



White Paper

What is Waveless Processing and How Can It Optimize My Operation?

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Waveless Processing

Most distribution centers today utilize wavebased order processing whereby many orders are simultaneously released to pickers in a single “wave.” In theory, all of the orders will be completed simultaneously as well. However, unexpected events routinely impact the efficiency of wave-based processing. From personnel working at a slower pace than anticipated, to equipment breakage and stockouts — every event has a negative impact on the efficiency of wave-based processes.

Waveless processing is a proven means for optimizing order selection by dynamically controlling tasks and handling unexpected events as new current conditions of the system. Rather than assigning work in a single wave, tasks are dynamically released to orders in real-time. Using a revolving batch instead of a wave batch allows pickers to work continuously, regardless of unexpected events that may slow down one worker vs. another, and allows individuals to receive assignments at a more even pace.

Waveless processing also allows work to be dynamically re-assigned from one pick zone to another. If one area falls behind another, workers from a zone that is further ahead can be dynamically re-assigned to the other area. This dynamic re-assignment allows a more even finish to order fulfillment tasks and enhances overall labor productivity.

Waveless Processing Will Positively Impact Your Bottom Line

Even those companies with well-designed wave-based processes have experienced immediate benefits from implementing waveless processing. For example:

- 1) Picking productivity increases by up to 20%
- 2) Throughput capacity increases by up to 35%

Additionally, designing a new facility based on waveless processing substantially reduces the initial investment when compared to a wavebased design. Examples exist to validate that facility utilization is higher in waveless systems. The same throughput can be achieved with smaller facilities.

The Past — Justifying Wave-Based Processes

The advantages of batch picking have been clear to distribution professional for many years. Picking multiple orders simultaneously greatly reduces travel time among the pickers.

When the first batch picking systems were implemented, they operated on paper. Pickers traveled first to a printing location to pick up a batch of orders, then they traveled throughout their zone to complete the batch transactions. Upon completion, they traveled back to the printer to pick up the next batch.

As shipping sorters and unit sortation devices were introduced to support batch picking, the approach remained the same. A batch (now called a “wave”) was released to all the pickers simultaneously. All pickers would work in that wave until it was completed. Some finished much sooner than others who may have faced an unexpected event such as a stock-out along the way. Workers completing their assignments ahead of others were then “idle.” When all stragglers had completed the wave, it was considered “closed” and a new wave was released.

Wave-Based Issues

Soon the shortcomings of wave-based processing became evident. At the beginning and middle of waves, the operation was very efficient. However, once the tail of the wave was reached, there was a severe drop in productivity.

Complex algorithms were developed to minimize the negative effects of wave-based transitions. Stragglers became the bad guys in this process because pickers who completed their portion of a wave ahead of others had to wait for the stragglers before continuing in the next wave. Massive and expensive buffers were added to wave-based designs to reduce idle times of pickers waiting for stragglers. Sophisticated pre-planning tools were developed to balance work across pick zones for them to complete waves in synch. Regardless of all these efforts, low-productivity wave transitions did not go away.

Wave-based Picking has its Advantages, but...

The advantages of picking orders in batches are undeniable: Pickers spend less time walking and more time picking when multiple orders are grouped and picked together. On the other hand, wave-based systems self impose the constraint that a batch must be completed before a new batch can be started. In reality, unexpected events cause a wide range of batch completion times, resulting in low productivity for workers who finish early.

How Does Waveless Processing Result in Higher Worker Productivity?

Waveless Picking Can Optimize Your People & Assets

Waveless processing is batch picking without the artificial self-imposed constraints of wave picking. Instead of releasing orders in static batches that must be completed before a new one is released, waveless processing dynamically adds individual orders to a revolving batch. Every time that an order in the batch is completed, a new order is added to replace the one just completed. In real-time, the waveless system adds the picking transactions for the new order to the existing picking transactions of all the required pickers.

There is no lost productivity from wave transitions while waiting for the stragglers. Work flow is evenly paced through dynamic assignment, allowing and planning for the variations in task completion time. Further, workers can be re-assigned to zones that fall behind, allowing a more even completion time between zones. Thus, the high efficiency achieved in the middle of a traditional "wave" is maintained continuously in waveless processing.

Picking productivity is higher with waveless processing for two primary reasons:

- 1) Waveless processing eliminates work starvation periods for the pickers created by wave transitions — pickers are not working faster, they are working consistently
- 2) Waveless processing reduces pickers' walking

In wave-based systems, pickers go around their entire picking loop in every wave. Their loops have a start point and an end point. In waveless processing, an order starts as soon as the previous order for the same destination finishes. In a direct-to-consumer operation based on a unit sorter, if the order profile has an average of 3 lines per order, orders would expect to complete in three quarters of the loop. In picking walking, this translates to 25% less walking. Adding further intelligence to dynamic task assignment based on current picker location can reduce walking time even further.

What Benefits Can I Expect by Implementing Waveless Processing?

1) Higher Throughput Capacity

Reclaim the wasted capacity between waves by eliminating the low-productivity wave transition periods. Actual applications that have switched from wave-based processing to waveless processing have seen throughput capacity increases of up to 35%.

2) Lower Initial Investment in New Projects

Distribution centers designed for waveless operation require less initial investment than those designed to operate with waves for 3 primary reasons:

- Without the low-productivity wave transitions, facility utilization is higher in waveless systems. The same actual throughput can be achieved with smaller facilities.
- With waveless processing the need for buffers required by wave-based processes is eliminated or greatly reduced.
- In unit sortation-based designs working with waves, most orders seize chutes at the beginning of a wave, while most orders do not complete until the tail of the wave. The requirement of chutes for incomplete orders is not leveled through the wave, resulting in a large requirement peak mid-wave. Waveless processing levels the requirements for chutes holding incomplete orders, allowing equivalent waveless designs with much fewer chutes than wave-based designs.

3) Lesser Straggler Impact

In wave-based processes stragglers affect entire waves, creating low productivity periods at wave tails and potentially bringing operations to a full stop. In waveless processes, stragglers affect only the order they belong to and all other destinations can continue working without any delay.

4) Better Handling of Last Minute Orders

In wave-based processes, emergency orders are often held to be assigned to a forthcoming wave where they will have a minimal impact on productivity. With waveless processing, the emergency order can be the next released order (as the highest priority order to process) without any impact on the productivity of the operation.

5) Enhanced Customer Service through Better Shipping Deadline Management

The real-time nature of waveless processing allows the distribution center to better manage shipping deadlines. If a retail distribution center is currently processing 50 stores and realizes that the next 30 stores to complete are at risk of missing their deadline, management can place a hold on the other stores to speed up the processing of the at risk stores. This hold can be cancelled when the situation is rectified. This is an option that wave-based systems do not offer. In a wave-based system, once a wave starts, that wave must complete before the next can begin.

Where Do I Start to Create a Waveless Processing Program?

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The principles of waveless processing are easy to understand and the risks of implementing waveless processing are low. Its implementation, on the other hand, is not trivial.

Issues like labor balancing, pick zone synchronization, real-time replenishment, and label requirements need to be fully analyzed and resolved during the design phase. Fortunately, technologies are now available to address these issues.

Additional investment in equipment is minimal in most cases, if any. The bulk of the change revolves around software systems. Highly configurable Warehouse Control System (WCS) tools that are compatible with most existing software packages make the transition easier.

Switching to real-time waveless processing requires software and process change. A proven path for a smooth and risk-minimized implementation utilizes WCS modules that can progressively add the required features in several steps.

Fortna, for example, has developed a WCS that allows this phased implementation strategy. It is not necessary to wait to have all the features implemented to start achieving the benefits. Fortna has the tools, skills and expertise to assist you during this implementation, sharing knowledge gained from past experiences to maximize the benefits of each stage of the implementation. Fortna approaches these projects as a partnership with you, and starts with an implementation plan customized for business results and focusing on the specific requirements of your operation.

In Conclusion...

Waveless processing offers multiple financial and operational advantages over traditional wave-based systems. It is a proven means for optimizing order selection by dynamically controlling tasks and anticipating unexpected events. Pickers work at a more even pace, and the system is able to manage and resolve unexpected events in real-time. Tools and expertise exist today to analyze and create an effective waveless system for you. Waveless processing will positively impact your bottom line by providing higher throughput, increased overall labor optimization, and enhanced customer service.

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