

E-commerce Order Fulfillment: 6 Steps to Optimization

Is it time to change the order fulfillment process to accommodate the demands of your e-commerce customers?



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Introduction

Filling orders can often be “the most labor-intensive and costly activity for warehouses, where the cost of order picking is estimated to be as much as 55% of the total operating expenses.”¹

This is typically the case in traditional, labor-operated warehouses using pallets, cases, and pieces. In fact, a picker’s travel time between receiving, picking, and transporting items to shipping can account for as much as 60-65%² of a facility’s direct labor activities.

With customer demand escalating faster than ever before, e-commerce retailers and manufacturers need to find more effective, less expensive intralogistics without adding more personnel. E-commerce warehouse space utilization and optimization must become priorities.

The Six Steps suggested in this White Paper include:

1. Categorize Inventory
2. Match Inventory to the Storage Tool
3. Double Check the Fulfillment Process
4. Slot Inventory within Storage Tool
5. Map Processes and Workflow
6. Integrate Business Systems

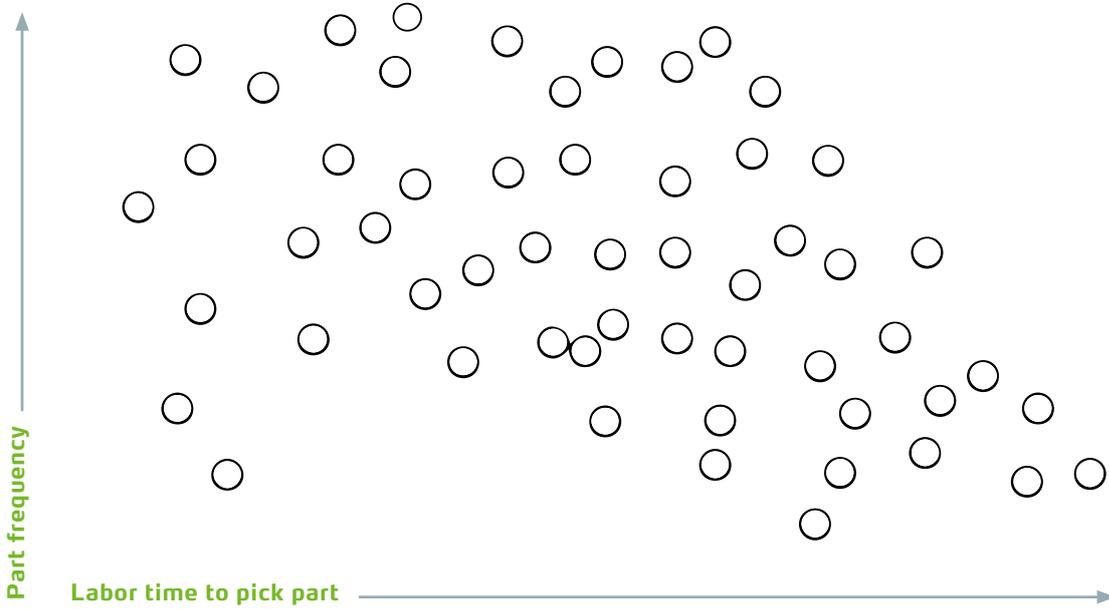
Step 1: Categorize Inventory

Consider two main factors when organizing inventory:

- Picking Size (by pallet, case or piece)
- Picking Frequency (fast, medium, slow or very slow)

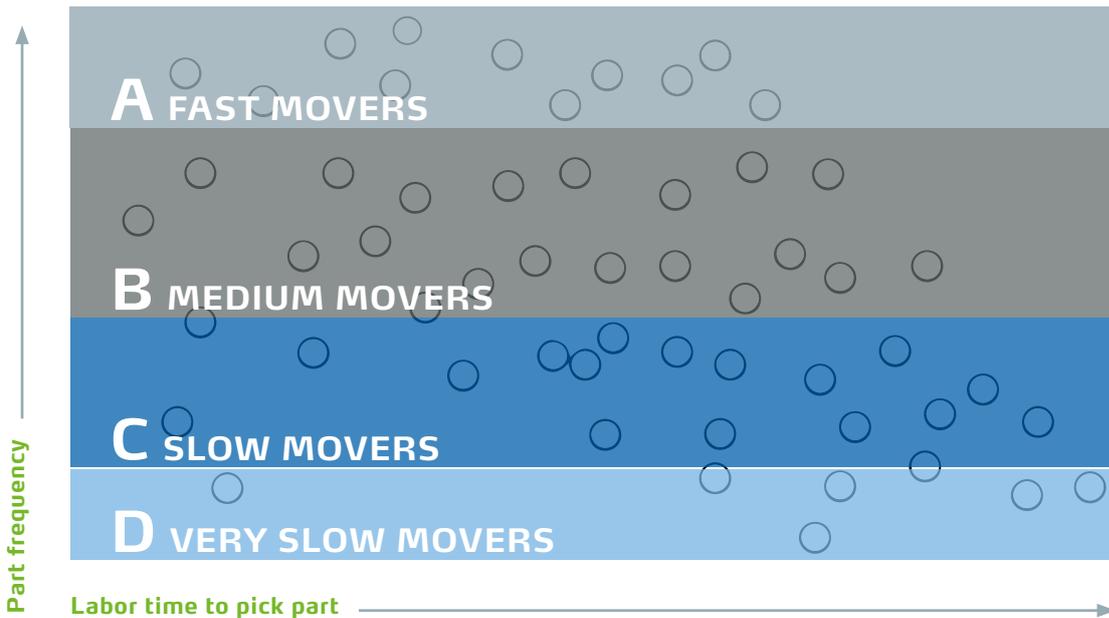
A cost-to-pick graph may be created by cross-referencing the various picking attributes.

Plot part attributes - costs per pick



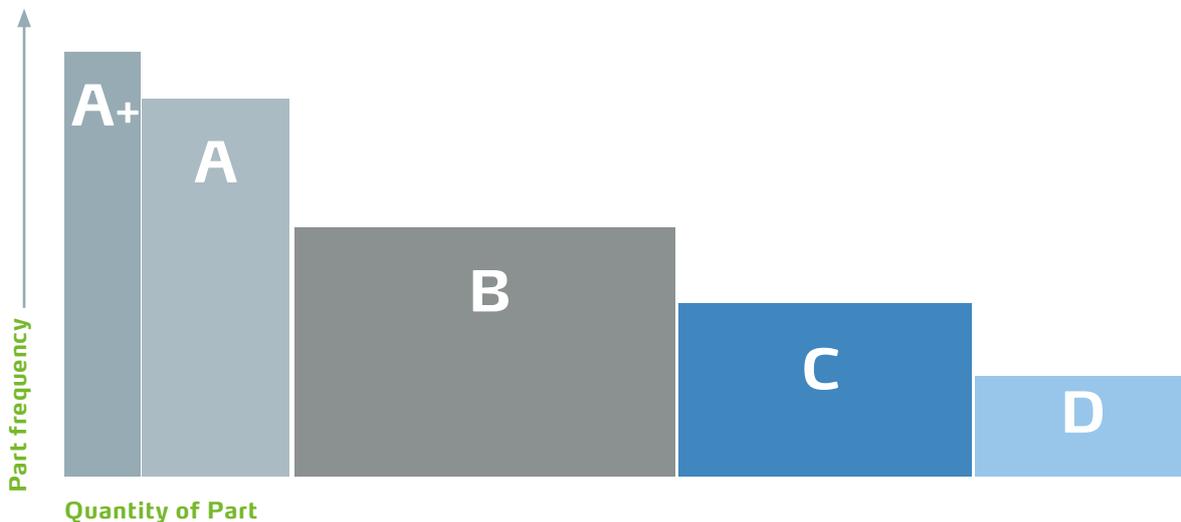
The Pareto Principle will allow dramatic improvement to the order fulfillment process by applying solutions to product categories vs. just a few SKUs. Also known as the 80/20 rule, this principle illustrates that roughly 80 percent of effects come from 20 percent of the causes.

Classify inventory



Or, otherwise stated, “most things in life (effort, reward, output) are not distributed evenly; some contribute more than others.”³

For example, 80 percent of a company’s sales often come from 20 percent of its customers. Following this line of thinking, it may be interpreted that 80 percent of a warehouse’s picks frequently come from 20 percent of its inventory (the fast movers). Most companies focus their picking optimization efforts solely on fast movers, which comprise just 20 percent of their inventory. It’s important to remember that medium and slow movers (which likely represent nearly 80 percent of the floor space and picking labor demands) can provide tremendous gains in efficiency, throughput, and cost savings.



Step 2: Match Inventory to Storage Tools

We’ve seen how all SKUs are not equal. They vary in size, weight, picking frequency, and more. The material handling industry recognizes these differences and supports storing them with a variety of tools and equipment.

These include:

- **Pallet Rack:** Single or multi-level storage that supports high stacking of single items or palletized loads.⁴
- **Shelving:** Storage for non-palletized loads made up of upright posts, formed steel sheet panels as horizontal shelves, and end and back braces or sheet steel back and side panels for support.⁵

- **Drawer Systems:** Storage drawers held in cabinets or within shelving systems that are ideal for smaller items. ⁶
- **Pick Modules:** Gravity-based flow storage of pallets⁷ or cartons⁸ 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.
- **Horizontal Carousels:** Bins mounted on an oval track rotate horizontally to delivery storage locations to an operator. These automated storage and retrieval systems eliminate unproductive travel and search time by sending the product to an operator.⁹
- **Vertical Carousels:** Comprised of a series of shelves that rotate around a track (similar to a Ferris wheel), these automated storage and retrieval systems deliver stored items safely and quickly to an ergonomically positioned work counter at the operator’s command. This eliminates walk and item search time.¹⁰
- **Vertical Lift Modules (VLMs):** An enclosed automated storage and retrieval system that consists of two columns of trays with an inserter/extractor in the center. The inserter/extractor automatically locates and retrieves stored trays from both columns and presents them to the operator at a waist-high pick window, eliminating travel and SKU search time.¹¹
- **Vertical Buffer Modules (VBM):** 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.

Storage System Comparison Ranked by Their Benefits

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

Benefits	Drawer Systems	Shelving	Pallet Rack	Pick Modules	Horizontal Carousel	Vertical Carousel	VLM	VBM
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

By correlating the specific benefits of each type of storage available with the inventory categorized in Step 1, it should be relatively easy to determine which types of methods are most appropriate to meet the picking needs of each category. Using pick frequency (fast, medium, slow and very slow) again as an example, 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 Carousels (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 Carousels (fast and medium movers)
- Vertical Carousels (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: Double Check the Fulfillment Process

Now that it's clear which inventory matches which storage tool, consider further picking enhancements. Standard options include adding pick-to-light technology, upgrading the software management system, using bar code scanning, and integrating a hoist for heavy lifting.

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

- Productivity: What manual steps can be cut to make the order picker faster?
- Space Savings: Can existing storage locations be better utilized?
- Throughput: How can order pickers accelerate identifying and delivering the product?
- Accuracy: Can technology minimize errors?
- Ergonomics: Are items delivered to the operator's "golden zone" (waist-high)?

Step 4: Slot Inventory within the Storage Tool

Slotting determines the most efficient place to store SKUs. Common goals include:

- Optimize Warehouse Space
- Minimize Handling Of Parts
- Increase Productivity
- Balance Workflow
- Improve Inventory Accuracy
- Enhance Worker Ergonomics
- Minimize Travel Time To Product
- Reduce Search Time

Slotting, however, is widely recognized as a "thankless job."¹² That's because slotting 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 as an additional module. For companies without a WMS, a stand-alone slotting software application may be purchased, or, in certain cases, a spreadsheet program like Excel may be all that's needed. Alternatively, a third-party consultant may be engaged to perform the data analysis and make slotting recommendations.¹³

Collecting inventory data should encompass:

- SKU picking methodology
- The number of pallets, cartons and broken cases for each SKU
- SKU hits (how many times is a product picked)
- SKU numbers and descriptions
- Pick quantities (the number of SKUs picked per order)
- SKUs frequently picked together
- SKU sizes and weights
- Total SKU quantity, reorder point and reorder quantity

Armed with inventory data that was previously classified by velocity, it's time to create a slotting plan. First, slot each SKU in the proper equipment (outlined in Step 2) based on pick velocity. This means fast and medium movers should be located in the most accessible areas, while slow and very slow movers should be stored in areas that are less accessible, or farther away

Then, determine where within each storage equipment or technology, each SKU should be placed. Certain constraints may factor into the slotting plan. This is where the information about SKU size and weight particularly comes into play. For example, if the product's dimensions or volume make it impossible to store it in the ideal equipment. Also consider how the product is accessed (by hand, ladder, fork truck, or scissor lift) and whether there are opportunities to group SKUs that are commonly picked together in close physical proximity, known as kitting.

For medium movers, a general rule of thumb is to maintain a twenty day supply. Less than a twenty-day supply requires excessive time for replenishment. More than a twenty-day supply indicates space could be better utilized for other SKUs.

Step 5: Map Processes and Workflow

Once the inventory has been slotted, it's essential to look for potential alternative picking methodologies to further enhance the order fulfillment workflow..

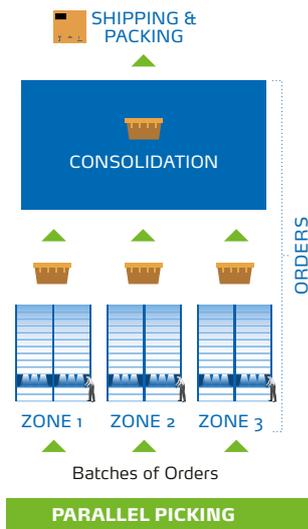
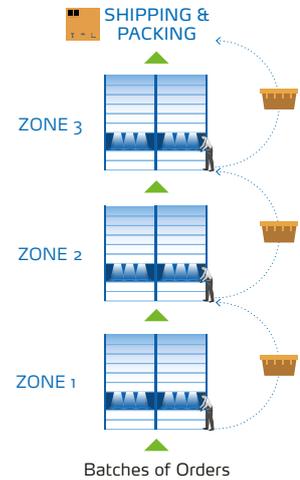
These include:

Batch Picking: Group multiple orders into small batches, typically 4 to 12 orders. Order pickers pick all orders in the batch at the same time, working from a consolidated Pick List.

“Batch picking systems may use extensive logic programmed to consolidate orders with the same items. In operations with low picks per order, batch picking can greatly reduce travel time by allowing the picker to make additional picks while in the same area.”¹⁴

Pick and Pass Fulfillment: Break up the picking area into individual sections, or zones.

Order pickers are assigned a unique zone and only pick items from their designated area. Orders move from one zone to another, giving the method the name “pick and pass.” This approach “is most effective in large operations with substantial SKUs and orders, and low to moderate picks per order. Separate zones also provide special picking techniques such as having automated material handling systems in one zone and manual handling in another.”¹⁵



Parallel Picking: As with “pick and pass”, the warehouse is separated into multiple areas or zones, but here all zones are picked simultaneously. The items from each zone are matched, or consolidated to complete the order. “Operations with a high total number of SKUs and moderate to high picks per order may benefit from parallel picking.”¹⁶

It is wise to use slotting to eliminate bottlenecks in the work zone and facility. Although on paper it might seem a good idea to consolidate all the fast movers in a single-aisle into one pick zone, it may instead cause congestion.

Step 6: Integrate Business Systems

As much as possible, it's best to integrate existing business systems with the slotting software. For example, it can incorporate enterprise resource planning (ERP), warehouse management systems (WMS), warehouse control systems (WCS), and workforce performance management (WPM) or labor management systems (LMS).

This will streamline the picking processes and inventory management: the result is continuous and error-free communication, broader inventory visibility, optimized order fulfillment and inventory management time savings (as outlined above in Step 4).

It can also result in extended order cut-off times, pleasing key business partners, suppliers, and shippers.

How it Works

Integrated business systems aggregate information to create a single report with the click of a mouse, avoiding manual retrieval and assembly of relevant datasets. It can facilitate routine reslotting as needed to accommodate changes in inventory, special promotions, or seasonal peaks.

A labor management system can calculate the cost of the labor associated with the slotting plan based on the labor standards used for that facility. That process provides an accurate cost/benefit analysis before deciding whether the gains from reslotting are worth the effort. If a warehouse accepts the slotting plan, the warehouse management system executes the plan by interweaving the reslotting tasks with other putaway, picking, and replenishment tasks that have to be performed during a shift.¹⁷

In Conclusion

A warehouse or distribution center can gain significant throughput and reduce costs by:

- Pairing an automated storage and retrieval system (e.g., horizontal carousel, vertical carousel, VLM and VBM) with an automated software management system
- Incorporating inventory management best practices to handle fast, medium and slow movers.

To learn more about implementing a results-oriented order fulfillment process, contact your Kardex Remstar representative today.

Case Study - TSC Chooses Kardex Remstar Megamat RS Vertical Carousel for Jewelry Distribution

A 54% labor decrease and a 600% productivity increase are the results of three Megamat RS Vertical Carousels with inventory management software.

Headquartered in Mississauga, TSC is a leading interactive, multi-channel retailer, offering a vast assortment of exclusive products and top brand names to customers throughout Canada. Over 15,000 quality products are available to customers 24-7 with the click of a button or quick phone call.



TSC ships roughly 10,000 orders a day via its 300,000 square foot warehouse equipped with the latest material handling technology.

Three, 29-foot Kardex Remstar Megamat RS Vertical Carousels combined with Power Pick Global (PPG) inventory management software manage the jewelry and coin inventory. Since the transition to automated vertical carousels, over 8,000 jewelry and coin SKUs are managed in 75% less floor space. With the implementation of the carousels and moving returns handling to another department, jewelry distribution requires ten people; down from 22 previously needed to receive, pick, pack, ship, and process returns. Further, throughput has increased from a previous average of 40 lines per hour per person to an average of 165 lines per hour per person, now a standard facility KPI.

At peak times, the system handles 240 lines per hour per person. Meaning jewelry distribution now requires 54% less total labor and has increased productivity by 600%.

The process begins when the operator scans a paper order followed by a tote license plate, placing the order paper into the tote cell - this ties the order to the cell location. Each tote has 12 compartments, and there are ten totes in a batch – allowing the operator to fill 120 orders simultaneously. Once each order is assigned a tote location, the operator is ready to pick.

As directed by PPG, the Megamat RS Vertical Carousels deliver the required SKUs to the accumulator (TIC) located at the work counter. The operator picks the correct amount and turns to the batch of 120 orders to distribute them.

Above each batch position is a display monitor that shows the operator the exact tote cell to place the item, and the quantity required. As each SKU goes into the tote cell, the operator confirms the put. Once all of the SKUs are distributed among the orders, the operator turns back to the vertical carousels and picks the next item. This allows the vertical carousels always to work one step ahead of the operator, minimizing operator wait time. Upon completion, orders move to the shipping area where they are checked for accuracy by scanning the paper order and scanning the item(s) within the compartment.

Returns are a challenge for any distribution operation, but especially retail. Jewelry sees an average of 2,500 pieces returned weekly. Returns start as a manual process: all jewelry must be thoroughly inspected and cleaned.

Once this process is completed and the item is deemed acceptable to return to inventory by the returns processing center, it goes back to jewelry. Upon receipt, the operator processes each return individually, assigning a storage location within the Megamat RS Vertical Carousel using the PPG software.

Case Study- Efficient eCommerce for Med24



Implementing six Megamat RS Vertical Carousels integrated with Power Pick Global inventory management software and a color picking solution has reduced order picking time by 60% with 55% less labor in 80% less floor space.

Med24 is a Danish e-commerce company focused on health, beauty, and medical needs. It was founded in 2005 in Løkken and specializes in wellbeing products and is approved by the Danish Medicines Agency. It aims to give customers an excellent shopping experience by offering low prices, fast delivery, and the broadest selection of products in the Nordic countries. Growing over 400 % in the past three years and with more than 10,000 products in stock, the company uses automated storage and retrieval systems from Kardex Remstar to guarantee cost efficiency, maximum speed, and customer satisfaction.

Med24 employs 50 people, including pharmacy assistants, dieticians, and beauticians who give professional advice to their customers. Additionally, 25 people work in the 1,200 m² warehouse, handling orders and incoming goods.

During a typical working day, the Med24 picking team handles about 4,500 order lines (with approx. 1,500 orders and three lines per order). With the number of articles steadily growing by 15 % annually, inventory reached over 10,000 items, and the warehouse became too small to store, pick, and pack the products in stock efficiently. The company needed to find ways to optimize their floor space, keep their productivity up, and delivery times down. To stay ahead of the game, they started looking for solutions that would use their square meters in the best possible manner.

In order to increase the warehouse capacity of Med24, Kardex Remstar installed six Megamat RS 350 Vertical Carousels. Three months later, they installed three more. "This kind of scalability is essential to us. Knowing that we can add machines through a smooth process gives us great flexibility as we continue to grow," says Nils K. Træholt, owner and director at Med24. Thanks to the automated storage system, Med24 have optimized their floor space by storing 90 % of their products (9,000 articles) in a 200 m² picking area. The warehouse management software Power Pick Global with the color picking option has allowed them to increase their efficiency, picking up to 50 orders simultaneously and reducing picking time by 60 %. The ease of use has also contributed to quick training of new staff, reaching full picking speed after only 2-3 hours on the job (compared to 2-3 months). "The Megamat RS 350 has proven to be the perfect storage solution for us. Excellent space utilization and high efficiency have made our business much more competitive," Nils K. Træholt concludes.

About Kardex Remstar

Kardex Remstar, LLC, a company of the Kardex Group, is a leading provider of automated storage and retrieval systems for manufacturing, distribution, warehousing, offices and institutions. For information about the company's dynamic storage solutions, visit www.kardexremstar.com.

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