D.C. Operations - Shipping

The process of fulfilling orders in a distribution center is usually referred to as shipping. The shipping process may be viewed as a series of activities, which are performed to retrieve items from storage, group those items into shipments and prepare them for transport. We often refer to theses activities as picking, consolidation or assembly, packing, and final shipment.

Order Pick and Batch Pick

Essentially, there are two fundamental ways in which orders are processed in most distribution centers. In the first method, orders are processed as a single unit. This is often referred to as order picking. In the second method, orders are grouped into batches of common items to be shipped and these items are picked at the same time regardless of their source order and then sorted and assembled back into individual orders prior to those orders being released to the transportation system. This is often referred to as batch picking. Both methods have their advantages and their disadvantages.

Order picking keeps the components of the order together as a unit as they move through the distribution center and, in general, no sortation or assembly is required prior to packaging and final shipment. In most cases a single individual is responsible for retrieving and processing the items to fulfill the order. Because the order always has a distinct identity and is maintained as a unit, it is easier to track its work in process status. Order expediting is also easier because the order can be isolated from other orders for processing. Additionally, the order picker can determine that the order is complete and accurate as part of their picking assignment. The main disadvantage to order picking is its inherent inefficiency. Depending on the size and makeup of an order, significant travel around the distribution center may be required in the retrieval activity. Parts of the order may be geographically spread out in different areas of the facility. Additionally, because the same items usually show up on many different orders, the same storage location will be visited many times by individual order pickers. This creates a wasteful activity usually referred to as excessive location trips, which results in costly nonproductive warehouse travel time. Additionally, because orders may vary in their number of component items and quantities and order picking does not encourage distribution of labor to support the picking activity, it usually promotes unbalanced resource utilization. Some workers are very busy while others are underutilized. This is wasteful and bad for morale.

Batch picking of orders eliminates excessive location trips by allowing all the units of a common item needed to satisfy a large number of orders to be retrieved in a single or reduced number of common location visits. Warehouse travel time is greatly reduced. Additionally, the workload of picking a large number of orders can be easily divided across a group of resources to insure more balanced resource utilization. But unlike order picking, a single order loses its identity during the batch picking activity and is not easily expedited separate from the entire batch of orders. Also, because a single individual is not directly responsible for the picking of each order, the task of determining when the order is completely picked and ready for final shipment cannot be performed as part of the picking activity. It must be done after order sortation during the assembly activity. Also, although order picking is usually inefficient during the retrieval activity, batch picking includes two additional activities, order sortation and order assembly. Sortation and assembly can be automated. This is often done by means of some form of automated materials handling, usually conveyors and a sortation system. In high volume situations the significant capital investment required in these types of automation systems could be cost justified. Lower volume operations may not economically support this capital-intensive approach. In these situations, batch picking may still be the most efficient picking method and manual sort and assembly techniques can be applied.

Non-Material Handling Assisted Batch Picking

Let's examine batch picking and its associated requirements for implementation without the introduction of automated materials handling. At this point in our discussion we will assume that batch picking is the most appropriate method for our distribution operation. In the final summary

of this article we will discuss the characteristics of our order profiles, which would validate or invalidate that assumption.

In order to implement batch picking we will be required to manipulate our orders so that we can create batches. As previously discussed a batch is a collection of orders that will be organized by item so that common items required to satisfy those orders can be retrieved in one or a reduced number of common location visits. The number of orders that will be grouped to create a batch and the number of different batches that we will create are decisions that must be addressed based on customer requirements and order profiles. For the purposes of this discussion we will not attempt to address batch size or batch frequencies except to say that in general we must be able to support batches created from varying numbers of orders and we must be able to support multiple batches during a given work period. Let's make the following assumptions for our purposes of discussion. First we will assume that different orders will require different transportation service levels. Some orders will require overnight express delivery, other orders will require two day express services, and some orders will be standard multi-day service. Second, we will assume that we receive orders continuously all day. These two assumptions tell us that we may, at certain times of the day, want to be able to separate our order batches by transportation services level due to freight carrier pick-up cutoffs and that we will need the ability to make clean batch cutoffs periodically during the day. Although on a small scale these order manipulations can be done manually, an electronic order manipulation system would be highly desirable. Each batch of orders is often referred to as a picking wave. Now that we can group orders logically into batches we will want to re-sort the items that are required to satisfy all the orders that comprise a batch. Our first pass is to gather all units of a common item together. Then each unit must be physically allocated against a unit of that item in a warehouse storage location. Once the units to location allocations are complete we can subdivide the picking assignments depending on our plan for picking resource utilization. This is often referred to as balancing the pick load. We are ready to begin picking items for this batch. We now face a real challenge. How do we identify that an item belongs to a specific order and how do we physically assemble each order for packaging and final shipment. There are a couple of successful manual sort methods that we might consider. The first method is a sort to destination. The second method is a two-stage pick method. Let's look at how each of these methods might be implemented.

Sort To Destination

In order to implement a sort to destination we must first designate an area in our distribution facility and create a series of destination locations. (Theses could be rectangles marked on the floor, pallet positions in a rack, boxes on a shelf, etc.) Each location has a unique location ID. Let's suppose that we want to have one hundred of these locations. (The actual number we might want to have would be based on what we determined should be the maximum number of orders per batch.) We might designate these locations as S-1 to S-100. (Again, the identification scheme would be a decision based on how we implemented the sort destination area, because a well thought out scheme would enhance productivity and reduce potential errors while a haphazard scheme could increase errors and kill productivity.) Now when we create the batch, each order within the batch is assigned a destination location. When a batch picker arrives at the designated sort destinations area of the facility with their batch of common items they will deposit the appropriate number of units of that item at the appropriate destination locations as directed. There are a number of ways that this drop off by location can be directed. One of the simplest methods is by a drop off list, which might also have been their batch picking instruction document. A more sophisticated method would be to use a hand held RF computing device with bar code scanning capability. The picker could have been directed to perform the picking assignments by the RF device and then as they scan each item at the sort destination area they are directed to specific drop off locations. One significant advantage to this use of an RF device is that it could support an electronic check off process, piece by piece, to indicate when all the items of a specific order has been completely sorted to it's destination location. In a paper-based system this check off requires a separate activity. Once the order is completely assembled at the destination location it can be packaged and labeled as required and moved to the final shipment

dock. The major disadvantage of this sort-assembly method is that the number of uniquely designated sort to destination locations limits the maximum number of orders that can be consolidated into a single batch.

Two-Stage Pick

The two-stage pick is a hybrid picking method. The first stage is a pure batch pick. The second stage is a pure order pick. To implement a two-stage pick you must set up a centralized batch delivery area. Items are batch picked and brought to assigned locations in the batch delivery area. The order pickers are directed to these batch delivery area locations where they pick the items they need to fill their orders. This two-stage method greatly reduces warehouse travel time by consolidating the needed items into a small-centralized order picking area. This creates a mini warehouse within a warehouse. The two-stage pick is relatively easy to implement. Orders are batched, items are physically allocated against location stock, the pick load is balanced, and the items are picked and transported to their batch delivery area location assignments. Then the same group of orders is order picked from the virtual mini warehouse created by the batch delivery area. Most of the advantages of batch picking are gained in the first stage while most of the advantages of order picking are gained in the second stage. This method is especially well suited to facilities where the item storage geography is large. The major disadvantage of this two-stage method is that the number of uniquely designated batch delivery locations could limit the maximum number of different items per batch.

Summary

We have discussed two methods of fulfilling orders in a distribution center, the order pick and the batch pick. Each method has advantages and disadvantages as discussed. To determine which method makes the most sense for your order fulfillment, you need to review the following items in your distribution center and order profiles. Small distribution centers with most items in close geographic proximity are more adaptable to order picking. Large distribution centers with most items spread out across large geographic storage are more adaptable to batch picking. Small order volumes are more adaptable to order picking, while large order volumes are more adaptable to batch picking. Orders with few common items are more adaptable to order picking. Orders with significant numbers of common items are more adaptable to batch picking.

If batch picking fits your distribution center and order profiles, then the choice between manual sort and assembly methods will most likely be between sort to destination or two-stage pick. In our experience the sort to destination works best for order profiles where the total number of orders is relatively small and the individual order size is large. The two-stage pick works best for very large distribution centers with the total number of orders being large and the individual order size being small.

One rule of caution should be noted in implementing either of these manual sorting and assembly methods. Do not designate a specific unit of the batch of an item to a specific order at the time of picking. Piece to order assignment should be done randomly at the time of final sortation. Many automated sort systems do assign pieces to orders at the time of picking by means of bar coded pick/sort labels. This practice would only create a nightmare of additional work in a manual sort method.

About The Author

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