

Slotting Improvements Increase Efficiency

Has the productivity in your distribution center been languishing or even declining? Have you tried worker incentives, mechanization/automation and new procedures with limited success? If so, it may be time to investigate *slotting*.

Inventory slotting or profiling is the process of identifying the most efficient placement for each item in a distribution center. Each warehouse is different, so proper slotting is dependent on the facility's unique product, movement and storage characteristics. An optimal profile allows associates to pick items more quickly and accurately, while reducing the risk of injuries.

Forget the legend that only huge distribution centers can benefit from or afford a slotting system. Wider availability of software has brought this optimization process within the reach of even small facilities.

In smaller warehouses, slotting is often done manually or using standard computer spreadsheet or database programs. Specifically-designed slotting software is a valuable tool for operations with a large number of SKUs (stock keeping units) as well as for businesses where the items inventoried change frequently, such as in catalog distribution centers.

Speed Up Picking

There are several ways to increase picking productivity with slotting. Placing fast-moving items close to conveyors and aisles minimizes picker travel time. Using easier to pick locations for high activity items, such as the center levels of carton flow rack, also facilitates quicker picking.

Items that are often sold together should be stored together to reduce travel. On the other

hand, in warehouses where mis-picks are a problem, separation of similar items reduces the chance of picking errors.

Heavy items should be placed on the "waist to shoulders" shelves to minimize the chance of injury to pickers and stockers. In warehouses where there is a mix of heavy items and crushable ones, the heavy items should be placed at the beginning of the pick path so they are loaded in the bottom of the box or tote.

When distribution centers provide several picking areas for the same type of items, such as multiple pick modules, the workload must be balanced between the areas.

If too much activity is concentrated in one zone, congestion can result and order consolidation may be more difficult because some portions of the order may be processed significantly faster than others.

Items may also be stored in groups within the warehouse based on vendor or product similarities. Vendor groupings may be used to simplify merchandise putaway.

Family groups may also be established to cluster items that are often sold together or items with specific storage or handling requirements. Retailers may use family groups to make sure that their stores receive the merchandise organized logically for them, such as separating men's and women's clothing.

Careful slotting can also reduce material handling work by placing items in properly sized locations. Items received in case quantities should normally be assigned to locations that fit the full case to minimize stocking effort.

The location should hold a sufficient quantity of inventory to meet the restocking goals for the warehouse. Another consideration, especially when picking full cases, is to organize items by height to enable better and more efficient pallet building.

Data Requirements

The first step in any inventory slotting exercise is gathering the necessary information about the items, locations in the warehouse and product sales.

Item dimensional data may already be stored in the WMS (warehouse management system) or ERP (enterprise resource planning) system, or items and cases may need to be physically measured. The following information is typically needed for each SKU:

- Item length, width, height and weight
- Active picking location(s) for the item
- Case quantity and dimensions (length, width, height and weight) for items stored by the case
- Pallet quantity (or cases/tier and tiers/pallet) for items stored by the pallet
- Vendor if items are to be stored in vendor groupings
- Family group if items are to be stored by product groupings
- Special storage conditions, if applicable (flammable, refrigeration, etc.)
- Maximum stacking height or crushability factor, if applicable
- Items that are often sold together, if applicable. They can be identified by analysis of the order files and/or conversations with the pickers
- Items that are similar and should not be stored nearby, if applicable

Each picking location in the warehouse needs to be defined. The information typically required for each slot is its:

- Location number
- Usable size (length, width, height)
- Weight capacity
- Proximity to material handling equipment and shipping
- Position within the pick path

- Types of items eligible to be stored here (hazard code, vendor or family group)

Item movement can be captured in terms of the number of times each item was sold (hits), the quantity sold, sales forecast and the on hand quantity. Hits and quantity sold are most typically used because high hit items should be placed in the most desirable locations and the optimal size location can be established using the quantity sold and the dimensions.

If items change frequently and do not have any historical movement figures, sales forecasts may be used instead of history. On hand quantity data is important for warehouses that choose to size locations in slow pick areas to a typical on hand inventory level, rather than a sales level.

Slotting Rules

Once the necessary data has been collected, the slotting rules must be established by setting up constraints (rules which cannot be broken) and objectives (goals). Constraints include weight limits, hazardous material areas and vendor/family group areas.

Objectives define factors like the desired stocking level, where faster moving items are placed and how activity will be balanced. Examples of some typical rules include:

- For non-conveyables stored on pallets, put the fast moving items close to the shipping dock and on the lower pallet rack levels. Store slower moving items on higher levels and further away from the dock.
- In the case pick area, locate taller cases and heavier cases at the beginning of the pick path. Put faster moving cases on floor/lower levels.

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Case History: Plow & Hearth

20% Increase in Productivity After Slotting Help

Plow & Hearth, national catalog distributor of high-quality, country-theme home furnishings and accessories, needed to implement a slotting system in its fulfillment center to improve overall picking productivity. The 300,000 square-foot facility contained pallet rack, decked rack, carton flow rack, decked pallet rack and shelving.

Plow & Hearth uses Manhattan Associates' warehouse management system. They needed a tool to balance the work within and between the two pick modules and selected Manhattan Associates' profiling product as their profiling tool and Sedlak to guide them through its implementation.

SlotInfo software was loaded with the warehouse map information, item data and initial item placement. Concurrently, several steps were taken in preparation for the new slotting system.

- Items that did not have size information were measured
- Case measurements were gathered for items received or sold by the case
- The interface between the order entry system and the WMS required tuning to be sure it was functioning properly
- Standard opening sizes were established in each warehouse area and storage media type

Next, Plow & Hearth, Manhattan Associates and Sedlak worked together to establish the slotting constraints and objectives. Rules they adopted were:

- Storing a one-week supply of inventory in each active location

- Placing the faster moving items on the center levels of the flow rack
- Putting the faster moving items closer to the conveyor in the pick module shelving and decked rack
- Balancing the activity among the decked rack aisles and carton flow units
- Establishing separate areas for items with special handling requirements, such as non-conveyables, chaise lounge cushions and shoes

Trial re-slotting runs were made to test the rules and refine them to achieve desired results. The interfaces among the forecasting, ERP, warehouse management and slotting systems were also tested and verified. Finally, Plow & Hearth was ready to use the profiling software.

The strategy was to first refine each storage media type in the pick modules, then add the workload balancing rule to even out the activity between the two modules. Moving items within each pick module allowed them to first become accustomed to using the software while making moves that were less time and resource intensive.

Plow & Hearth opted to make the profile changes gradually during normal operations, rather than interrupting their fulfillment activities to move hundreds of items. They reviewed item placement on a weekly basis and moved items each night to relocate the most badly misplaced SKUs. Although it took several months to achieve the optimal profile, picking productivity gradually increased with each set of moves.