Fundamentals of Product Slotting

Historically most product slotting has taken place on an ad-hoc basis in most operations around the globe. The reason for most product slotting is the necessity to create new space or to rationalize old SKU's. The traditional method of product slotting would essentially take the form of an ABC linear slot algorithm, where the number 1 SKU in the velocity sequence would be placed in slot number 1 in the pick sequence. Theoretically, this is a sound method. However, fundamentally it misses the uniqueness of the SKU's and the rules surrounding various factors such as storage conditions, family groupings and product characteristics. Essentially you may be able to effectively slot 50-55% of your products in this strategy; however, this slotting strategy would leave a large number of exceptions and outliers in your operating plan.

Taking a step back and looking at your operation from 10,000 feet, you must ask yourself what is the goal of the operation. If it is a grocery or retail operation where the DC is designed to support the retail outlet and its efficiency, the product may be picked and sorted to maintain the integrity of the SKU placement in the store. For example, a grocery chain, where all stores have the same product layout, such as Aisle 1 is Cereal and Breakfast, Aisle 2 is Condiments, 3 is Canned goods and so on. At the DC level, regardless of velocity of the entire product range in the warehouse, product is picked in reverse sequence to increase efficiency at the store level. A methodology such as this would minimize the importance of the SKU velocity, and characterize the family group as the primary slot criteria.

Once we have considered the operational strategy of the DC, store level support, pure profitability and/or lowest cost scenario, possibly in a 3PL, we would then need to look at the sectioning or zoning of the warehouse based on rules or labor assignment. Back in our grocery facility, orders could be large where we have high moving SKU's but also a large number of full pallet picks, and a considerable large number of each or unit picks. The storage mediums and handling equipment would be different in each of these zones or assignments, as would the rules surrounding SKU's and families. In a facility such as this we would look to have a minimum number of micro slotting models which would be based on the rules of the assignment, rather than the grand scope of the entire DC operation.

If we look at the entire range or number of SKU's, we would then have to first Macro slot these products based on the characteristics of the SKU and the dependencies of the resources or storage mediums. In other words, which SKU's are best suited to each assignment or pick medium, based on variable cost, capital cost or utilization factors. For example, do you want to enforce FIFO in the building or some type of stock rotation in the storage medium. If yes, then storage types such as Double deep or floor stack would be eliminated, as they do not support this type of rotation. From both a practical and theoretical standpoint, this step must completed first, before a functional slot plan or algorithm can be completed for the DC. This is a quick step in a facility with 1 or 2 mediums, and a small range of SKU's, but in a large DC with multiple assignments and SKU ranges in excess of 10,000, it becomes a major project.

Once we have completed our Macro slotting or storage and assignment selection, we can then look at the rules surrounding the creation of an actual slot plan. Aside from the factors of the SKU's, we must also decide the logic that is going to be used in the building our individual assignment. Do we run a linear algorithm based on the pick sequence, or would we look at aisle proximity logic, where the A SKU's are placed near the end of the aisles to decrease travel? Does the building support 2 way traffic in the aisles or is there a cross aisle along with a number of transit aisles? In a pallet pick assignment we would consider the best usage of space and density, as well as overall travel in the assignment, to maximize the efficiency of the building; however, in a unit pick scenario, such as static shelving or Carton Flow, we would more likely consider slot utilization and cube as primary factors as well. These are the types of decisions which are made regularly on a small or select range of SKU's in the building, but not the entire range, thus minimizing the overall effect of the plan.

Many companies will look at a single characteristic in terms of their slot plan and then manage by exception any other characteristics when laying out their plan. An example of this is taking velocity as a function of unit sales in an ABC model, but then pick out SKU's by weight to make sure heaviest product are in a specific family of locations. In a scenario where there are less than 500 SKU's in the range, this would be effective, but not so much in a facility with 10,000 SKU's. Other characteristics that may be considered with the SKU are: the following;

Cube Size of Product

Product Weight

Package Crushability

Toxicity or chemical nature of the product

Actual SKU number (such as a library system)

Velocity based on the Hit ration rather than unit movement

Product Value

In almost all operations around the globe the rules of the operation not only look at ranking the products by an ABC velocity curve but also a function of 1 or more of these other factors. The more factors, the more complicated the plan, which is illustrated by the increasing number of exceptions or outliers in the plan.

Though we have looked at a very limited number of scenario's regarding the creation of a slot plan, we can summarize the steps to the plan in the following order.

1) Determine the role of the DC..
2) Determine the number of assignments or Macro slot plan for the operation
3) Create a Micro slot plan looking at the 3 fundamental elements of a plan
    a. Family Groupings – by velocity, range, order, or special characteristics

b. SKU Characteristics- by velocity, cube, weight, toxicity, crushability, number and other special characteristics
c. Location in the facility – pick sequence, aisle proximity, center of gravity, or other specific location criteria.

Finally, looking at all the elements of the slot plan, from an operational level we must consider the number of moves to get the greatest benefit of the plan. That is to say, we want to make the minimum number of touches or moves to create the maximum benefit to the operation. In an operation or assignment with a range of 1000 SKU's we would want to consider less than 150 touches during implementation to maximize our plan.