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Expert Insight: Optimizing Warehouse Facility Design

Make the process data driven, with attaining balance a key operational goal

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The goal of warehouse layout design is to optimize your warehousing functions and achieve maximum efficiency and space utilization. A warehouse is typically divided into areas to support your every day processes. These areas include: reserve storage, forward pick, cross docking, shipping, receiving, assembly/special handling lines, and quality/inspection area. Designing a new facility starts with analyzing your current and projected data on the activities in each of these areas, including the receiving, shipping and inventory levels. This data should be supported by other considerations such as process flows, material handling equipment, type and styles of racking equipment, special handling requirements, and personnel.

There are four primary functions that your warehouse layout must accommodate:

1. Product storage
2. Inbound operations (including receiving and returns)
3. Outbound operations (including picking and staging)
4. Value-added processes

These four primary functions require analysis based on historical and projected unit and cubic/weight volume. Analyze at least a year's worth of history and then project inventory and sales growth in three to five years segments into the future.

Product Storage

Start the analysis by looking at current average inventory levels and growth projections by SKU. Ensure this analysis leverages clearly defined units of measure in the facility - whether they are eaches, cases, pallets, widgets, etc. Also consider the variations you might have amongst your SKU's; for example, do you have date sensitive products? Or items that require refrigeration? Is special material

handling equipment (MHE) needed to move certain groups of product? Is there a large range of weights and sizes that may cause pallet building issues or product damage? This analysis will assist in sorting your SKU's into separate product categories.

Next, classify each product by the numbers of activities (typically shipments or picks) that are involved in over a span of time (one month to one year). You can significantly reduce travel time by storing high movers together within each pick zone, thus making your warehouse more efficient. It is helpful to set up SKU classifications based on movement velocity. For example, using A, B, C, and D to reflect velocity from A – fastest, to D - slowest movers.

Now that you have separated your inventory by product category, velocity, and unit of measure, the next stage is to perform a slotting analysis to balance your inventory. Slotting is the process where you define the quantity and size of all your forward pick and reserve locations. This is determined by analyzing the best combination of product category, velocity, and unit of measure to place in forward pick locations, and where to store the reserve inventory for each product category by velocity. It is important to have dimensions and cubic volume for every product in each unit of measure you inventory. Balancing inventory with picking and replenishment is critical when determining the size of your pick faces. To decide how large your pick faces should be, analyze the cube, velocity, and the number of times you want to replenish each product group and velocity combination.

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Inbound Operations (Receiving and Returns)

Gather the necessary data to determine your receipt and returns profiles. Your profiles should include the average number of lines on a receipt/return, the quantities and cube of an average receipt/return, the number of trucks you receive per day, and the units of measure in which you are receiving (pallets, cases, eaches, etc.). Make sure you account for your average receiving day - as well as your heaviest receiving day - when considering the size of your yard, the number of receiving docks doors, and the size of your receiving and returns areas within your warehouse.

Your receiving process also impacts the size and layout of your receiving area. For instance, you might be staging product on the dock before putaway or there may be a vendor quality assurance program that you incorporate into your receiving process. Both of these processes add to the square footage needed for a receiving area.

Outbound Operations (Picking and Shipping)

When allocating space for picking and shipping areas, it is important to consider shipment order profiles and pick units of measure to analyze the flow of product to the dock. Separating units of measure and product categories into separate pick zones allows pickers to focus on picking eaches, cases, or pallets within certain zones which results in higher picking productivity.

Another major consideration when planning pick process flows is to determine whether your facility will implement batch picking or order picking. Most batch picking environments involve conveyors to transport product to the shipping dock and to provide sortation at the dock. In order picking environments, pickers travel through the warehouse and pick to a final shipping pallet. Order picking is much faster from the floor rather than picking from the high racks. In most order picking environments, A and B movers should be on the floor as much as possible when being picked whereas slower moving products can be stored up above in racks and replenished.

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Value-Added Processes

Whether it is re-labeling product, applying price stickers, a special kitting process, or another customer-specific value-added process, many warehouses incorporate some additional value beyond receiving, storing and shipping. Many processes can be included within the picking or receiving processes, but some may need to be performed in a separate area. Ensure that you incorporate the correct cube of the inventory and incorporate growth when sizing these areas.

Conclusion

Balance is imperative in any well run facility. It is important that you analyze the labor in picking, replenishment, and shipping and receiving to ensure there is proper balance amongst all warehouse functions. Whether you are updating an existing warehouse or developing a new distribution center, it is important to focus on balance to provide flexibility for future business requirements.

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