White Paper

6 Steps to Optimized Order Fulfillment

kardex

Introduction

Customer demand for fast order delivery has increased exponentially since the start of the COVID-19 pandemic. Even now, with COVID relenting, customers' expectations for fast, accurate, and on time delivery remain. Manufacturers and distributors are focused on improving fulfillment processes to meet these expectations without adding labor costs.

6 steps to optimized order fulfillment

This white paper proposes 6 steps designed to help warehouse and distribution center managers establish the foundation of an optimized order fulfillment system that enhances both productivity and accuracy.

The 6 steps include

1. Classify inventory
2. Match SKUs with technology
3. Check the fulfillment process
4. Slot your inventory
5. Map processes and workflows
6. Integrate systems to maximize visibility

Increase worker efficiency and productivity

Improve order accuracy to 99.9%

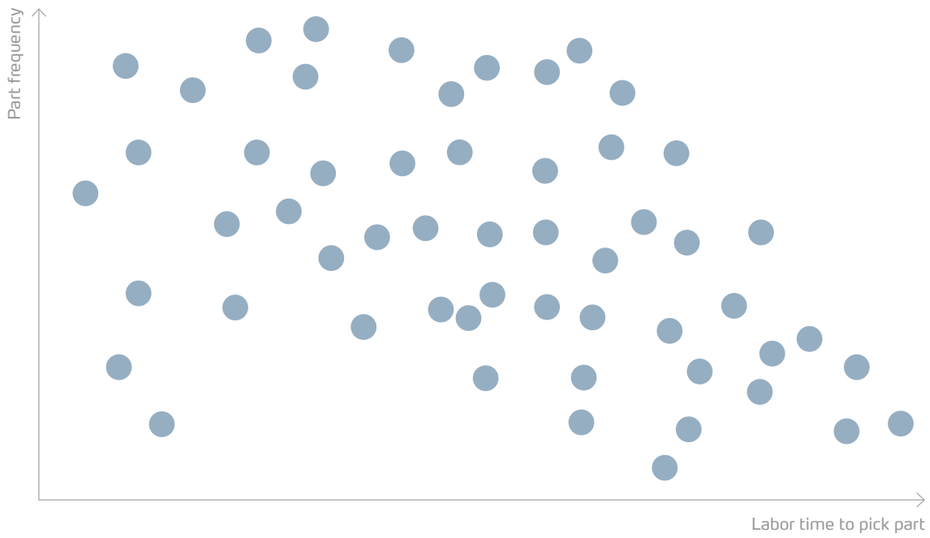
Step 1:
Classify inventory

Exactly how a facility's inventory should be categorized depends on many factors, including the types of products and picking sizes common to that business. At the highest level, classify inventory based on picking size (by pallet, case or piece) and by frequency of picking/velocity of movement (fast, medium, slow or very slow).

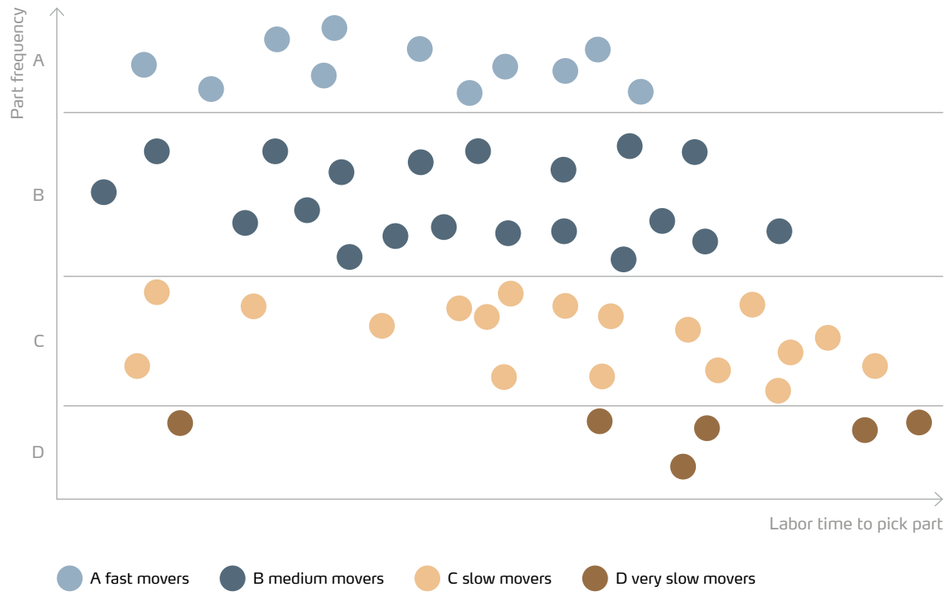
During the classification process, certain shared attributes will appear. For example, when comparing pick velocity, group fast, medium, slow and very slow movers together. By cross-referencing the time associated with picking each of these parts against their order frequency, a cost-to-pick graph can be created.

The most dramatic improvements in order fulfillment optimization will come from applying the Pareto Principle (also known as the 80/20 rule). For example, 80% of a warehouse's picks frequently come from 20% of its inventory (the fast movers).

Plot part attributes – costs per pick

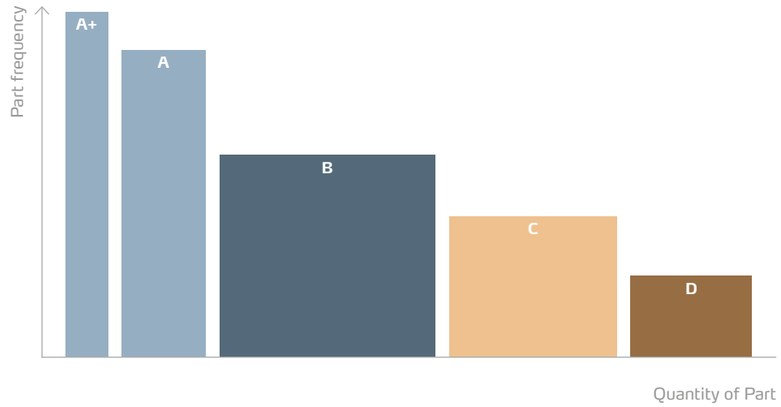


Classify inventory



Most companies focus their picking optimization efforts solely on their fast movers—which comprise just 20% of their inventory. Applying the Pareto Principle, however, tremendous gains in efficiency, throughput and cost savings remain to be exploited in medium and slow movers, which likely represent nearly 80% of a facility's floor space and picking labor efforts.

Classify inventory

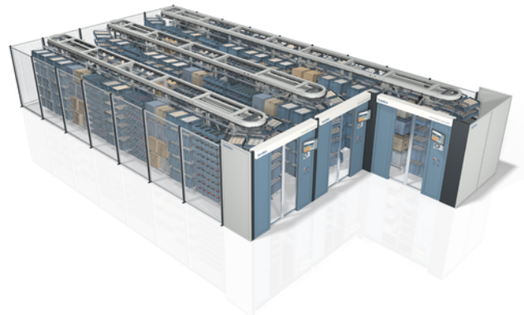


Step 2: Match SKUs with technology

After concluding Step 1, it should now be clear that all SKUs are not created equal. They vary in size, weight, order popularity and in a host of other ways. Each SKU classification should be supported by the right technology for effective part handling. These technologies include:

Horizontal Carousel Modules (HCMs)

Consist of bins mounted on an oval track that rotate horizontally to deliver storage locations to an operator. These systems eliminate unproductive travel and search time by delivering the product to an operator.



Learn more about the HCM

Vertical Lift Modules (VLMs)

This enclosed system consists of two columns of trays with an inserter/extractor in the center. Stored trays are automatically retrieved and delivered to the operator at a waist-high pick window, eliminating travel and SKU search time.

Learn more about the VLM

Vertical Buffer Modules (VBMs)

In the middle of a multi-segment shelving system is an aisle, where a moveable mast with a telescopic gripper operates. The control unit sets the gripper in motion picking a bin and transporting it to a picking station.

Learn more about the VBM

Vertical Carousel Modules (VCMs)

Comprised of a series of shelves that rotate around a track, these automated storage and retrieval systems deliver stored items safely and quickly to an ergonomic work counter, eliminating walk and item search time.

Learn more about the VCM

Storage methods

- **Pallet rack** – Single or multi-level storage that supports high stacking of single items or palletized loads.
- **Shelving** – Storage for non-palletized loads made up of upright posts, formed steel sheet panels as horizontal shelves, and back and end braces or sheet steel back and side panels for support.
- **Drawer systems** – Storage drawers held in cabinets or within shelving systems that are ideal for smaller items.
- **Pick modules** – Gravity-based flow storage of pallets or cartons that use elevated rails and wheels or rollers within a rack-supported structure. Loaded from behind, contents move toward the pick face by the force of gravity for first-in/first-out (FIFO) inventory management.

Which technology is best?

Each of these technologies offers different benefits, including the footprint it requires, how easily it can be expanded, and the levels of throughput, productivity, accuracy, inventory control and ergonomics it supports, as shown in Table 1.

Storage system comparison ranked by their benefits

Benefits	Drawer systems	Shelving	Pallet rack	Pick modules	HCMs	VCMs	VLMs	VBMs
Space/Footprint	3	1	2	2	4	5	5	4
Throughput	1	1	3	2	5	3	4	5
Productivity	1	1	1	2	5	3	4	5
Accuracy	2	2	3	2	5	4	5	5
Inventory Control	3	1	3	3	3	4	4	5
Ergonomics	1	1	1	2	4	5	5	5
Expandability	5	5	5	4	4	3	4	4

Rankings: 5=Best, 4= Great, 3=Better, 2= Good, 1=Fair

By correlating the specific benefits of each type of technology with the inventory classified in Step 1, it should be relatively easy to determine which types of technologies are most appropriate to meet the picking needs of each inventory category. As an example, using pick velocity (fast, medium, slow and very slow), the ideal storage method for each type of pick size (pallet, case or piece) typically breaks down as follows:

Storage method by pick size

Pallet picking

- ✓ Pallet rack (fast and medium movers)
- ✓ Pallet Flow rack (fast and medium movers)

Case picking

- ✓ Carton Flow rack (fast movers)
- ✓ Horizontal Carousel Modules (medium and slow movers)
- ✓ Pallet rack (slow and very slow movers)
- ✓ Shelving (slow and very slow movers)

Broken case/eaches picking

- ✓ Carton Flow rack (fast movers)
- ✓ Horizontal Carousel Modules (fast and medium movers)
- ✓ Vertical Carousel Modules (medium movers)
- ✓ Vertical Lift Modules (slow movers)
- ✓ Vertical Buffer Modules (slow and medium movers)
- ✓ Shelving (very slow movers)
- ✓ Drawer storage (very slow movers)

Step 3: Check the fulfillment process

Now that it's been determined which inventory classification goes into which technology, consider the minor enhancements that can improve picking each category. This includes adding pick-to-light technology, upgrading software, adding barcode scanning, integrating a hoist for heavy lifting, etc.

Detail specifically how each inventory category will be received, inventoried, stored and retrieved from the selected technology and identify small adjustments that can streamline the process.

What manual steps can be cut to accelerate picking?

Can storage locations be better utilized?

How can items be delivered or located faster?

Can a technology addition increase accuracy?

Is inventory available at an ergonomic position?

Step 4: Slot your inventory

The slotting process determines the best place to store each SKU within the technology selected. Slotting typically seeks to achieve maximum efficiency and storage capacity. Common goals can include:

- Improve space utilization
- Minimize handling of parts
- Increase productivity
- Balance workflow
- Improve inventory and accuracy
- Enhance worker ergonomics
- Minimize travel time to product
- Reduce search time

Slotting is widely recognized as a "thankless job" because it requires inventory data. Lots of data – at least a full year's worth, including any seasonality and projected inventory growth. For companies with a warehouse management system (WMS), slotting software or functionality is often included or can be added-on as an additional module. For companies without a WMS, a standalone slotting software application can be purchased, or, in certain cases, a spreadsheet program like Excel may be all that's needed.

Collected inventory data for slotting should include:

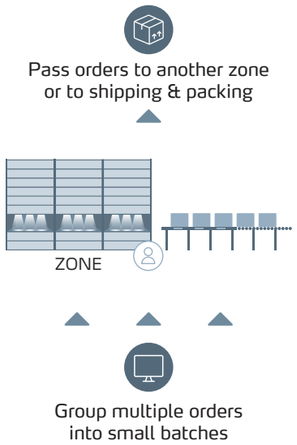
- ✓ SKU picking methodology
- ✓ Number of pallets, cartons and broken case eaches of each SKU
- ✓ SKU hits (the number of times a product is picked)
- ✓ SKU numbers and descriptions
- ✓ Pick quantities (number of SKUs picked per order)
- ✓ SKUs that are frequently picked together
- ✓ SKU sizes and weights
- ✓ Total SKU quantity, reorder point and reorder quantity

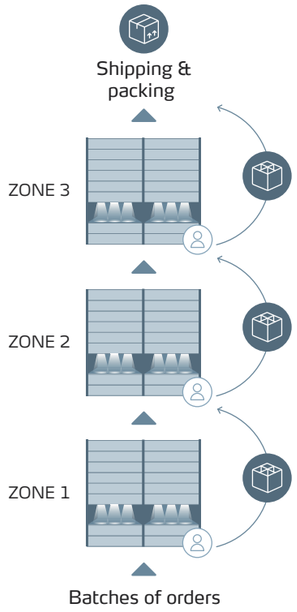
Step 5: Map process and workflows

Now that inventory has been slotted, it's important to look for potential alternative picking methodologies for further enhancing order fulfillment workflow. Here are some easy to implement picking strategies to consider.

Batch picking

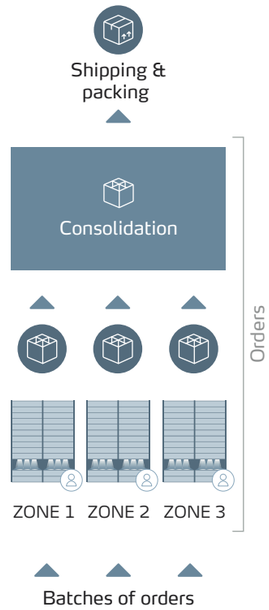
Grouping multiple orders into small batches, typically including 4 to 12 orders. Order pickers pick all orders in the batch at the same time, working from a consolidated pick list.





Pick and pass fulfillment

Items for an order are picked from one zone into a tote. The tote is sent to the next zone for picking by either conveyor or manual delivery until the order picked is complete and ready to be sent to packing and shipping.

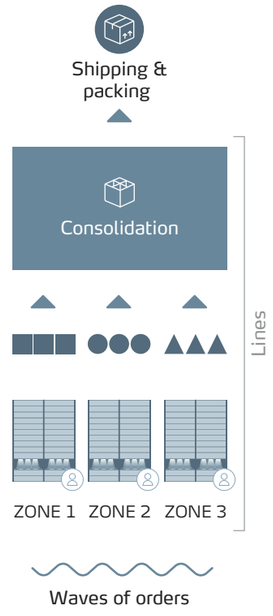


Parallel picking

Items for an order are picked from all zones in parallel. Partial orders are sent to a consolidation area where it awaits the arrival of the rest of the parts needed for that order.

Wave picking

Order lines are picked from individual zones and sent to a consolidation area. These order lines are then combined into discrete orders and sent to packing and shipping.



Step 6: Integrate systems

To the extent possible, integrate any business systems already in place—such as enterprise resource planning (ERP), warehouse management systems (WMS), warehouse control systems (WCS) and workforce performance management (WPM) or labor management systems (LMS)—with the slotting software to better streamline picking processes and inventory management. This can result in extended order cut-off times and increase visibility to key business partners, including suppliers and shippers.

Additionally, this integration provides the data needed for routine reslotting to accommodate changes in inventory, special promotions or seasonal peaks. Integrated business systems can also aggregate information to create single reports from multiple systems with the click of a mouse.

- Extend order cut-off times
- Increase inventory visibility
- Enable ongoing routine reslotting
- Cross system reporting

Slotting can also be used to eliminate bottlenecks in work zones and throughout a facility. Although it might appear on paper to be a good idea to consolidate all the fast movers in a single aisle in one pick zone, in practice it might produce time-wasting congestion. Instead, it might be wiser to spread the fast movers throughout the facility, not only for improved throughput but also to maximize usage of low activity areas, or “dead zones.”

In conclusion

By implementing automated storage and retrieval systems—such as HCMs, VCMs, VLMs and VBMs—to handle fast, medium and slow movers as part of an overall order fulfillment optimization process, a warehouse or distribution center can achieve tremendous gains in throughput while simultaneously reducing costs associated with processing customer orders.

Customer reference – Mazak Corp

Same-day shipping of CNC parts from OEM gains 95% increase in storage capacity and 99.67% jump in accuracy with inventory profiling, VLMs, and pick-and-pass techniques.

Mazak Corp.'s 13.716 m² parts center in Florence, Kentucky is home to an inventory of more than $65 million in parts. More than 46,000 different SKUs, including ball screws, linear guides, motors, spindles and more, are maintained to stock and handle parts distribution for every Mazak CNC sold in the Western Hemisphere.

As part orders typically arrive in the afternoon and required same-day shipping; nine workers struggled to fill 1,200 orders in only six hours. Since it was not feasible to increase labor, Mazak elected to automate the parts center and transition to a pick-and-pass batch picking order fulfillment process. Their complete system includes 13 Kardex VLMs grouped in four zones (called pods). It also incorporates barcode scanning, pick-to-light, inventory management software, and computerized order monitoring and tracking.

80% increase in productivity

95% increase in storage capacity

99% increase in accuracy