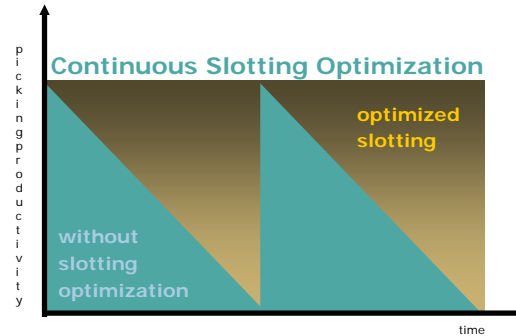


**The most successful innovation in logistics or supply chain in which you have been involved**

**The science behind Slotting optimisation: Myth or Real?**

**Introduction:** All warehouses and distribution centers need to set up a slotting plan at least once in order to determine the best location for products. In reality, most warehouses have to optimize slotting layouts more than once. As new products are introduced and demand for existing products increases, fast-moving goods are added and slow-moving goods disappear. Many companies therefore carry out a yearly, monthly and even weekly slotting review. In a few cases, this may even take place on a daily basis.



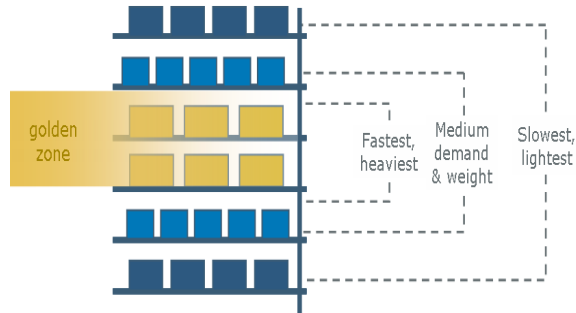
Working for a leading Retailer it was a great experience to witness remarkable productivity and business benefits using a sophisticated yet simple Slotting application. In the recent years Slotting optimisation application has helped to arrange stocks methodically overnight where large volumes of orders have to be picked within a short period of time on the next day. The application also supports automated slotting of new items as the warehouse management system becomes aware of them. This helps avoid costly delays in receiving and put-away of new items. The reslotting which was often done manually or using standard computer spreadsheet or database programs has now been replaced by slotting software for operations with a large number of SKUs (stock-keeping units).

**Business drivers:** Product placement must be regularly reviewed and maintained. The amount of change in SKUs and their movement is the primary factor in determining the optimal frequency for updating placement, but this must be balanced against the material handling effort required to relocate the items.

Specific category Items had to be grouped within the warehouse based on vendor or product similarities. Family groups had to be established to cluster items that are often sold together or items with specific storage or handling requirements. As Retailers use family groups to make sure that their stores receive the merchandise organized logically for them, such as separating baby food from other canned food. .

Through the usage of Roll-cages, retailers have aimed at building better store deliveries. Vendor codes and Family group attributes can now be automatically downloaded into slotting application which will take care of grouping to deliver 'Store friendly pallets', including Roll-cages. The 'store friendly pallet building' has delivered significant cost savings at the stores (reduction in stacking costs) through improved family/category grouping.

Previously when heavy items or ugly SKUs had to be placed in suitable locations, items had to be specially tagged upon receipts and managed manually. Heavy items had to be placed on the "waist to shoulders" shelves to minimize the chance of injury to pickers and stockers. The heavy items were placed at the beginning of the pick path so that they are loaded in the bottom of the box or tote. These requirements are handled effectively by the Slotting application (set as 'hard constraints').

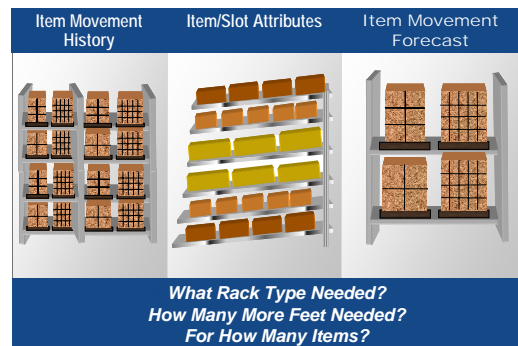


Picking productivity has always been a key measure within the warehouses. There are several ways to increase picking productivity with slotting. Placing fast-moving items close to conveyors and aisles minimizes picker travel time. Using easier-to-pick

locations for high-activity items, such as the center levels of carton flow rack, also facilitates quicker picking. Items that are often sold together are stored together to reduce travel. On the other hand, even where miss-picks were a problem, they now can be separated from similar items to reduce the chance of picking errors. Picking productivity gains have been rather significant and have justified the Slotting application investments many folds.

**Systematic Slotting:** Slotting was set up by gathering the necessary information about the items, locations in the warehouse and product sales movements. Item dimensional data was already available in the WMS (warehouse management system) and ERP (enterprise resource planning) system. Some items and cases had to be physically measured. Specific attributes such as special storage conditions, (flammable, refrigeration, etc.) Maximum stacking height or crushability factor were identified by analysis of the order files and/or conversations with the pickers. Items that are similar and should not be stored nearby in the warehouse were also defined. The information typically required for each slot included Location number, size (length, width, height), Weight capacity, Proximity to material handling equipment and shipping and Position within the pick path.

Item movement were 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 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 were used instead of history.



**Slotting Rules:** Once the necessary data had been collected, the slotting rules were 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. Goals define factors like the desired stocking level, where faster moving items are placed, and how activity will be balanced. Examples of some typical rules were;

- For non-conveyables stored on pallets, fast moving items were placed closer to the shipping dock. Slower moving items on higher levels and further away from the dock
- In the case pick area, taller cases and heavier cases were located at the beginning of the pick path and faster moving cases on floor/lower levels.
- Items into carton flow rack, were placed with the very fastest on the center levels, balancing the workload among the flow rack units.
- Slower-moving items were placed into shelving, with the faster moving ones placed closer to the take-away conveyor and heavier items on the center levels.

## Conclusion

Having worked with series of spreadsheets, whiteboards and slotting specialists who had stored all their logic in their heads, this is a revelation to be using Slotting optimisation. The slotting application (being used by the author) consists of genetic algorithms and uses around 40,000 SKU-SLOT combinations during optimisation to decide the best location for each SKU. Ability to maintain the product slotting based on their true merit (hits, movements, attributes) to determine the optimal frequency for replenishments, and ability to increase picking productivity and make order selection easier and safer is truly inspiring. It's a great tool to enhance Customer satisfaction when shipments are organized the way they want them.

