



Photo courtesy of Dematic Corp.

The Importance of Slotting

Correct slotting can be a major driver of warehouse productivity.

Slotting is the “placement of product in a facility for the purpose of optimizing material handling and space efficiency.”

Slotting significantly impacts many of a distribution center’s key performance indicators (KPIs). It influences productivity, shipping accuracy, inventory accuracy, dock-to-stock time, warehouse order cycle time, storage density and the level of automation. Yet, today, many warehouses are improperly slotted.

“More companies are spending more money per year than necessary moving product through their warehouse because their facility is not properly slotted,” charges Chris Werling, president, Cornerstone Solutions, Inc., Fort Wayne, Ind. “Assigning items or SKUs to correct storage locations is vital,” he declares in his white paper, “Tomorrow’s Warehouse.”

“Less than 15 percent of the items in a typical warehouse are slotted correctly,” Edward H. Frazelle, president and CEO, Logistics Resources International, Atlanta, Ga., writes in *World-Class Warehousing and Material Handling* (McGraw-Hill). “Consequently, most warehouses are spending 10 to 30 percent more per year than they should because the warehouse is improperly slotted,” he estimates.

Not everyone is a believer in slotting, however. Robert C. Daniell, principal, SRA International, Inc., Fairfax, Va., maintains, “There are other ways of getting

around the problem, unless you’re in a critical spare parts replacement business, for example, where slotting and aligning inventory takeaway according to customer demand is essential.” In fact, he believes that slotting now is considered “more of a leading practice rather than a best practice because it is not widely deployed, or considered as a differentiator in the supply chain.”

Meanwhile, Tom Singer, principal, Tompkins Associates, Orlando, Fla., author of the “Supply Chain Consortium Focus Report on DC Slotting,” reveals that, “Only 31 percent of participants in the Consortium’s Benchmarking and Best Practices on-line survey/interview said that their slotting plans were efficient or near optimal in terms of minimizing picking travel times.” His conclusion: “In the order of importance on day-to-day operations, slotting comes in at a level of importance that does not correspond to its potential benefits. We take for granted the pick flow and often look at other technology such as WMS or automation to help increase the throughput, and do not realize the full benefit that we can get by taking our slotting plan to its near optimal level,” says Singer.

The case for slotting

Effective slotting, as defined by Aberdeen in the Research Brief, “Three Key Components to Effective Slotting,” is “determining the optimal location for each SKU in the warehouse,” the goal of which “is to make fast-moving products easily accessible without large amounts of walking required to pick them.”

According to the white paper, “Maximizing Your Resources Through Warehouse Slotting,” from Tompkins Associates, Raleigh, NC, slotting is the “placement of product in a facility for the purpose of optimizing material handling and space efficiency.” It further states, “Product slotting maintains or establishes the warehouse layout to an optimum condition.”

The advantages of proper product slotting, as listed in the white paper are:

- Reduced picking labor requirements by locating product in the optimal pick sequence.
- Reduced replenishment labor requirements by matching product unit loads with the appropriate size storage slot.
- Reduced response time and improved flow by balancing workload among operators.
- Increased picking accuracy by separating similar products to avoid proximity picking errors.
- Reduced possibility of injuries by placing product in its ergonomically best location.
- Reduced product damage by organizing heavier product first in the pick path, ahead of crushable product.
- Increased palletizing productivity by arranging product by case height, allowing the building of tighter pallets for better trailer utilization.
- Deferred capital expansion by maintaining the optimum warehouse layout and cube utilization, reducing the need for the building expansion.
- Increased store level productivity by organizing product in family groups, eliminating or reducing sorting of product for restocking at the store level.

Travel time

“Few operations can afford to ignore slotting,” says Singer. “Product location is the key to optimizing warehouse operations, and labor costs are a large factor in optimizing DC slotting.” In today’s traditional warehouse, he says, “productive work, such as actual unloading, stocking, picking and loading accounts for 40 to 50 percent of all direct labor activities. The balance is spent on travel time, moving from location to location.”

Slotting, properly done, maximizes productivity and minimizes travel time from location to location by deter-

mining the most advantageous arrangement of SKUs within a range of pick faces or slots.

“There are several ways to help reduce travel time in the warehouse,” says Werling. “An analysis of SKU and customer order activity must be performed to identify problems and to pinpoint major opportunities for improvement.” This information, he states, will help to determine where to store each product or SKU, what storage method to use, and how much to store. Among the slotting measures, he lists:

- **Popularity.** The number of requests for a SKU during a certain period.
- **Turnover.** The number of units shipped per period.
- **Cube-per-order.** The physical size of the product, the daily demand, and the average order size.
- **Volume.** The cubic volume of a SKU, or a product, shipped period.
- **Pick density.** The number of requests per volume of a SKU.

“Each of the above criteria is sometimes used in ‘golden zone’ picking where the SKUs with the highest pick rates are assigned to the most accessible locations within the warehouse,” says Werling.

According to Daniell, “One of the primary reasons to do slotting is to optimize the utilization of inventory, and to bring some kind of sanity to the inventory management plan.” He explains, “I have come to a deeper appreciation as I’ve studied and practiced Lean over the years of the contributions that slotting can have. In many respects, there’s a lot of synergy between kanban and slotting when you get into distribution. In fact, when you take kanban into distribution, in essence, you’re actually dealing with slotting.”

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Slot & re-slot

Generally speaking, for most warehouses, actual slotting is often performed only twice. First, slotting occurs during the initial start-up of a DC. The other time that slotting actually occurs is when a major re-layout is planned or a significant automated material handling system is contemplated.

However, as Frazelle points out, “almost as soon as an item is properly slotted, its activity profile changes. Hence, it is critical to maintain current slotting to maintain the productivity and storage density gains that are achieved under the initial slotting program.”

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Aberdeen research shows that best-in-class companies are 82 percent more likely to perform slotting on at least a quarterly basis.



Photo courtesy of Dematic Corp.

Re-slotting rules should be defined to suggest when and if a particular item should be re-slotted, he advises.

For slotting to be effective, according to the Aberdeen report, "it must be done on a regular basis as seasons change and new products are introduced." In fact, Aberdeen research shows that best-in-class companies are 82 percent more likely to perform slotting on at least a quarterly basis.

"To be truly effective at executing and enforcing the slotting policy, the slotting application must be integrated to DC operational systems such as warehouse management and labor management systems," states "Improving Business Results: An Inventory Manager's Guide to Integrated Slotting," a white paper from RedPrairie Corporation, Waukesha, Wisc. "This enables the slotting plan to be a natural complement to normal DC operations such as replenishment and putaway."

Manual vs. software

There are a wide variety of slotting approaches and methodologies, but they can be summarized according to four basic categories, says Singer. In the Supply Chain Consortium survey of 100 top retail and related companies less than a quarter of distribution centers use slotting optimization software even though efficient slotting practices have been shown to reduce labor hours and operating costs. "Participants who use slotting software packages report an average 16 percent reduction in labor hours by using an automated tool over a manual approach," according to Singer.

Components to effective slotting

Aberdeen has identified three key components to an effective slotting program, used by best-in-class companies.

1. Blended demand forecasting. Although many companies focus on rules-based SKU analysis as the key component to a slotting system, Aberdeen research shows that this functionality is a limited value if not used in conjunction with a reliable demand forecast.

When new products are introduced, there is no prior demand history to draw from. In these instances, a forecast must factor historical demand for similar products, in addition to planned promotional activity.

The slotting system itself does not need to perform the demand forecast, but must at least have the ability to input a forecast from a best-of-breed third-party system, says Hobkirk.

2. Multi-variable placement rules. Most basic slotting systems focus on identifying fast-moving items and slotting them closest to areas of activity. "While this is the underlying goal of a slotting program, velocity should not be the sole determinant of where items are placed in the warehouse," he explains.

A number of other variables should be considered, such as hazmat and other classifications, and the pack size(s) of the stored items. "Even in relatively simple warehouses, it is usually a bad idea to base slotting solely on one variable," Hobkirk cautions.

3. Integration to labor management. It is usually not a good idea to have the entire warehouse fully optimized from a slotting perspective, he declares. "Certainly, when setting up a new warehouse, this is desirable and practical. However, progressive re-slotting operations should only involve making the product moves that will provide the greatest return on investment."

A slotting system will first determine the ideal location. Then, high performance systems will calculate the amount of labor required to move the products from their current location to the ideal location. It next predicts the amount of labor that will be saved in reduced picking time over the next month or so.

"Generally speaking, this slotting ROI analysis is not an exact science," cautions Hobkirk. "While most systems can provide a general, comparative guideline that can be used to prioritize moves given a finite amount of labor at a company's disposal, this functionality can be a valuable tool for making regular, incremental changes such that the warehouse never lapses into a highly deficient slotting state."

"The lesson, as stated in the Tompkins white paper: Proper product placement is essential in any warehousing and distribution operation attempting to compete in today's marketplace."

Yet, the survey definitely shows that slotting remains a manual process. Almost two of five respondents indicate using the manual assignment approach, which designates SKUs based on physical characteristics, unit of measure, and inherent knowledge of the impact of slotting an individual SKU in a particular location."

Some 10 percent said they use the fixed assignment method in which SKUs are assigned to locations based on physical characteristics and unit of measure without any attempt to minimize labor, improve flow, or meet other operational requirements. The manual assignment approach, assisted by spreadsheet or other database tool, is the slotting method of choice by slightly more than one-third of the respondents.

Singer is quick to point out that "Many operations do not need sophisticated tools or packaged software to slot product." He explains, "If I have a small DC with a relatively stable SKU base, or even a large DC where 60 to 80 percent of the product is flow-through directly to the stores, I do not need to slot."

However, he acknowledges that the "larger and more complex an operation, the more sophisticated its slotting approach should be."

Similarly, Aberdeen research indicates that only 23 percent of companies have an automated slotting solution in place. Ian Hobkirk, senior analyst, logistics, says, "If slotting was a one-time exercise, it could best be managed by building an extensive spreadsheet to calculate velocity, cubic dimensions, and demand, and then, using it as a roadmap to fill the warehouse."

However, as pointed out by others also, "most warehouses are in a constant state of change." Seasonality, volatile product life cycles and changing promotional activities create a situation where the optimal location of SKUs changes rapidly.

"Spreadsheets have real limitations in terms of their ability to keep up with these macro dynamics," maintains Hobkirk.

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WERCSheet correction

In the January 2008 *WERCsheet*, an incorrect website was printed at the end of the article "WMS: Key Link in the Supply Chain" on page 9. The correct website for Rene Jones, founder, Total Logistics Solutions, Inc. is www.logisticsociety.com