



Optricity™

Sustainable Warehouse Slotting

*Savings, solution quality,
and the timing of
performing reslots*



Executive Summary

When undertaking a warehouse slotting initiative to improve productivity, it's important to design a plan that extends beyond an initial reslot. Having the foresight to consider ways to prolong the benefits resulting from a reslot allows an operation the potential to impact distribution for a long time, possibly with minimal strategic changes. With a strong handle on the types of data available as well as slotting goals and constraints, an operation can employ a number of techniques to perform and elicit benefit from an initial product reslot and retain solution quality with Sustainable Slotting.

By first understanding factors such as the availability of time and data, in addition to overall objectives, an operation can determine what type of reslot approach, if any, will best suit its needs; various approaches range from reslots that require compressed time periods and increased labor, to exercises conducted over longer periods of time and with more slowly realized benefit, to a more theoretical approach that homes in on a subset of items that require the most attention. Although a reslot on its own can improve slotting drastically, it's important to also understand the value of Sustainable Slotting, either in conjunction with a reslot or independently. Sustainable Slotting can both fine-tune a reslot and/or be employed independently to tackle and manage regular slotting challenges like seasonality and promotional activity, changing SKU mix, daily and weekly changes in product velocities, and more.

Although an operation can achieve significant benefit by executing a well-designed reslot, it's important to also consider the impact and continued benefit that defining and employing a strong Sustainable Slotting strategy can offer.



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1.0 Introduction

Defining a solid slotting strategy is paramount to any distribution operation's ability to increase selection efficiency and cut costs through the methodical placement of product. Many operations have recognized the need to improve slotting and have taken steps to reorganize product in the warehouse. While many of these operations succeed in creating improved productivity through slotting, some fail to maximize the potential benefit of good slotting, while others initially make significant improvements but don't take the steps necessary to retain and continue realizing the benefit over time. Planning for and executing reslots and Sustainable Slotting, separately or in combination, can greatly improve an operation's ability to boost productivity and continuously reap the benefits over time.

2.0 Reslots vs Sustainable Slotting

Sustainable Slotting is the process of aligning items to slot types and specific locations based on short term demand, item characteristics and location characteristics, subject to a defined set of goals and constraints. Sustainable Slotting is quite different from a reslot.

The primary differentiator between a reslot and daily or weekly slotting, or Sustainable Slotting, is the product movement data that is used to qualify items to slot types and locations. With a reslot, the movement data is broadly defined. With Sustainable Slotting, the movement data may represent a shorter time period, for instance, a day or a week. Movement data may be actual order data or short term forecasted data.

3.0 Selecting a Reslot Strategy

Reslots are usually calculated based on a set of goals and constraints, using average unit volume over an extended historic time period. If a reliable movement forecast by item is available, then that forecast data may be used to slot the items, rather than the historic



movement data. One can typically expect the result of a reslot to be a recommendation to move many items from their current locations to optimal locations in the pick path.

A reslot usually requires at least one of the following actions:

1. In a short time period, move most or many items to their optimal locations. This may be accomplished by bringing in additional labor during off-selection periods or weekends. Using this approach, the benefits of optimized slotting are realized in a short timeframe. The potential drawback is a large labor cost.
2. Over an extended time period, move most or many items to their optimal locations, starting with the moves that best meet the slotting objectives (e.g., pick cost minimization). The benefits of the reslot are somewhat delayed; however, the cost of making the item moves to optimal locations is minimized if current staffing and hours are used to move the product.

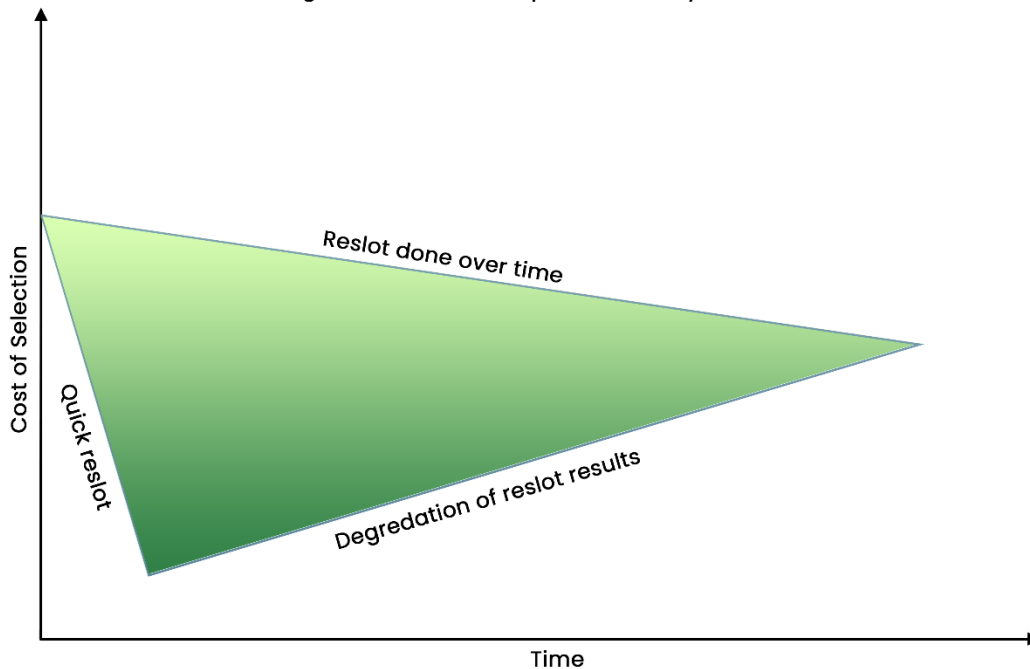
A variation of this strategy is to perform most of the item moves over time via replenishments. That is, as slots become empty due to picking, use a natural replenishment operation, which in essence is a move from reserve, to put the targeted item into that slot. Then replenish the original item (which was not targeted for that slot according to the slotting logic) to an unused slot or temporary slot. This requires a tighter integration with the Warehouse Management System (WMS) but will allow most of the item moves to occur as a natural side-effect of replenishment activity.

3. Validate the slotting logic but make no moves. The validation process consists of reviewing reslot results to make sure the optimal slot assignments make operational and financial sense. Once slotting logic (goals and constraints) as well as item and slot data are validated, jump right into Sustainable Slotting using more near-term order data and product velocities. The result of this approach is that Sustainable Slotting will focus on items that require attention the most, e.g., fast movers in small locations, slow movers in



large or favorable locations, items out of their required product groups, etc. The drawback is that many or most items, on average, will not be placed in the most optimal locations, the result of which is a sub-optimal solution that still elicits cost savings.

Figure 1: Reslot Accomplished Quickly vs Over Time



The shaded area represents the opportunity loss for selection cost reductions if a reslot is done over time.

4.0 Implementing Sustainable Slotting

A reslot is not a prerequisite for accomplishing Sustainable Slotting. However Sustainable Slotting results will be closer to optimal if a reslot or partial reslot has been completed first, as the objective of the reslot is to match optimal slot assignments as closely as possible to daily picking needs on an average unit volume basis, creating an overall optimal slotting map. Sustainable Slotting is also a fine-tuning mechanism that can improve on either reslot results or current slotting assignments by basing slotting decisions on more recent (or future) movement and order data.



One form of Sustainable Slotting is to simply implement the product moves that have been suggested by a reslot analysis. Unless significant labor has been allocated to make all the reslot moves at once (or in a short timeframe), this simple form of Sustainable Slotting implements the reslot moves plan over an extended time period. For this approach to be effective, the most impactful moves should be implemented first, followed by less valuable moves. As described previously, with a tight integration of a slotting tool to the WMS it is possible to perform many of the item moves needed for Sustainable Slotting via the natural process of replenishing items as they are depleted.

4.1 Controlling Stock Outs and Selection Costs through Sustainable Slotting

Proactively slotting the distribution center is highly important because the value created through optimized slotting is notable. Staying ahead of business changes like seasonality and promotional activities generates significant cost savings. Work plans to relocate seasonal/promotional product ahead of the season/promotion will cost less to implement in an optimized facility because most of the items will already be in their correct locations. As a result, the cost of selection and replenishment during the term of the season/promotion will be reduced. The likelihood of an item stock out during a selection cycle will also be reduced.

Daily/weekly variations in product movement also have an effect on slotting requirements, as those variations could cause excessive labor costs or stock outs. The same benefits of Sustainable Slotting described above also apply to items with high day-to-day or week-to-week movement variability. Sustainable Slotting can ensure that selection costs and product availability are controlled.



The introduction of new items also impacts slotting. New items need to be assigned to slots before or upon receipt. Although movement history is unavailable and a forecast may not be accessible, these items still must be slotted based on a set of goals and constraints. Ultimately, Sustainable Slotting provides the functionality and framework for making slotting decisions for these new items, even though complete item data might not be available.

Sustainable Slotting provides the functionality and framework for making slotting decisions.

4.2 Additional Sustainable Slotting Strategies

Several additional Sustainable Slotting strategies that are both cost effective and practical can also be considered. If a reslot has been performed correctly, then simply keeping up with the defined slotting rules based on demand fluctuations and SKU changes makes sense and will facilitate retention of productivity gains from the reslot. To waste the benefits of the reslot by allowing the slotting quality to degrade over time simply doesn't make sense and is a waste of valuable time. Creating a simple linkage with a WMS or Order Management System (OMS) to update movement values and add/delete SKUs will enable effective Sustainable Slotting

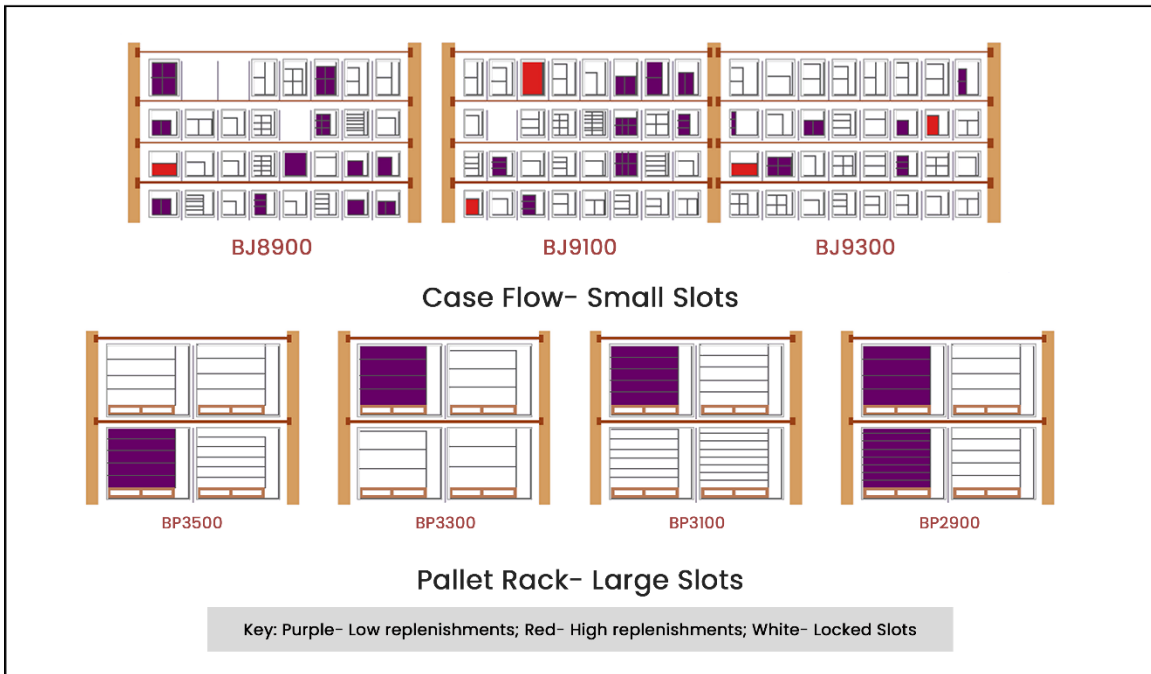
If a reslot has been performed correctly, then simply keeping up with the defined slotting rules based on demand fluctuations and SKU changes makes sense and will facilitate retention of productivity gains from the reslot.

When sustaining a reslot, one must prioritize the product moves in order to elicit the biggest return for the labor investment. There are different ways to accomplish this. In many instances, a high priority is ensuring enough product is available in the pick slots to reduce the odds of a stock out. In this scenario, a simple Sustainable Slotting approach is



to identify items that are most frequently replenished as well as those that are least frequently replenished. The remainder of the items in the forward pick area are ignored. The daily (or weekly) Sustainable Slotting exercise, then, is to theoretically remove these fastest and slowest moving items, reslotting them to better locations, with the items currently needing more replenishments moving to the larger or more favorable openings and the items currently needing fewer replenishments moving to the smaller or less favorable openings. While this strategy is not mathematically optimal, it does address the immediate daily concern of having enough product in the forward pick slots to minimize the chances of a stock out.

Figure 2: Prioritizing Product Moves to Minimize Stock Outs



Lock out all but the highest and lowest replenishment locations and re-shuffle what is left.

4.3 Selective Sustainable Slotting

The XYZ Foodservice Company has noticed that a significant number of fast-moving items are requiring multiple replenishments per day, and this is causing slowdowns and order inaccuracies. Unfortunately, they do not have many empty slots in which to put more of these items. They cleverly identify not just these problem items but also their slow movers, which require the least number of replenishments (likely because they are located in slots that are too large) and devise a plan to swap item locations between the two groups.

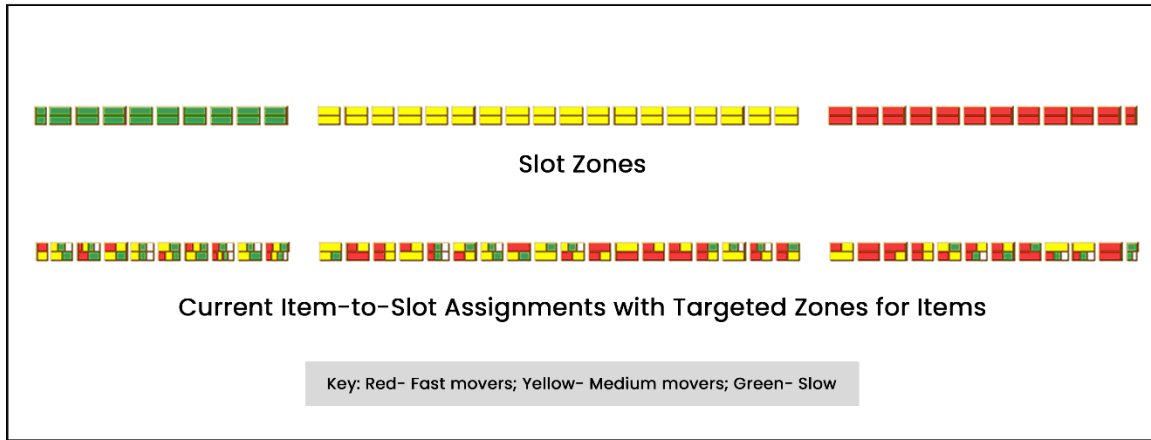
Another approach to Sustainable Slotting is to implement only a select set of reslot moves. Using a reslot as the baseline for optimal slotting, make moves based on certain criteria, for example, only move items if they are in the wrong slot type, or only move items that are in the wrong product group range, or only move items if their optimal locations are at least some certain distance (to be specified) down the pick path from their current locations. Of course, this same approach can and should include a cost benefit analysis of the moves, and the moves should be done in 'biggest bang for the buck' sequence.

Moves should be done in 'biggest bang for the buck'

ABC Parts Replacement Company picks eaches, mostly from case flow rack and static shelving. ABC groups product by vendor; this grouping eases the put away process and creates pick density since ABC's customers usually order by vendor. Lately though, the vendor groups have degraded, resulting in more expensive picking, and put away. Fixing this issue is a priority, so ABC establishes a baseline slotting optimization that moves items, but only if they are currently not in their vendor groups.



Figure 3: Making a Select Set of Moves Based on Specific Criteria



Using baseline slotting assumptions, one might choose to only relocate items that are out of their targeted zones.

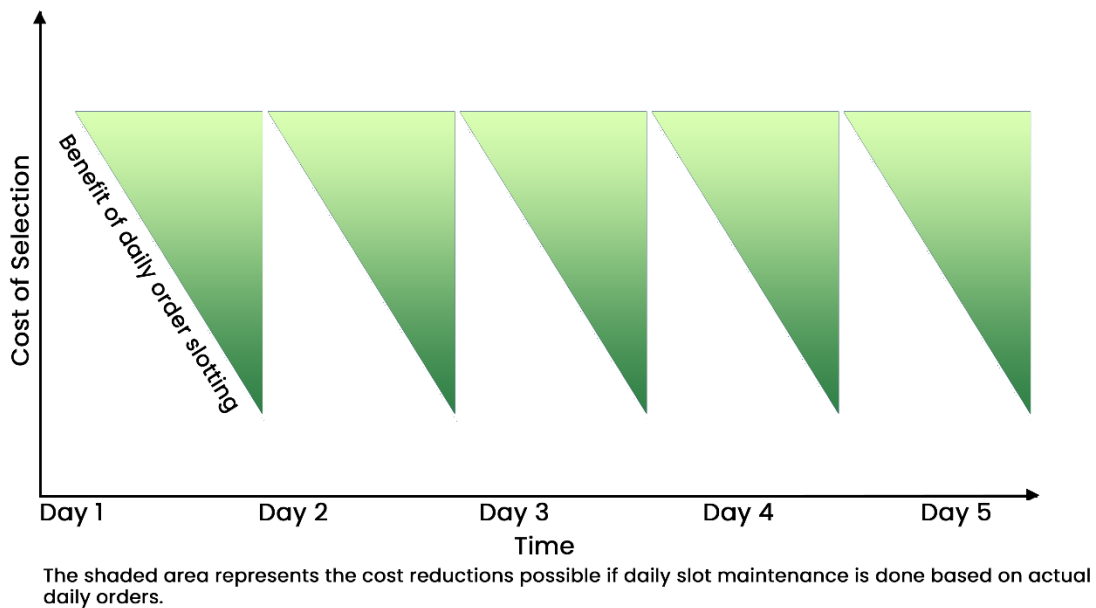
5.0 Combining a Reslot with Sustainable Slotting to Elicit Compound Benefit

In addition to the benefit of sustaining the efficiencies gained through a reslot, other Sustainable Slotting activities can be done based on reasonably accurate short term order forecasts, e.g., tomorrow's actual orders or one week's forecasted orders. If a short-term item forecast is available, then one can temporarily adjust slot assignments to best fit the orders needing fulfillment. One approach is to work with tomorrow's known orders and to temporarily match quantity on hand in forward pick locations to the order quantities. To do this, floating pick slots may be employed to temporarily slot these

Triangle Marketing Company is a multi-tier product supplier whose salespeople, who work from their homes, are motivated based on specific monthly sales goals. Triangle has identified that product volumes for certain items increase an average of 30% in the last week of each month, and this creates stock out issues and pick line congestion. Triangle determines which items will cause the issues before the last week of the month and establishes a slot maintenance strategy that temporarily adds locations for these items to alleviate congestion and to make sure product is available to pick.

items. The floating pick slots may be grouped near the shipping dock or in some other convenient location or interspersed throughout the pick path. Once tomorrow’s orders have been picked, the floating pick slots become available for use with other items that are ordered in the future. If this short-term strategy is employed after performing a reslot, the benefit of using floating pick slots to handle daily orders is achieved on top of the benefit of the reslot, since on an average movement basis, the reslot would already have positioned the items properly and the only slot change would be to handle the volume increase over average volume on a daily basis.

Figure 4: Daily Slot Maintenance Using Actual Daily Orders



6.0 Conclusion

While performing a reslot is a planning function, daily Sustainable Slotting efforts fall equally into the planning and execution categories. The slotting activities are different. Reslots work to align items to slots based on a longer-term outlook using a more forward-



looking representation of movement data. Sustainable Slotting is concerned with the movement of product that either improves the product layout based on short term labor availability or aligns the product to enhance short term selection requirements.

Distribution centers should have strategies for implementing slotting activities for both reslots and daily Sustainable Slotting. Management should support both activities, as both activities produce cost savings. A reslot process should be defined and followed on a regular, long-term basis; a sustainable slotting process should also be defined and implemented on a frequent basis. Both processes benefit from the structure and calculation capabilities of specialized slotting optimization software as long as that slotting software has the functionality to handle both slotting reslots and Sustainable Slotting.



Optricity Profile

Optricity offers a platform of warehousing optimization, design, and analysis software solutions to enhance operational precision within the workplace. By utilizing a unique blend of domain expertise, advanced mathematics, and software engineering skills, Optricity has developed innovative technologies to support warehousing professionals and improve operational clarity in distribution centers around the world.

Capitalizing on powerful computing algorithms and patented processes, Optricity's solutions drive productivity and efficiency and offer software users the ability to master warehousing operations, from gain to maintenance. Continuous software enhancement exemplifies Optricity's commitment to its users addressing both dynamic operations and ever-changing industry conditions. Responding to business-specific requirements, Optricity systems modify advanced mathematics to serve real operating environments, ensuring results are optimal according to defined rules.

Optricity software-supported warehouses are more efficient at accomplishing true objectives – receiving, storing, and shipping goods with efficiency to achieve customer satisfaction, both internally and externally. Mirroring the values of Optricity's leadership team and the rigorous demands of the marketplace, the software development team delivers:

- solution speed, quality, and ease of use,
- system integration simplicity,
- high quality user training, dedication to innovation,
- extreme customer support,
- and industry-advancing, thought leadership, to produce software that serves as a global leader in its class.

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