

WHITE PAPER

SLOTTING

Finding the right bin location strategy for greater efficiency in warehouse logistics



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WHITE PAPER

Slotting

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RESPONSIBLE FOR CONTENT

EPC – Ehrhardt + Partner Consulting GmbH
Marcel Wilhelms

EDITORIAL

Dear Readers,

to keep pace with the constantly increasing demands in logistics, the level of service that requires and the very short delivery times for e-commerce, continuously optimizing intralogistics processes and increasing the productivity, of your warehouse is essential. Slotting is a solution for optimizing warehouse space that allows you to maximize your warehouse capacity and significantly reduce the duration of intralogistics movements. A slot is a bin location and slotting is the strategy for optimizing intralogistics processes with the objective of finding the optimal bin location for each item in the warehouse. As part of digitalization, warehouse management systems are a software solution that have made an error-free bin strategy possible. But only combined with the right slotting strategy will exploit the full potential of your warehouse.

In this white paper, you will discover the parameters to take into account when setting optimum and ergonomically beneficial bin locations and the criteria you can use to avoid inefficient logistics processes. We set out how to prepare for multi-order picking most effectively by setting optimum bin locations and also show you how to generate long-term benefits by continuously optimizing bin location assignment with slotting.

Then, by applying a slotting strategy, you can not only reduce your storage costs, but also increase throughput and service levels, ultimately ensuring customer satisfaction.

I hope you will find this interesting reading.

Sincerely,

Marcel Wilhelms
General Manager of EPG CONSULTING

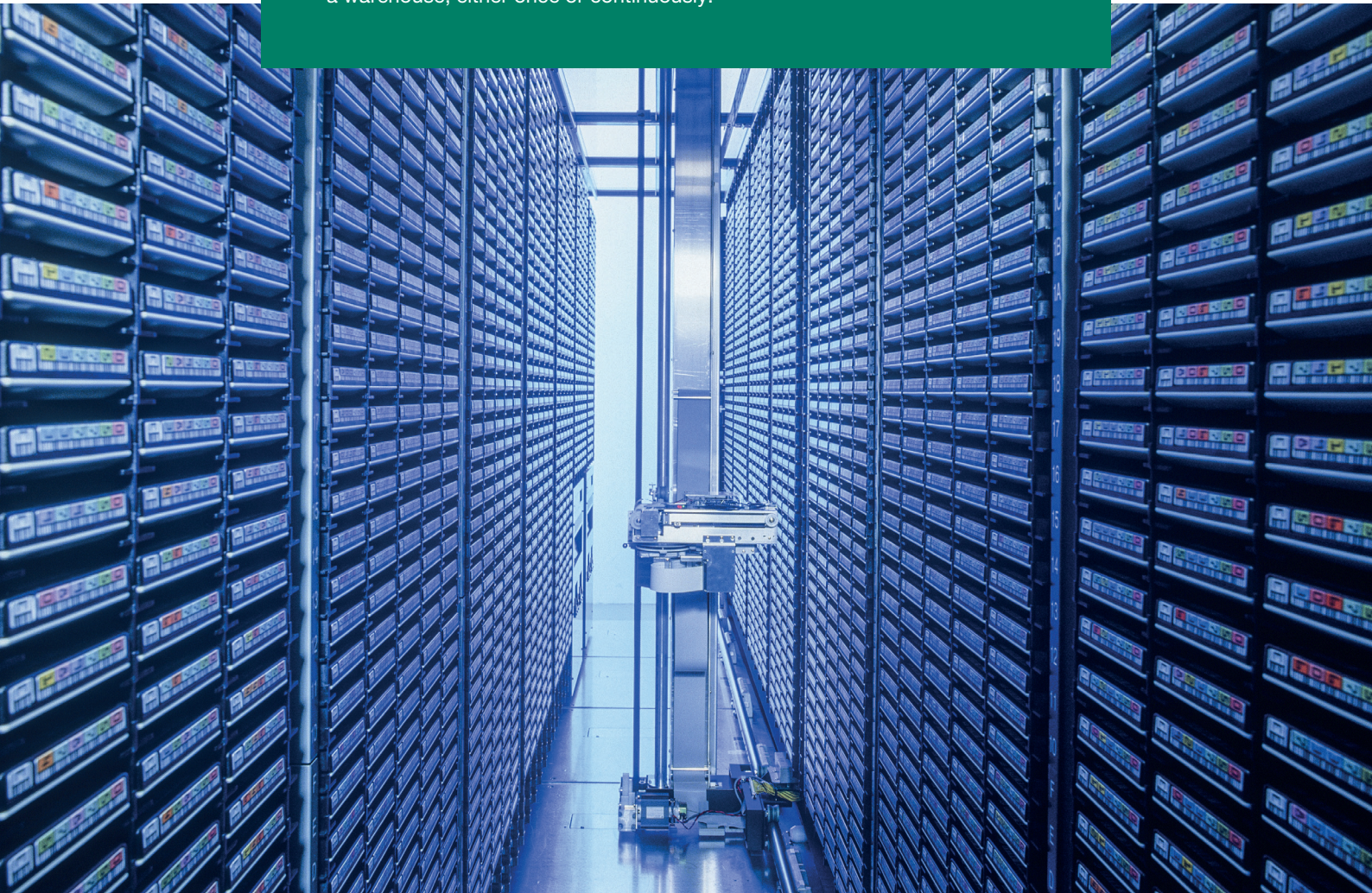


WHAT DOES SLOTTING MEAN?

A slot, for the purposes of logistics, means a storage space or bin location. Slotting therefore means assignment to bin locations. However, the meaning of the term slotting goes further and combines all aspects of intralogistics to mean smart and optimum assignment of bin locations according to previously defined goals and restrictions. For example, slotting includes information on the turnover rate and the morphology of items and information on existing processes.

The term slotting therefore ultimately refers to a strategy for optimizing intralogistics processes. It focuses on everything from investigating and optimizing specific subareas of a warehouse through to an entire warehouse and from looking at single items or groups of items through to looking at all items.

Overall, the goal of slotting is to find the optimum bin location for each item in a warehouse, either once or continuously.



WHY IS SLOTTING USED?

The increasing relevance of slotting is due to the rising demands placed on intralogistics processes and other factors. One example are typically short to very short delivery times (such as 24-hour delivery) while maintaining or increasing the level of service. To meet today's and tomorrow's requirements, all intralogistics processes have to mesh as effectively as possible with optimum design.

Slotting is part of the solution, as the strategy assigns the optimum bin locations so that picking is as quick and efficient as possible, because slotting, either once or continuously, reduces picking times to the minimum in both automatic and manual storage systems. This is achieved, for example, by storing items that need to be picked frequently in the most accessible bin locations. Items that regularly need to be picked together are also stored close together.

Slotting therefore contributes significantly to prompt order fulfillment and increased throughput thanks to the reduction in picking times. Slotting also maximizes utilization of available storage space, as available bin locations are used most effectively.

"To meet today's and tomorrow's requirements, all intralogistics processes have to mesh as effectively as possible with optimum design."



It is essential that the dataset is first checked to ensure it is plausible and complete, as this has a significant impact on the results of slotting.

The current situation is then analyzed. The flow of goods from goods incoming through the warehouse to goods outgoing is determined from the data (actual quantity structure). This includes determining the turnover rate of items using ABC analysis and items correlations using shopping cart analysis. Seasonal trends are also analyzed, as a further example. Once all the data for the current situation is available, it is applied to the available warehouse layout by converting the warehouse layout to a digital data model. The current situation is then assessed on the basis of various key figures, such as the average picking distance or picking time. A graphical version of the current situation is also prepared to provide an overview.



The key figures for the current situation are used to identify the potential for optimization and various optimization algorithms are applied. The aim is to identify the optimum target bin locations for the items. Simulations are then carried out to assess the target situation.

The current situation and the target situation are then compared. This comparison is used to identify the extent to which the target situation represents an improvement on the current situation. If the target situation results in optimization, the bin location optimization is implemented. However, if the key figures for the target situation do not outweigh those of the current situation at this point, it is highly recommended to update the dataset after a period of up to 6 months and carry out the assessment of the current situation and determine and assess the target situation again. This approach is also advisable to ensure the solution continues to be effective, even after bin location optimization has been implemented.

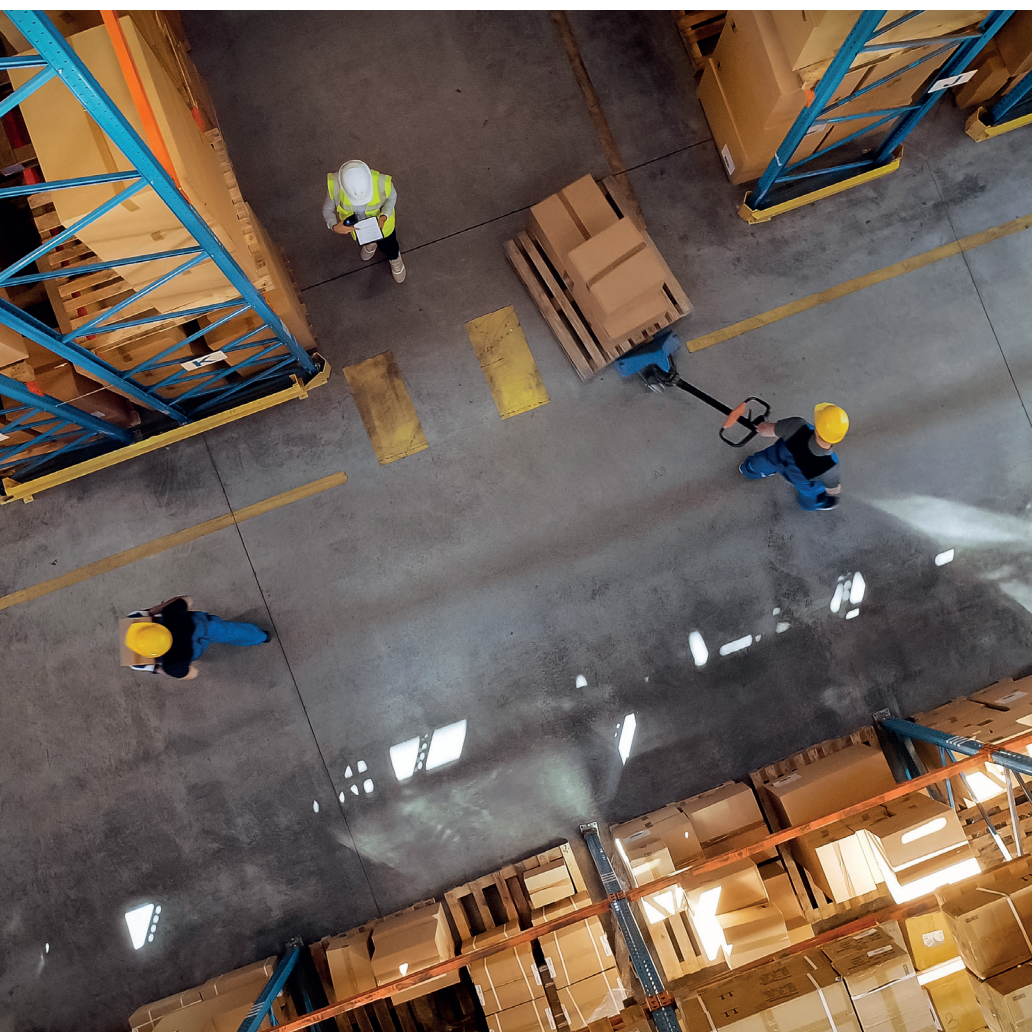
There are various approaches for practical implementation of bin location optimization. If a warehouse management system is used, feeding the slotting results into and integrating them with the warehouse management system is always recommended, so that slotting can be used continuously and permanently effectively.

A resource-efficient but time-consuming approach is to apply slotting results in combination with running regular replenishment movements. An item is only transferred in this case when the optimum bin location is available as a result of normal consumption. The replenishment movement to another bin location is done for the item previously stored at this bin location. This can be both the optimum bin location and a temporary bin location if the optimum bin location is not available at that time. A positive with this approach is that daily warehouse operations can continue almost unimpeded and no additional human resources are required. However, the positive effects of slotting are delayed as the process is time-consuming.



Immediate relocation of almost all items according to their optimal storage locations is a resource-intensive approach, but can be implemented quickly. This involves relocating all items according to their optimum bin locations within the shortest possible time following regular operations or on weekends. The advantage in this case is that the positive effects of slotting are immediately apparent. However, this method requires additional cost in terms of human and therefore financial resources.

A variation on this approach is to focus initially on items and storage areas that are expected to have the greatest impact. This means that not all items are relocated in the shortest possible time, but the relocation process is carried out over a longer period, focusing initially only on the items and storage areas with the greatest potential. Slotting results should be implemented continuously, not one-time, to ensure the solution continues to be effective. This involves updating the database at regular intervals (e.g., weekly, monthly or quarterly) and repeating the slotting process from analysis of the current situation.



PRACTICAL EXAMPLE 1



BRIEF

This practical example is a proof of concept for optimization of bin location assignment for manual person-to-goods picking based on an observation period of 16 months.

OBJECTIVE

The objective is to optimize picking routes and times and to determine the resulting potential for new bin location assignment.



RESULT

Figure 2 compares the current and target situation of the warehouse on a heat map. This shows the workload of the individual bin locations in color based on the number of picking items. The color gradient is from white (low number of picking positions) to red (large number of picking positions).

The current situation has clear potential for optimization, as picking is mostly done in the left part of the warehouse. One bin location in particular is subject to considerable additional workload (see area highlighted in box on top left in Figure 2).

Once slotting has been completed, most of the picking is done in the front area of the warehouse. This reduces the picking time and distributes the picking workload over the entire front length of the warehouse,

reducing the picking distance or picking time by 15%.

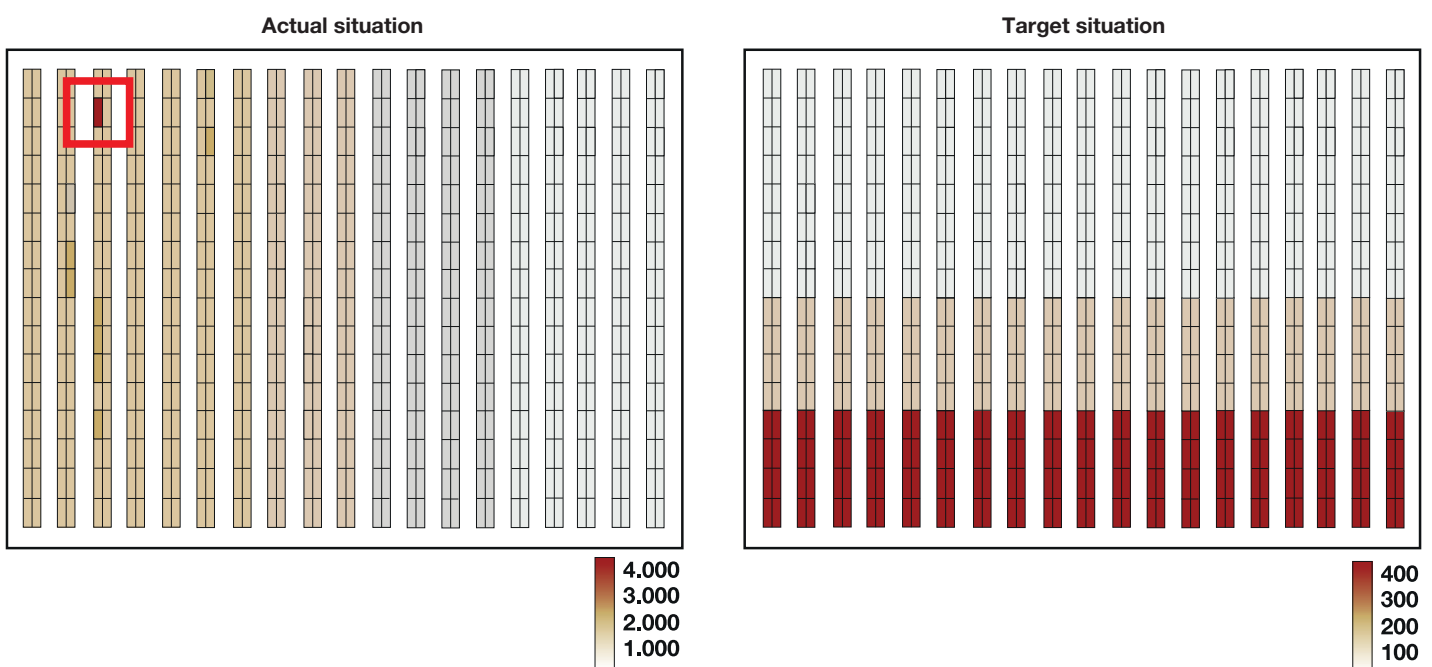


Figure 2: Target/actual comparison and result of slotting for practical example 1

PRACTICAL EXAMPLE 2



BRIEF

This practical example involves analyzing the warehouse process and potential for holistic optimization of the warehouse logistics based on an observation period of 12 months.

OBJECTIVE

The objective is holistic improvement of internal logistics by optimizing picking routes and bin location assignment.



RESULT

Figure 3 shows the target/actual comparison of the warehouse for practical example 2. This shows both the picking workload of the individual areas of the warehouse on a heat map and the main route of the picking paths in the warehouse layout. The color gradient of the heatmap is from white (low number of picking positions) to red (large number of picking positions).

The current situation shows that the storage area at the top right in particular has a very heavy picking workload (SEE AREA HIGHLIGHTED IN BOX IN FIGURE 3). In addition, the current picking paths in the warehouse are not optimal.

Slotting has the effect of reducing workload on the overloaded part of the warehouse and shortening the average picking distance. Overall, slotting delivers a 20% reduction in the picking distance or picking time.

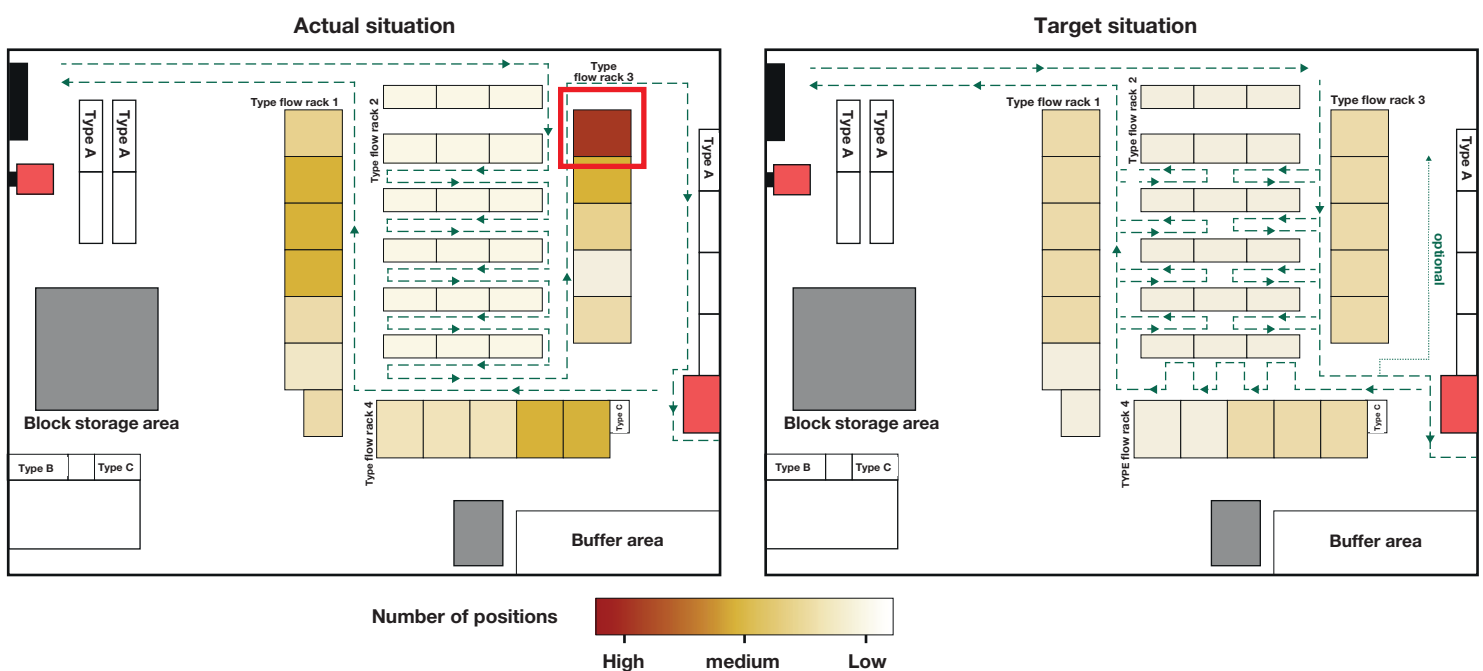


Figure 3: Target/actual comparison and result of slotting for practical example 2

BENEFITS OF SLOTTING

Slotting includes a range of item analyses, providing a clear picture of the item structure in the warehouse. The findings from item analysis also help to ensure that the items are assigned to the optimum and also ergonomically beneficial bin locations, e.g., according to weight or turnover rate. This reduces the risk of injury. Stock is also compacted as the stock level can be adjusted to the turnover rate and other item characteristics, also contributing to optimizing replenishment movements. Assigning optimum bin locations is also the best possible preparation for multi-order picking, i.e., the combination of several orders for the picking process.

Continuously optimizing bin location assignment means that slotting remains effective. The continuous process ensures that all the benefits from one-time slotting are exploited long-term. It is also important to note that the effort required to relocate stock decreases over time, as the majority of the items have already been assigned to the optimum bin locations. Integrating slotting into an existing warehouse management system also makes continuous and automatic monitoring of the bin location optimization process possible.

Identifying and eliminating storage areas with a workload that is too high or too low makes it possible to use all your storage space optimally. Improved bin location assignment also reduces picking routes and times by an average of 10% to 20% and prevents congestion during picking.

Overall, slotting delivers optimum utilization of storage space and a reduction in intralogistics storage costs, while also increasing throughput and productivity within the warehouse. Maintaining or increasing the level of service improves customer satisfaction too.



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