestration across a network of distribution centres, offering a number of different approaches based on the make-up of each individual facility. It also can support variable automation across several DCs (automation types and multiple automation vendors), enabling a common decision-making core across the network that helps to increase standardisation and lowers overall total cost of ownership (TCO).

As today's e-commerce trends continue to emerge and impact supply chains, brand owners must find ways to modernise their distribution centre operations in order to remain competitive with new pure-play e-commerce startups, international brands, and other omnichannel enterprises. Advancements in technology, equipment, and operational best practices will certainly provide opportunities and inspiration for supply chain professionals and decision makers.

CONCLUSION

E-commerce will only become more demanding in the years to come, and brands that are ready and willing to adapt their fulfilment processes to strike the right balance across labour, equipment, orders, and inventory will be the ones to prosper. A sophisticated approach to unified channel fulfilment, including a native Warehouse Execution System (WES) to orchestrate task execution across human and robotic assets will be crucially important. Order Streaming is extremely valuable to today's distribution centres, as the core science-driven methods support continuous analysis and real-time execution strategies. Order Streaming enables DCs to efficiently process the influx of orders characteristic of e-commerce shopping, while ensuring speedy fulfilment and a positive experience for the consumer.

Please visit Manhattan Associates' website to learn more at **www.manh.co.uk/orderstreaming**

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